

# FORAGE AVAILABILITY AFFECTS WHEAT FORAGE INTAKE BY STOCKER CATTLE<sup>1</sup>

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## Story in Brief

Forage intake was estimated while beef steers grazed paddocks with varied levels of standing wheat forage. Standing crop of forage varied from 600 to 2361 lb dry matter/acre. Herbage allowance varied from 5.5 to 64.2 lb/100 lb body weight/day for the seven-day trial periods. Forage intake, in vitro forage digestibility, and estimated average daily gain responded in quadratic manner to herbage allowance. Forage intake response was primarily a function of forage digestibility. Our observations suggest that as herbage allowance falls below 20 lb/100 lb body weight/day, average daily gains will begin to decline severely as a result of depressed energy intake.

(Key Words: Cattle, Grazing, Intake, Forage Availability.)

## Introduction

A frequent problem encountered by stocker cattle grazing wheat pasture is a lack of forage in the winter. However, little is known about the impact of forage availability on daily nutrient intake. A better understanding of the impact of limited forage availability on forage intake would aid in developing supplemental feeding programs to economically maintain a desirable level of gain. The objective of this study was to develop relationships among wheat forage availability and daily intake of nutrients by stocker cattle.

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## Materials and Methods

In early February, 1991, and late January, 1992, a 14.5 acre wheat pasture (Chisholm variety) was subdivided into eight 1 acre paddocks, a 2 acre paddock and a 4.4 acre paddock. The entire area had been grazed as one unit prior to subdivision. After subdivision, each unit was grazed further to reduce the amount of forage and provide an array of standing crops. The two larger paddocks allowed for observations at forage standing crops (lb dry matter/acre) similar to the smaller paddocks but with herbage allowances (lb forage dry matter/100 lb body weight/day) in excess of the allowances on the smaller paddocks. Forage standing crop in each paddock was determined by clipping forage to ground level in frames (.5 m<sup>2</sup>) at ten locations along paced transects.

Thirty beef steers, which averaged 690 lb/head in 1991 and 589 lb/head in 1992, were randomly allocated by weight into 10 groups of three head. Each group was then randomly assigned to a paddock. All steers had been grazing on this area prior to the trial. The steers grazed the trial paddocks for a total of 7 days.

Forage intake was determined from estimates of fecal output and in vitro diet disappearance. Fecal output was estimated using chromic oxide. Fecal samples were collected twice daily from each steer on the final four days of each trial. Diet samples were collected from each paddock twice during final four days of each trial. Esophageally fistulated steers that were grazing an adjacent wheat pasture were used for sampling. Estimated daily gain was calculated from intake data and net energy values derived from the in vitro disappearance data.

Regression analyses were conducted using paddocks as the experimental units. Models contained herbage allowance (lb DM/100 lb BW/day) as the independent variable.

## Results and Discussion

The relationship between in vitro disappearance of the diets and herbage allowance (HBALL) is shown in figure 1 ( $r^2 = .67$ ). The regression equation for diet digestibility was  $\% \text{ DIGESTIBILITY} = 64.0719 + .7329(\text{HBALL}) - .0093(\text{HBALL}^2)$ . This indicates that steers grazing at the higher herbage allowances (lb forage/100 lb BW/day) either grazed more selectively, or that quality of the available forage declined as standing crop was reduced. The distribution of points in figure 1 suggests that digestibility declined most severely at herbage allowances below 15 lb/100 lb body weight/day. Based on standing crop data (lb forage/acre;  $r^2 = .67$ ),

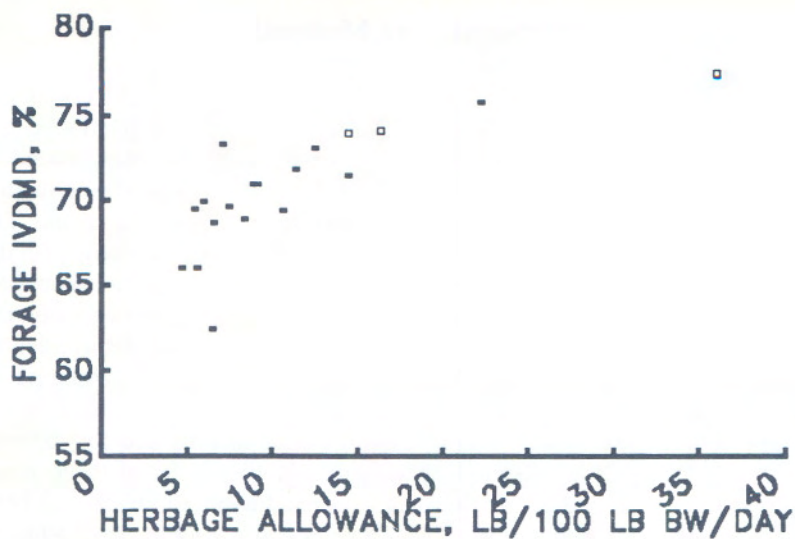


Figure 1. The relationship between herbage allowance and the digestibility of forage consumed by steers grazing wheat pasture.

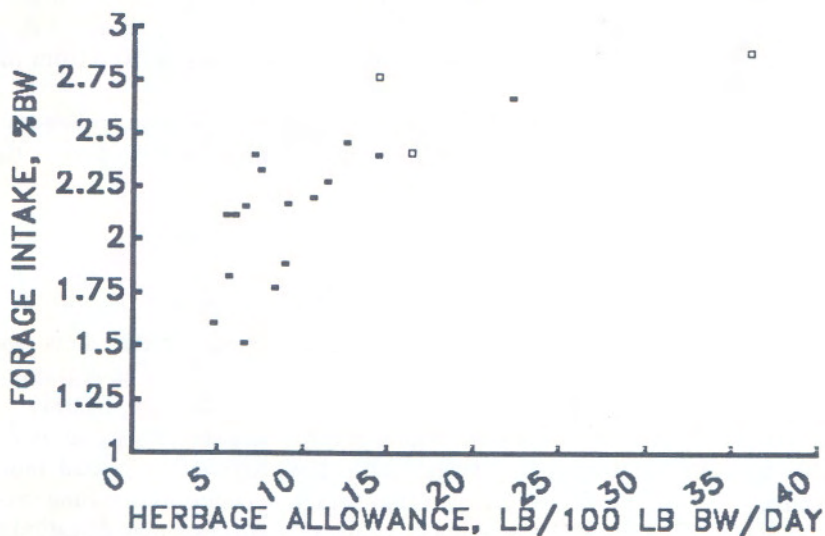


Figure 2. The relationship between herbage allowance and the daily forage intake by steers grazing wheat pasture.

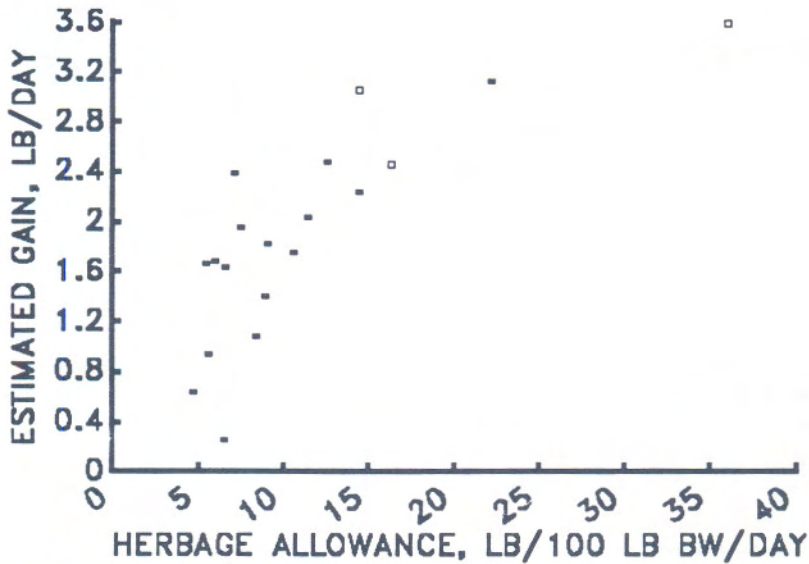


Figure 3. The relationship between herbage allowance and estimated daily weight gain by steers grazing wheat pasture.

digestibility declined more rapidly as standing crop was reduced below 800-1000 lb/acre.

The relationship between herbage allowance and forage intake (% body weight) is presented in figure 2. The regression equation for forage intake was  $\text{INTAKE, \%BW} = 1.5179 + .0775(\text{HBALL}) - .0011(\text{HBALL}^2)$  ( $r^2 = .63$ ). Once again, the distribution of points in figure 2 indicates that forage intake declined more severely as herbage allowance decreased below 15-20 lb/100 lb body weight/day.

The variable of economic importance is weight gain. Gain could not be measured directly in our trials but the forage intake and digestibility data can be used to estimate daily gain based on energy intake. The impact of herbage allowance on estimated daily gain is illustrated in figure 3. Estimated gain ranged from less than .5 lb/day at the low allowances to over 3.5 lb/day at the higher allowance. As noted with the digestibility and intake data, the relationship is curvilinear ( $\text{ESTIMATED GAIN, LB/DAY} = .2100(\text{HBALL}) - .0028(\text{HBALL}^2)$ ;  $r^2 = .75$ ) with gain declining rapidly at herbage allowances below 15-20 lb/100 lb body weight/day.

Based on these results, energy intake and weight gains will be depressed at herbage allowances less than 15 - 20 lb/100 lb BW/day. In these trials, this breakpoint corresponded to 1000-1200 lb forage/acre. The depression in intake is associated with a shortage of forage which results in reduced consumption of forage of lower digestibility. The threshold observed in this study can be utilized to plan supplementation programs for cattle grazing wheat pasture.