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The influence of stage of pregnancy on digestion characteristics in beef cows

Abstract

Feed intake during the final trimester of gestation did not appear to vary significantly until 2 weeks before calving, after which it decreased dramatically. Measurements during two periods in the final trimester suggested that passage rate increased and digestibility decreased, as pregnancy proceeded.

Keywords

Kansas Agricultural Experiment Station contribution; no. 88-363-S; Cattlemen's Day, 1988; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 539; Beef; Pregnancy; Digestion; Feed intake

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The Influence of Stage of Pregnancy on Digestion Characteristics in Beef Cows¹

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Dave Harmon, and Tom Avery²

Summary

Feed intake during the final trimester of gestation did not appear to vary significantly until 2 weeks before calving, after which it decreased dramatically. Measurements during two periods in the final trimester suggested that passage rate increased and digestibility decreased, as pregnancy proceeded.

Introduction

The variation in voluntary intake by range cows can be attributed, in part, to alterations in the physiological status of the animal. While studies indicate that voluntary intake varies significantly between pregnant and lactating animals, little work has specifically concentrated on changes that occur during pregnancy. Similarly, limited information is available regarding changes in fill and passage rates with stage of pregnancy. These changes must be identified in order to efficiently manage the pregnant cow herd for optimum animal performance.

Experimental Procedure

Four ruminally cannulated Hereford x Angus cows were synchronized and hand mated to the same Angus bull. All cows were bred within a 2-week period. Three months prior to calving, the cows were moved to individual (10' x 10') pens with climate control (average daily temperature 78 F). Alfalfa cubes were offered once daily in the morning at 115% of the previous 3 day's intake. Refused feed was weighed and subsampled for future analysis.

During two periods in the final trimester (June 14-21 and July 3-10; approximately 6 and 3 weeks before average calving day, respectively), cows were further confined (4' x 10') for two 7-day digestion trials. On day 8 after each digestion trial, ruminal fill was determined immediately before feeding by emptying the rumen, then weighing and subsampling the contents. Samples were analyzed for alkaline peroxide lignin in order to describe fill and passage relative to an indigestible portion of the diet. After evacuation, the cows' reticulorumens were filled with water to determine reticuloruminal capacity.

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Results and Discussion

Although day-to-day fluctuations in individual animal intakes were observed, average intake appeared to remain relatively constant throughout most of the final trimester of gestation. However, approximately 2 weeks prior to calving, intake decreased dramatically, with the lowest point typically occurring the day before calving (Figure 4.1). Similarly, ruminal dry matter fill, alkaline peroxide lignin fill, and reticuloruminal capacity (Table 4.1) did not differ over the course of the two trials. Although daily observations of these characteristics are not available during the final 2 weeks before calving, it seems likely that both fill and capacity were altered during this period, thus, contributing to the dramatic decline in intake.

Although intake, fill, and capacity appeared to remain constant during the two measurement periods, dry matter digestibility decreased ($P < .05$) and rate of passage increased ($P < .05$). Because rate of passage and digestibility are competing forces, the decline in digestibility seems to be explained by the increased passage rate. It appears that the cows were able to partially address their increasing nutrient requirements during late pregnancy by increasing overall throughput of digesta. However, as their fetuses continued to grow and change position in preparation for parturition, ability to compensate appeared to be exceeded, thus, prompting the subsequent decline in intake.

Table 4.1. Influence of Stage of Pregnancy on Dry Matter Intake, Digestibility, Fill, Passage, and Capacity

Item	weeks before calving		SE ^a
	T1	T2	
Dry matter intake (lb/day)	23.1	22.1	1.80
Dry matter digestibility (%) ^b	50.4	42.0	.97
Rumen dry matter fill (lbs)	17.3	16.4	.84
Alkaline peroxide lignin fill (lbs)	2.3	2.0	.16
Alkaline peroxide lignin passage (%/hr) ^b	2.9	3.8	.32
Reticulo-ruminal capacity (liters)	120.7	125.0	.64

^aSE = standard error, (n=4).

^bRow means with different superscripts differ ($P < .05$).

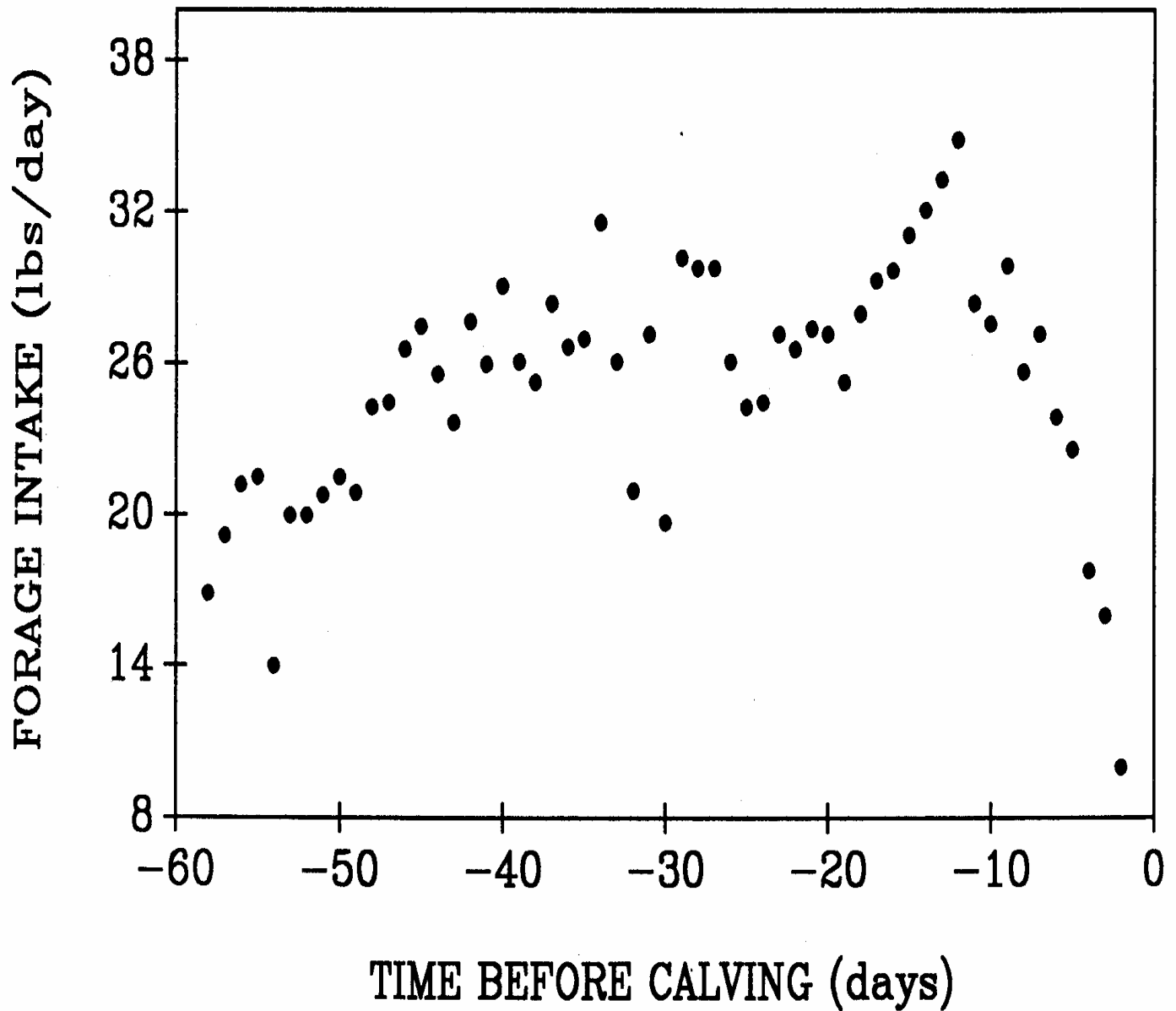


Figure 4.1. Influence of Stage of Pregnancy on Forage Dry Matter Intake