

# INTAKE AND DIGESTIBILITY OF LOW QUALITY NATIVE GRASS HAY BY BEEF COWS FED INCREASING QUANTITIES OF CORN GRAIN

C.C. Chase, Jr.<sup>1</sup> and C.A. Hibberd<sup>2</sup>

## Story in Brief

Supplements providing 0, 2, 4 or 6 lb ground corn/d were fed to sixteen beef cattle (12 Hereford cows, 4 mature ruminally cannulated heifers) maintained on native grass hay (4.2 percent CP) to determine the effect of corn feeding on utilization of low quality forage. Corn supplementation decreased hay intake, especially when 4 or 6 lb corn was fed. Feeding 4 or 6 lb corn/d decreased ( $P < .05$ ) hay digestibility from 33.7 percent (no corn) to 23.2 percent (6 lb corn/d). Digestible dry matter intake (DDMI) was unaffected ( $P < .05$ ) when 0, 4 or 6 lb corn was fed although 2 lb corn/d increased ( $P < .05$ ) DDMI compared to 4 or 6 lb corn/d. Feeding grain-based supplements that provide more than 2 lb grain/d appears to decrease forage intake and seriously hinder forage utilization.

## Introduction

Beef cows wintered on native range are commonly supplemented with small quantities (1-2 lb) of a high protein cube (40 percent). Under some circumstances such as inadequate forage supply or high nutrient requirements (cold weather), feeding larger quantities of a high energy, low protein cube may be justified. Previous research suggests that feeding high energy supplements composed of high starch cereal grains such as corn may decrease forage utilization. Starchy supplements appear to decrease forage digestibility which may result in decreased forage intake. Little research, however, indicates the amount of corn that can be fed or the extent to which forage intake and digestibility are depressed. Thus, the objective of this experiment was to determine the effect of feeding increasing quantities of supplemental corn on digestibility and intake of low quality native grass hay by beef cows.

## Materials and Methods

Twelve Hereford cows (873 lb) and four ruminally cannulated Hereford x Angus heifers (724 lb) were blocked by weight into four groups and utilized in four simultaneous 4 x 4 Latin squares. Four iso-nitrogenous supplements providing 0, 2, 4 or 6 lb of ground corn were fed daily (table 1). These supplements supplied from .1 (0 lb corn/d) to 4.2 lb (6 lb corn/d) starch/d. Native grass hay (4.2 percent CP, 52.6 percent ADF) harvested in mid-November was coarsely chopped through a 2 in screen and offered free choice daily to all animals.

---

<sup>1</sup>Graduate Assistant <sup>2</sup>Assistant Professor, Animal Science

Table 1. Supplement intake and nutrient supply (DM basis).

	Corn			
	0	2	4	6
Daily intake, lb				
Corn, ground	0	1.9	3.8	5.8
Cottonseed meal	1.3	.9	.4	0
Mineral premix <sup>a</sup>	.3	.3	.3	.3
Total	1.6	3.1	4.5	6.1
Nutrient supply, lb/d				
Crude protein	.57	.60	.60	.54
Starch	.1	1.3	2.6	4.2
TDN <sup>b</sup>	1.0	2.4	3.7	5.2

<sup>a</sup>Mineral premix contained 63.4% dicalcium phosphate, 15.1% potassium chloride, 20.9% trace mineralized salt and .6% Vitamin A (20,000 IU/d).

<sup>b</sup>Estimated.

After 10 days of adaptation in each period, fecal samples were collected twice daily (0800 and 2000 h) on days 11 through 14. Supplement and native grass hay, offered and refused, were weighed and sampled daily. All samples were composited by animal, dried and ground through a 1 mm screen prior to analysis. Acid-insoluble ash was used as an indigestible marker to determine dry matter (DM) and acid detergent fiber (ADF) digestibility. Hay digestibility was estimated by difference assuming a supplement digestibility of 80 percent. The data were subjected to least squares analysis and differences between means detected with Tukey's HSD test.

### Results and Discussion

Feeding 0 or 2 lb of corn/d had no significant effect on hay intake (table 2, figure 1). When corn supplementation was increased to 4 or 6 lb, hay intake decreased ( $P < .05$ ) by 5.1 and 8.1 lb, respectively, when compared to no corn. Feeding 6 lb corn/d decreased hay intake from 2.3 (no corn) to 1.3 percent of body weight. Similarly, hay digestibility was not different ( $P > .05$ ) when 0 or 2 lb of corn were fed. Consumption of 4 or 6 lb of corn/d decreased ( $P < .05$ ) hay digestibility by as much as 31 percent. Acid detergent fiber digestibilities mimicked estimated hay digestibility. Much of the decrease in hay intake observed with grain feeding is probably due to the observed depression in fiber digestion.

Apparent dry matter digestibility (DMD) increased as corn intake increased, a reflection of the high digestibility of corn grain. Greater increases in DMD might be expected when feeding corn; however, the depression in hay digestibility negated some of the beneficial effects of corn feeding. Digestible dry matter intake [DDMI = (hay + supplement) x DMD] was similar for 0, 4 or 6 lb of corn/d (figure 1). Feeding 2 lb of corn increased ( $P < .05$ ) DDMI when compared to higher quantities of corn. Although DDMI is a very crude estimator of energy intake, the energy status of cows fed 4 or 6 lb corn/d was probably little, if any, better than cows receiving 2 lb corn/d. This observation emphasizes the importance of forage digestibility as a major contributor to the energy intake of grazing cattle.



Table 2. Daily intake and digestibility of hay and supplements.

Item	Corn lbs/day				SE
	0	2	4	6	
Hay intake, lb	19.2 <sup>a</sup>	18.0 <sup>a</sup>	14.1 <sup>b</sup>	11.1 <sup>c</sup>	.62
Hay intake, % body wt	2.3	2.2	1.7	1.3	---
Hay digestibility, %	33.7 <sup>a</sup>	33.5 <sup>a</sup>	24.6 <sup>b</sup>	23.2 <sup>b</sup>	1.41
Acid detergent fiber digestibility, %	33.6 <sup>a</sup>	33.2 <sup>a</sup>	27.2 <sup>b</sup>	25.9 <sup>b</sup>	1.18
Dry matter intake, lb	20.8 <sup>ab</sup>	21.1 <sup>a</sup>	18.6 <sup>bc</sup>	17.2 <sup>bc</sup>	.62
Apparent dry matter digestibility, %	37.4 <sup>b</sup>	40.8 <sup>ab</sup>	39.3 <sup>b</sup>	44.2 <sup>a</sup>	1.08
Digestible dry matter intake, lb	7.7 <sup>ab</sup>	8.6 <sup>a</sup>	7.3 <sup>b</sup>	7.5 <sup>b</sup>	.26

abc Means with different superscripts differ ( $P < .05$ ).

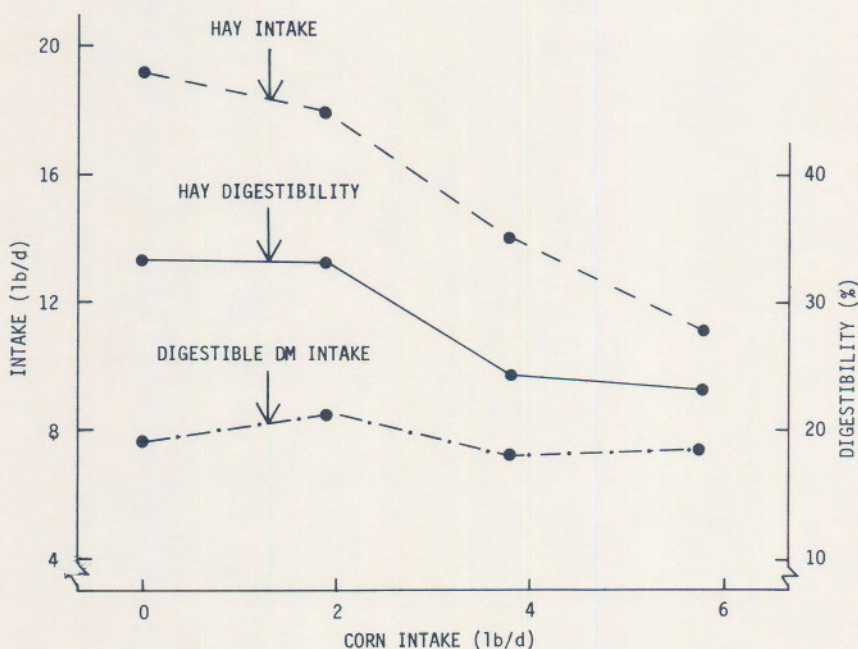


Figure 1. Hay intake (---), digestibility (—) and digestible dry matter intake (-·-·-) of beef cows fed increasing quantities of corn.

This study suggests that feeding more than 2 lb corn/d will dramatically depress digestibility (31 percent decrease) and intake (39 percent decrease) of low quality native grass hay. Although minor depressions were noted ( $P>.05$ ), feeding 2 lb corn/d had little effect on hay utilization. Consequently, feeding large quantities of corn-based supplements in an attempt to enhance the energy status of beef cows grazing native range may not be successful. Because forage intake was depressed, feeding high grain supplements provides a management tool to spare available forage. The utilization of consumed forage under these circumstances, however, was very inefficient (23.2 percent hay digestibility). Alternate high energy, low starch supplements may allow better forage utilization when forage supplies are low or cattle requirements are high.

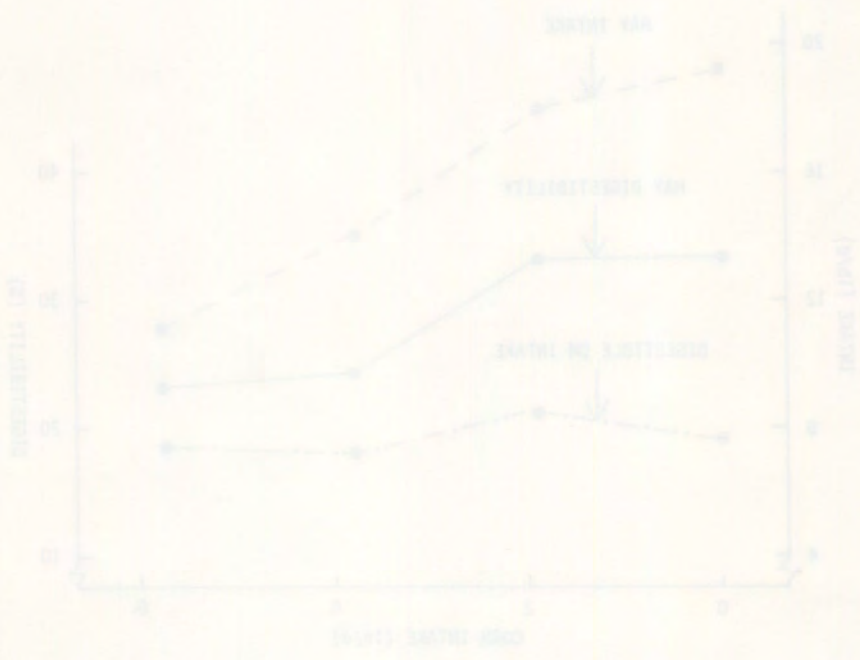


Figure 1. Hay intake (—), digestibility (---), and utilization (· · ·) of low quality native grass hay by beef cows as the quantity of corn (— · —) fed increased.