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Effects on Protein Content and Digestibility of Fall Diets in the Nebraska Sandhills

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Summer Grazing Date and Fall Grazing Intensity Effects on Protein Content and Digestibility of Fall Diets in the Nebraska Sandhills

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Increased fall stocking intensity decreases the crude protein and digestibility of fall diets regardless of summer grazing date. June grazing increases the crude protein content of fall diets.

Summary

Four blocks of Sandhills rangeland (three pastures/block) were used to test summer grazing date and fall grazing intensity effects on protein content and digestibility of fall diets. Summer treatments applied to each block were 1) no summer grazing, 2) June grazing and 3) July grazing. Each block was grazed in sequence at six different stocking rates the following fall by six esophageally fistulated cows (two per pasture). Digestibility of fall diets declined linearly and crude protein declined quadratically as fall stocking intensity progressively increased. June grazing increased the CP content of fall diets compared to July or no summer grazing, but no summer by fall grazing interactions were detected.

Introduction

Increasingly, many producers in the Nebraska Sandhills are using fall-winter grazing, because systems extending the grazing season and minimizing use of harvested and purchased feedstuffs have a greater profit potential. Fall-winter grazing systems often require utilization of pastures grazed to some degree the previous summer. The effects of time and degree of summer grazing on fall-winter diet quality have been investigated (1998 Nebraska Beef Report, pp 20-21), yet summer by fall-winter stocking intensity interaction effects on diet quality have not been determined for the Nebraska Sandhills. Understanding how grazing systems imposed during summer affect nutrient content of forages grazed during the fall-winter could improve cattle and forage management.

Defining the protein content and digestibility of fall-winter diets across different levels of management is needed to develop supplementation protocols. The ability to predict the quality of fall-winter range under different management systems allows producers to more precisely determine the type and amount of supplement to offer cattle, alleviating the inefficiencies associated with over-feeding or under-feeding fall-winter supplements.

The objectives of this study were to determine the interactions of summer grazing and fall-winter stocking rates on protein content and digestibility of diets of cattle grazing dormant fall-winter rangeland in the Sandhills of Nebraska.

Procedure

Four blocks of rangeland at Gudmundsen Sandhills Laboratory (GSL) were each separated into three .74 acre paddocks by electric fence during the summer of 1997. The blocks were located on a sands range site in good to excellent condition and dominated by little bluestem (*Schizachyrium scoparium*), prairie sandreed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*) and switchgrass (*Panicum virgatum*). Each of the three pastures in each block were randomly assigned to receive one of three summer grazing treatments. Summer grazing treatments were 1) no summer grazing, 2) grazing in mid-June by yearling cattle at .2 AUM/acre and 3) grazing in mid-July by yearling cattle at .2 AUM/acre. Beginning October 9, 1997, six esophageally fistulated cows (two per pasture) were stratified by age and weight and randomly assigned to pastures in the first block. Blocks were grazed sequentially throughout the fall for seven days each, with the fourth period ending November 22, 1997.

Six winter stocking rates were cumulatively applied to each pasture during the seven day grazing period by a nested design. On days one through four of grazing in each block, the three .74 acre pastures were stocked at .6 AUM/acre, which yields the recommended stocking rate when combined with the summer stocking rate (.2 AUM/acre). On day five, the pastures were split in half (.37 acre) by electric fence and grazed for two days resulting in a cumulative stocking rate of 1.2 AUM/acre. On day seven, this area was halved again and the final quarter (.18 acre) was grazed for one day resulting in a cumulative stocking rate of 1.8 AUM/acre. Diet samples were collected by each of the two esophageally fistulated cows in each treatment pasture when the cumulative stocking rate was 0 AUM/ acre (day 1), .3 AUM/acre (day 3), .6 AUM/acre (day 5), .9 AUM/acre (day 6) 1.2 AUM/acre (day 7) and 1.8 AUM/acre (day 8). Samples were freeze-dried, ground and analyzed for CP and *in vitro* organic matter disappearance (IVOMD). The values for diets from the two cows in each pasture were averaged within sampling day and analyzed using the GLM procedure in SAS.

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Results

Although diets collected during the fall and winter on Sandhills upland range are generally similar in protein content and digestibility, diets in this study were only collected in the fall. Digestibility (IVOMD) of fall diets decreased linearly as fall stocking rates were increased (Figure 1; P = .0001). Crude protein content of diets decreased quadratically as stocking rates progressively increased (Figure 2; P = .004). The CP content of the diets declined from an initial 8.6 percent CP (OM basis) at 0 AUM/acre to under 6.9 percent CP at .9 AUM/acre and the rate of decline appeared to be reduced after this point. When grazing pastures at different stocking intensities during the winters of 1996 and 1997, Downs (1997 M.S. Thesis) found a similar linear decline in winter diet digestibility as grazing intensity increased during both winters and a similar quadratic decline in winter diet CP values in 1996. However, winter diet CP values collected in 1997 were not greatly reduced by increased winter stocking rate. Variation between years may cause differences in both plant and animal response to fall/winter stocking intensity.

Crude protein content and digestibility of fall diets collected across the three summer treatments are shown in Table 1. The CP values of diets from pastures grazed in June were higher than those collected from pastures grazed in July (P = .02) or from deferred pastures (P = .08). Summer grazing treatments did not affect digestibility of fall diets. This effect is different from results of previous work at GSL where no effects of summer treatments were found on CP values, and deferred pastures had slightly higher digestible diets than June or July grazed pastures (1998 Nebraska Beef Report, pp 20-21). It appears plants may respond differently to summer grazing, in terms of crude protein and digestibility, across multiple years. No fall stocking rate by summer grazing treatment interactions were detected in this study.

In summary, digestibility of fall diets followed a linear decline as fall stocking rates were progressively increased and diet CP declined quadratically with increased fall stocking intensity. June grazing increased the CP content of fall diets, but no summer grazing treatment by fall stocking rate interactions were detected.

Table 1. Crude protein and *in vitro* organic matter disappearance (IVOMD) of fall diets collected on Sandhills upland range grazed at .2 AUM/acre in the previous June or July, or not grazed (OM basis).

	Summer grazing		
Item	June	July	Deferred
CP[a]	7.5	7.1	7.2
IVOMD	50.6	51.8	51.5

[a]June versus Deferred (P = .08); June versus July (P = .02).

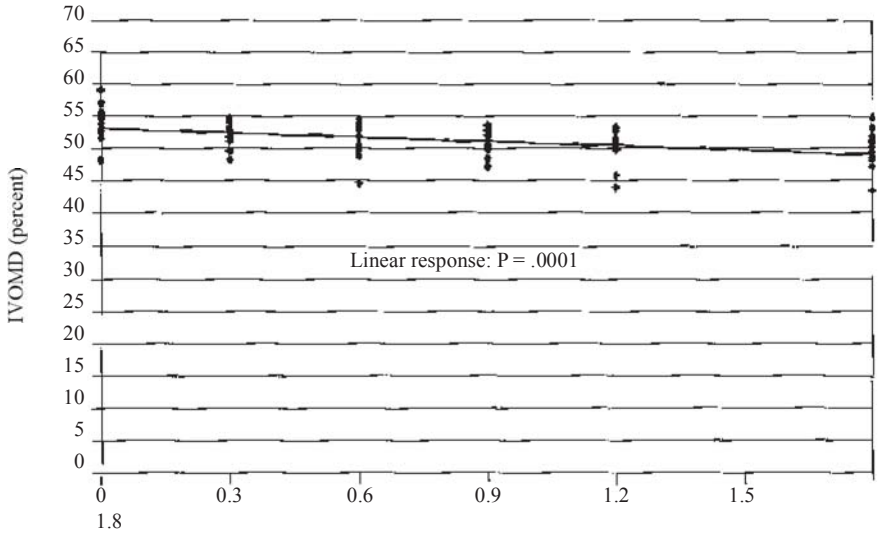

Figure 1. *In Vitro* organic matter disappearance (IVOMD) of fall Sandhills range across various stocking rates.

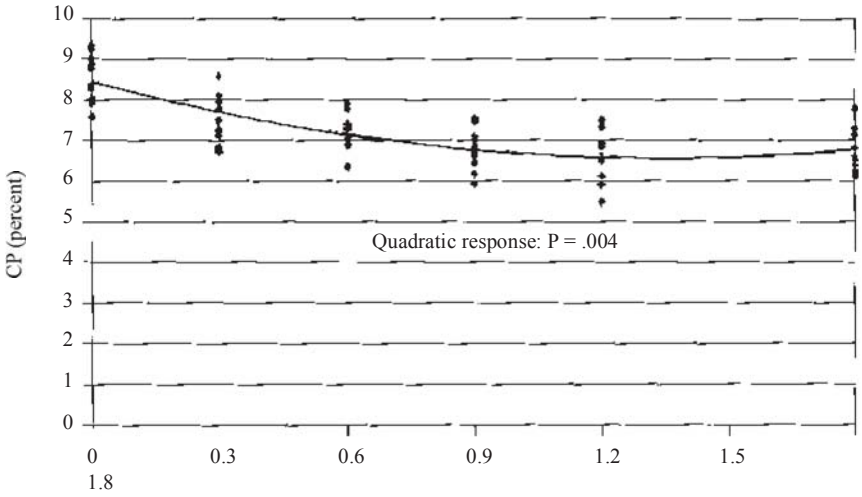

Figure 2. Crude protein content in the fall of Sandhills range across various stocking rates (OM basis).

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