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Effect of Stocking Rate and Supplements on Performance of Steers Grazing Wheat Pasture

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Summary

Supplements of small amounts of cottonseed hulls or cottonseed hulls and corn fed to stocker steers grazing wheat pastures at four stocking rates did not improve rates of gain when forage supply was not limiting. In this experiment, early season gains were unusually high in control cattle (> 3 lb daily), greatly limiting the potential benefit from supplements. Supplements did improve average daily gains during periods when forage was limiting on the pastures with higher stocking rates.

Introduction

The digestibility of small-grains during the first half of the grazing season is high enough to support body weight gains greater than 3 lb/day in stocker cattle. Yet such rates of gain are rarely experienced. Aside from disease and parasite problems, major potential causes for reduced performance are (1) excessive stocking rate, (2) acute acidosis from gorging at turnout and/or chronic acidosis caused by rapid fermentation and low fiber intake, (3) low efficiency of protein utilization, and (4) severe mineral imbalance leading to persistent diarrhea and reduced forage utilization. This experiment was conducted to determine the effects of supplements to increase fiber and/or energy content of diets of stocker steers grazing wheat pastures at four stocking rates.

Keywords: grazing / cattle / stocking rate / supplement / wheat.

Procedure

Four irrigated wheat pastures (6, 9, 12, and 15 A) were each stocked with nine no. 2 Mexican steers (416 lb) on November 12, 1991. Before turnout, all steers were on a ration of 8 lb of chopped alfalfa hay and 2 lb of cottonseed hulls (CSH) for 18 days while being trained to operate Calan automatic gate feeders. During this preliminary period, each animal was vaccinated for prevention of common diseases, treated for internal parasites, and implanted with a growth promoter. Alfalfa and grass hay were fed free-choice for 4 hours just before the steers were taken to pasture. Three steers in each pasture were individually fed 0.33 lb of CSH per 100 lb body weight daily, three others were fed 0.33 lb CSH and 0.25 lb corn per 100 lb body weight, and the remaining three served as controls. All nine steers were group-fed a mineral/salt mixture at the rate of 2.25 lb every other day.

Beginning weights were taken after an overnight fast 13 days after turnout. Additional fasted weights were taken at 28-day intervals thereafter through May 11. Herbage mass was estimated, also at about 28-day intervals, by weighing the dried forage from 25 small plots (2.7 ft^2) clipped at ground level from randomly selected sites in each pasture. A rapid-drying procedure (<1.5 hour) was used to reduce chemical changes. Dried forage was ground and retained for organic matter, protein, and fiber analyses.

Results and Discussion

The progression of average body weights during the experiment is shown in Figure 1 for each stocking rate. Considering the entire grazing season, the stocking rate groups did not differ significantly ($P > 0.1$) in body weight gains. Average daily gain (ADG) during the first 28 days on test exceeded 3 lb for all stocking rates and all supplement treatments across stocking rates. During this time, the supplements provided no advantage in ADG. However, as forage was being grazed down to very low levels on the 6- and 9-A pastures in late December and January (Fig. 2), the CSH + corn supplement provided significant improvement ($P < 0.05$) in ADG over animals fed no supplement (Fig. 3). Comparison of the trends in ADG and herbage mass (Figs. 2 and 3), both within and across pastures, reveals the profound effect of herbage mass on animal performance. Frequent heavy rains in January and early February may have decreased gains by cattle on all stocking rates during that period. Because herbage mass declined rapidly, the steers on the 6-A pasture were allowed access to an additional 9.3 A on January 10. They were again restricted to the original 6-A pasture on March 16.

When forage growth rate and, consequently, herbage mass increased after mid-February, steers grazing the 6- and 9-A pastures responded with increased gains, particularly those on the augmented 6-A pasture that were fed CSH or no supplement. Protein and fiber values (Figs. 4, 5, and 6) indicate that forage quality was not a factor in the low gains in January and February. Hand-plucked forage samples taken at the beginning of the trial to simulate steer-selected plant parts had 5 percentage units higher protein and 5 units lower acid detergent fiber than whole-plant material. Forage quality declined rapidly in April and appeared to be a factor in reduced rates of gain during the last month of grazing.

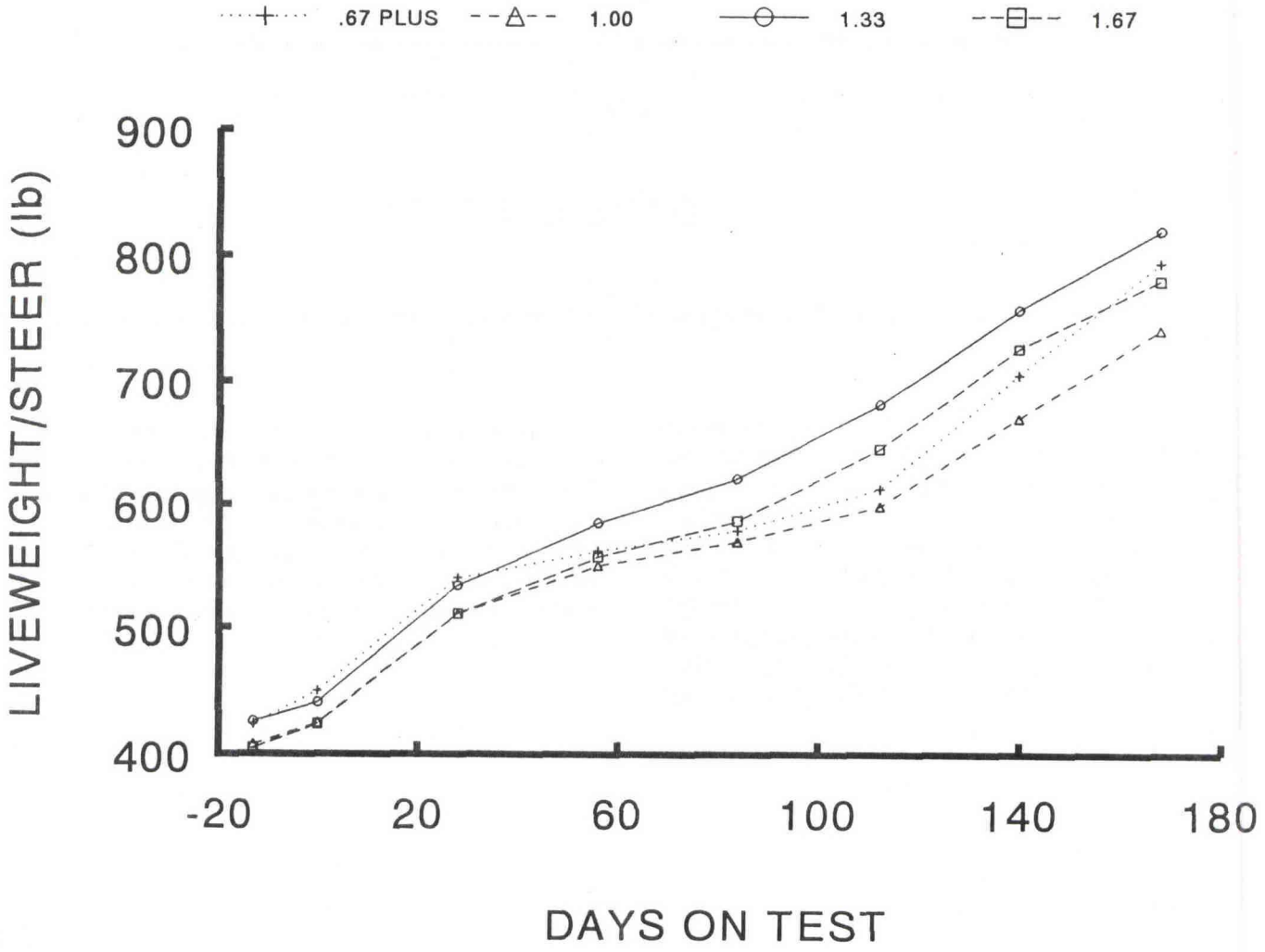

Figure 1. Fasted body weights of steers grazing wheat pasture at four stocking rates, expressed as acres/steer.

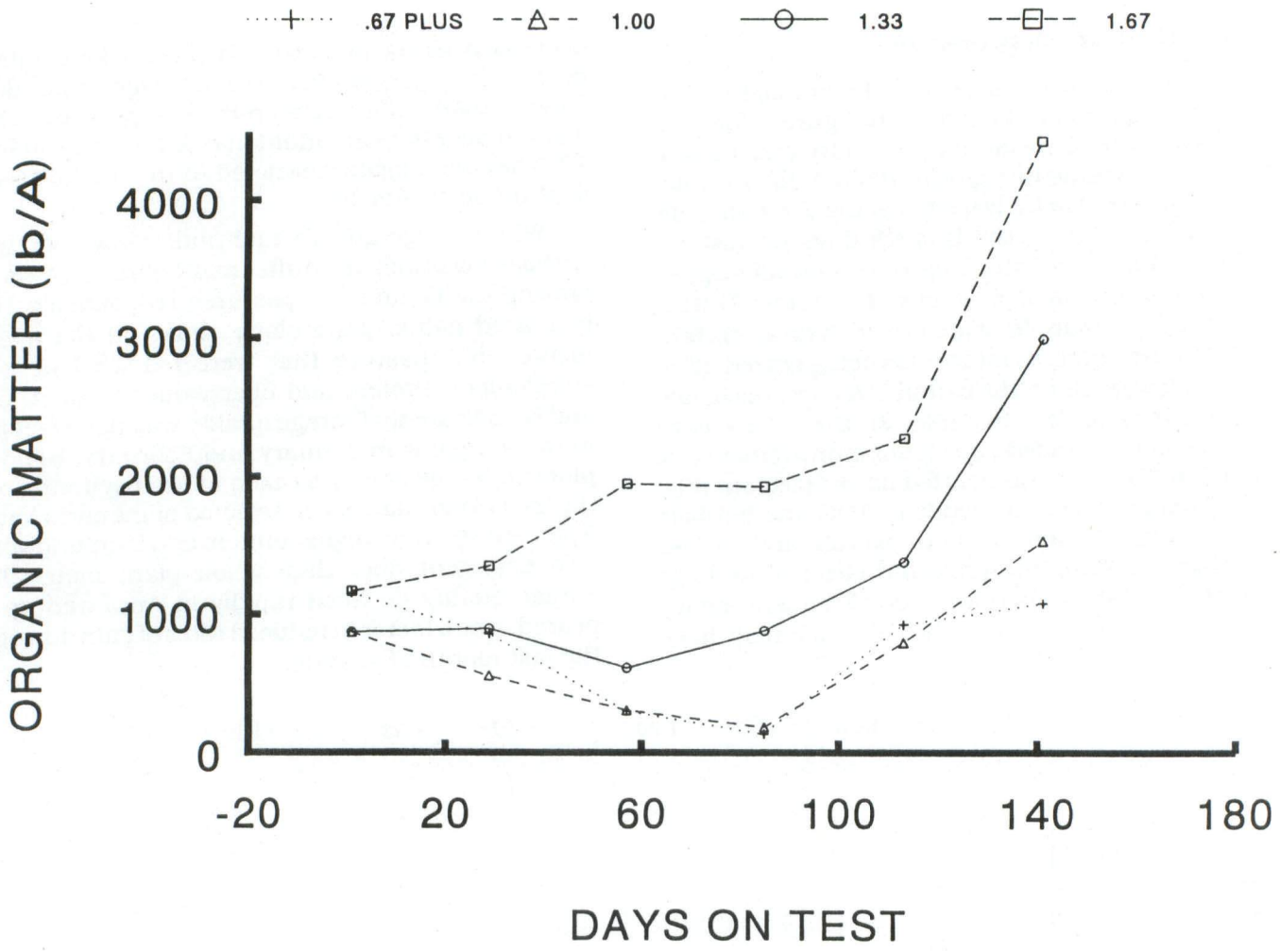

Figure 2. Organic matter of wheat forage clipped at ground level from pastures grazed at four stocking rates, expressed as acres/steer.

The high rates of gain when herbage mass was not limiting may have been predicated by pretrial diet and feeding management. The steers rapidly consumed their morning and evening allotments of chopped alfalfa hay, creating ruminal fermentation conditions that may have generated low levels of lactic acid and, more importantly, allowed development of a population of microorganisms that metabolized lactic acid. This aspect of cattle performance on small-grains pastures should be studied further.

Although bloat incidence was severe (Fig. 7), our capability to treat individual animals with medicated supplements prevented death losses. The bloat incidence data suggest an interaction between herbage mass and supplements. The contrasting patterns of bloat incidence between the 6-A and 15-A groups of cattle are noteworthy.

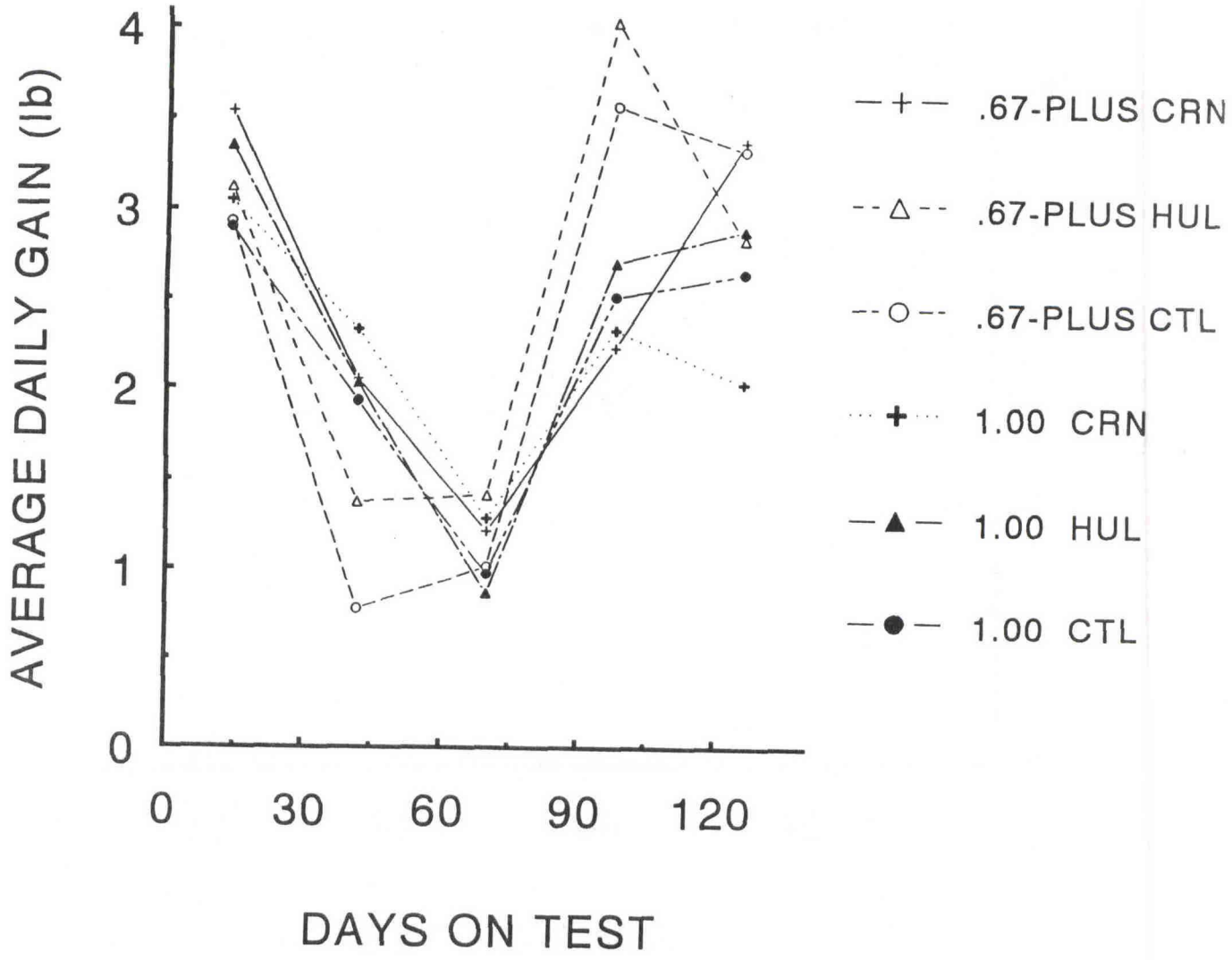

Figure 3. Average daily gain by steers supplemented with cottonseed hulls (HUL) or cottonseed hulls plus corn (CRN) or no supplement (CTL) on the heaviest stocking rates, expressed as acres/steer.

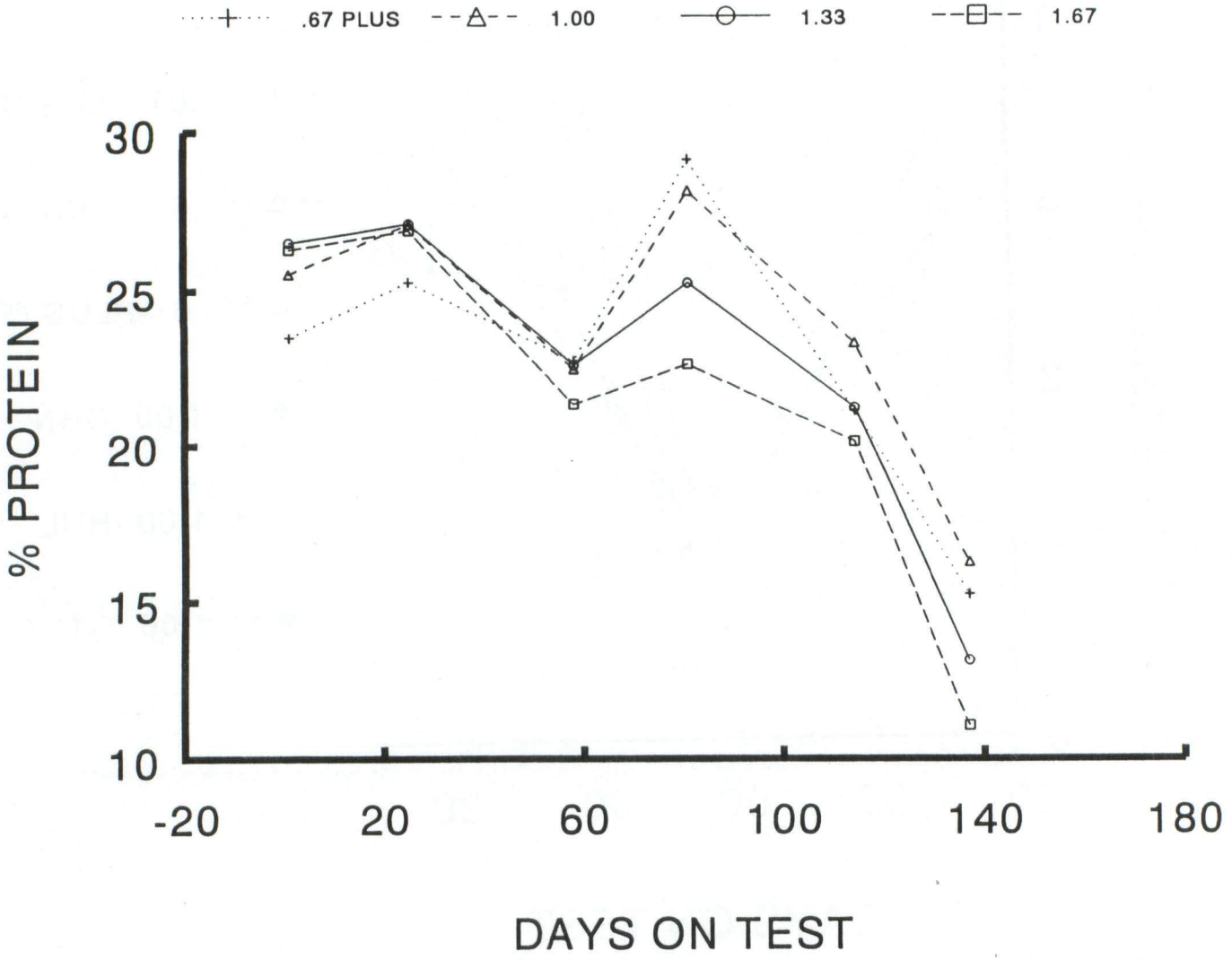

Figure 4. Protein content of wheat forage clipped at ground level from pastures grazed at four stocking rates, expressed as acres/steer.

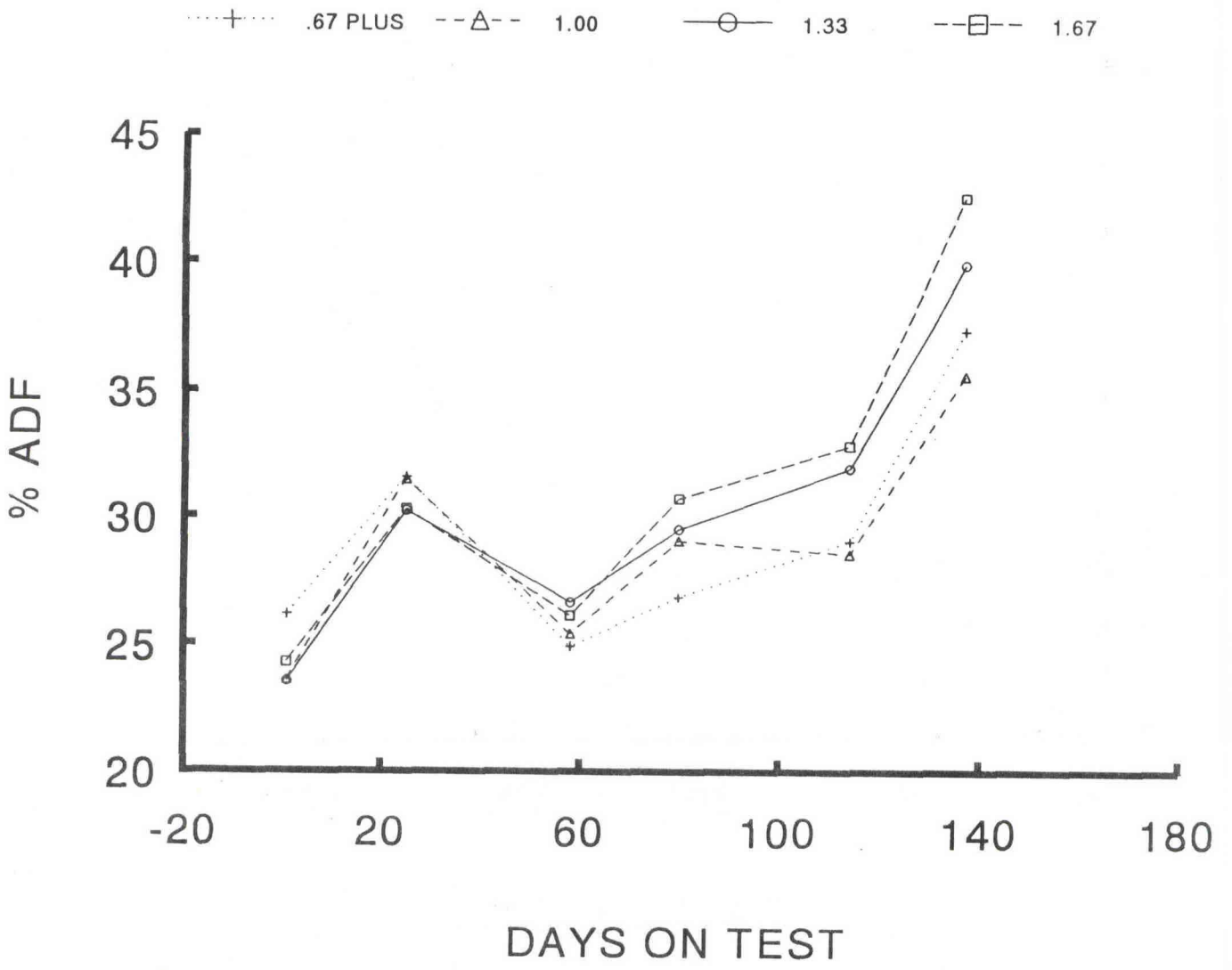

Figure 5. Acid detergent fiber (ADF) content of wheat forage clipped at ground level from pastures grazed at four stocking rates, expressed as acres/steer.

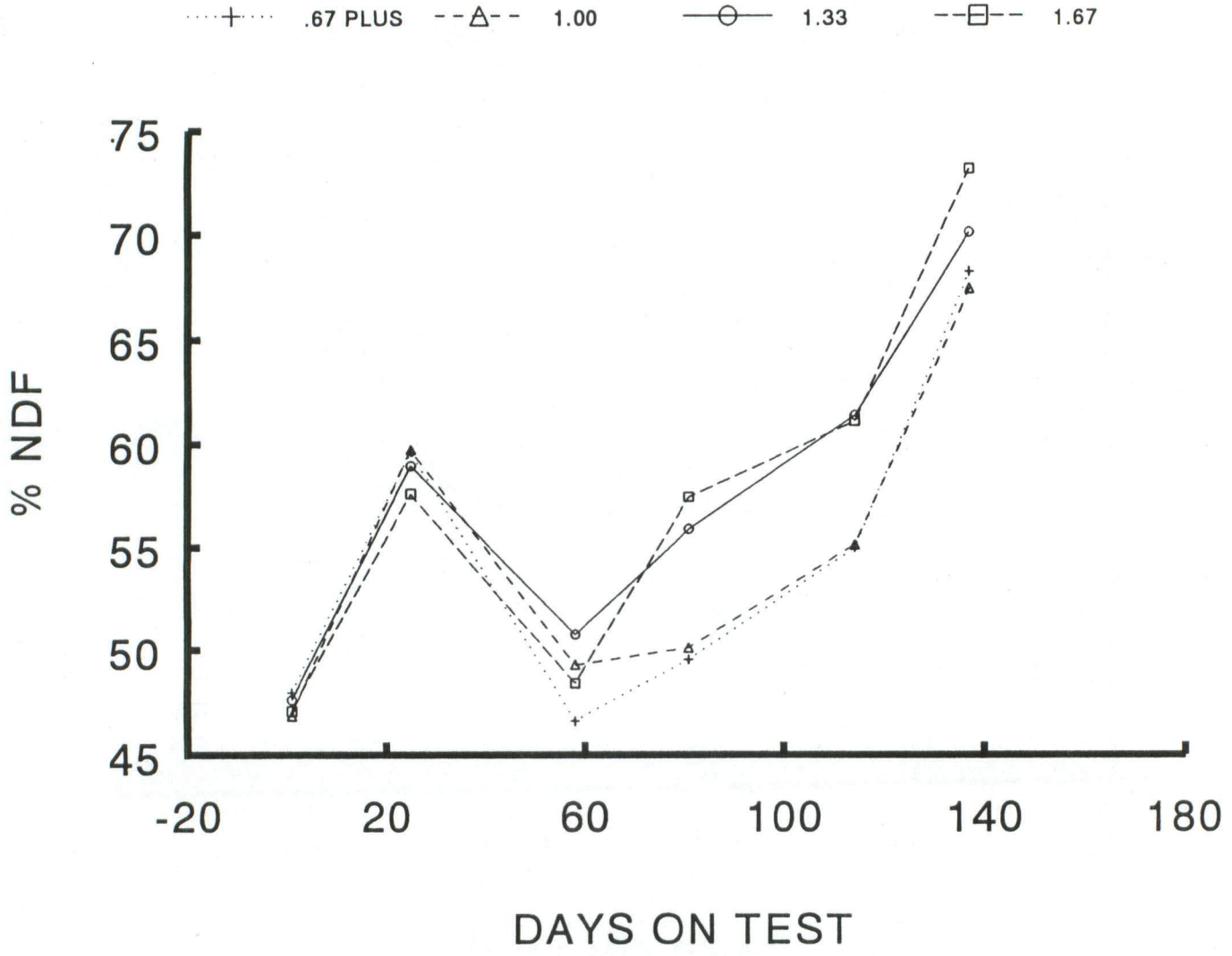

Figure 6. Neutral detergent fiber (NDF) content of wheat forage clipped at ground level from pastures grazed at four stocking rates, expressed as acres/steer.

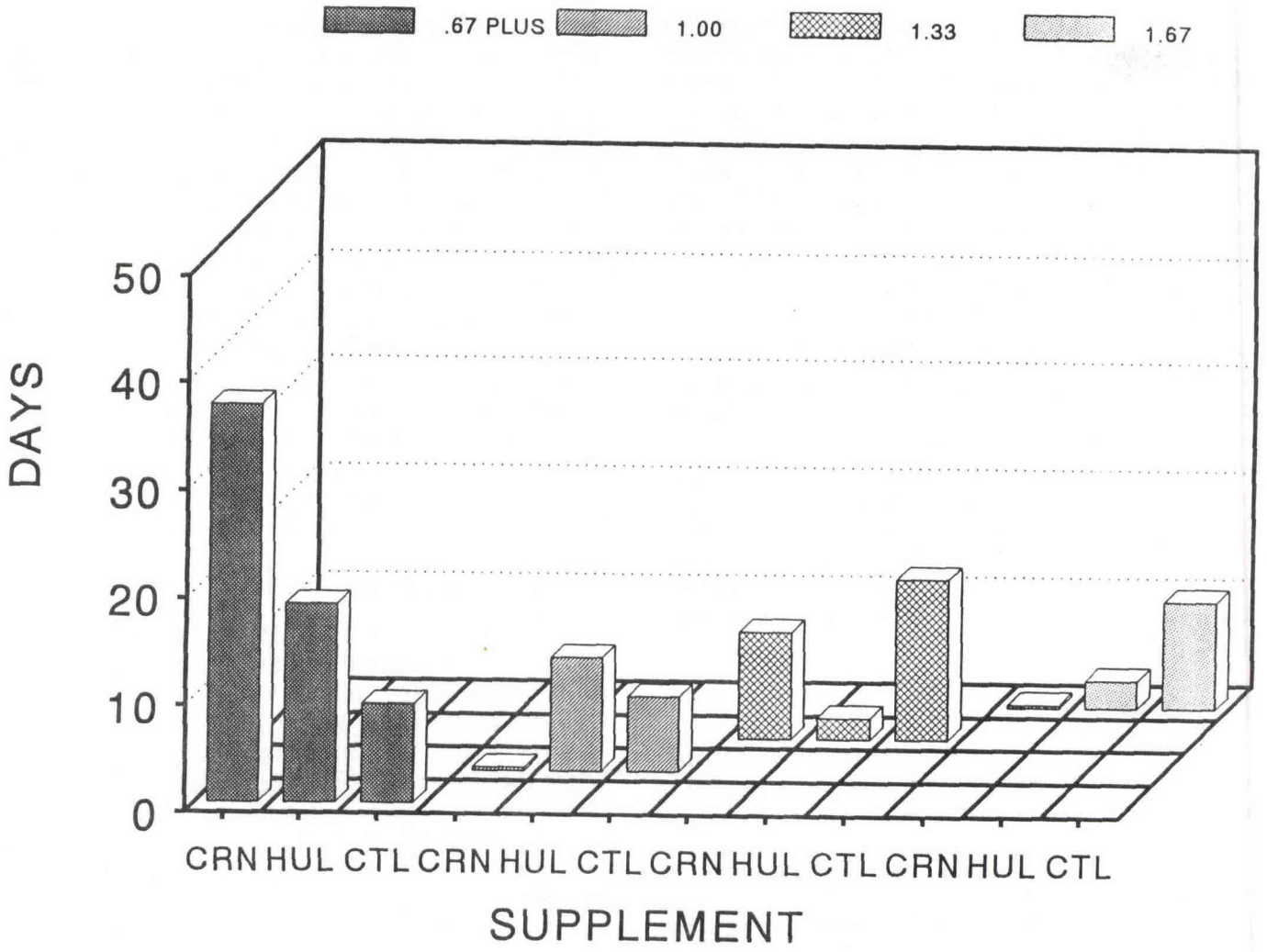

Figure 7. Average days of bloat per animal for steers supplemented with cottonseed hulls (HUL) or cottonseed hulls plus corn (CRN) or no supplement (CTL) and grazed at four stocking rates, expressed as acres/steer.