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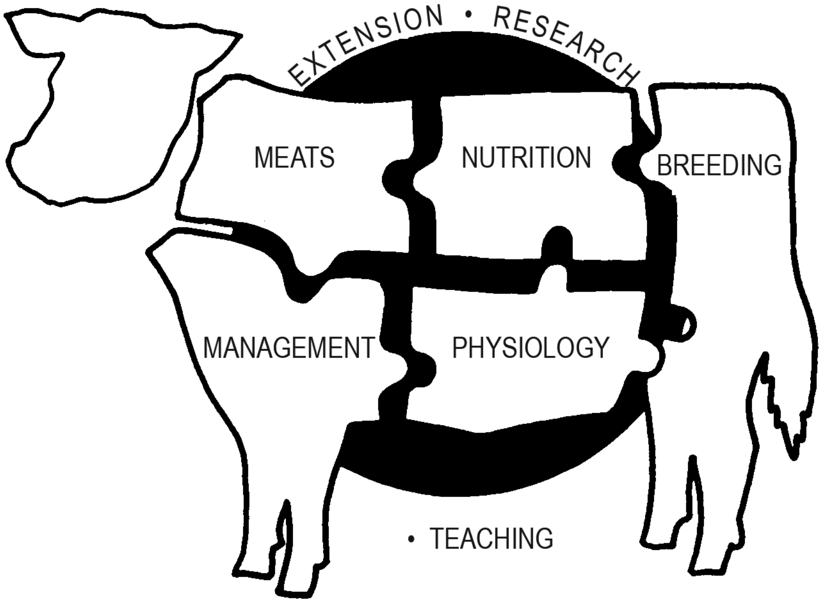

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Effects of Grazing on Nebraska Sandhills Meadow Forage Nutrient Content

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Summary

Nebraska Sandhills subirrigated meadow pastures were used to measure the effects of grazing on forage nutrient content in summer pastures. Non-grazed pastures had greater diet CP content than grazed pastures early in the grazing season. By late July, grazed vs. non-grazed pastures did not differ in diet CP content. Non-grazed pastures had greater in vitro organic matter disappearance compared with grazed pastures from late July through September; however, early summer pastures were not affected. Observed results indicate the greatest differences in nutrient content between grazed and non-grazed meadow pastures occur early and late in the grazing season when the majority of cool-season grass species growth occurs.

Introduction

Nebraska Sandhills subirrigated meadows are an excellent resource for grazing cattle. Most are dominated by cool-season grass species which have greatest growth during early spring. However, as temperatures increase by mid-summer, forage quality decreases due to increased maturation of the plant (*1997 Nebraska Beef Cattle Report,* pp. 3-5). Previous research has shown changes in forage nutrient composition throughout the year, but how grazing affects the nutrient composition of Sandhills subirrigated meadows has not been documented. Therefore, the objective of this research was to determine the difference in forage quality between grazed pastures vs. non-grazed pastures in Nebraska Sandhills subirrigated meadows.

Procedure

A total of twenty-six subirrigated meadow pastures (262 ac ± 114 ac) in the Nebraska Sandhills were used. The meadow was divided into multiple pastures to allow rotational grazing. Of the 26 sampled pastures, two adjacent pastures were sampled on one of 13 dates throughout the 2013 grazing season: June 17, June 26, July 2, July 11, July 15, July 18, July 22, July 26, July 31, Aug. 7, Aug. 12, Aug. 22, Sept. 6, or Sept. 27. Of the two adjacent pastures sampled each date, one pasture was not previously grazed during the season (non-grazed), while the other pasture had been grazed the previous four days. On each sampling date the non-grazed pasture was sampled prior to introduction of cattle to the pasture and the grazed pasture was sampled after the allotted grazing had occurred. Grazing pressure ranged from 2.0 to 18.9 animal units per ton of available forage (Table 1). Three esophageally fistulated cows were used to sample each pasture on each date to determine forage quality. Prior to each diet sample collection, cows were withheld from feed, but not water, for 12 hours, then transported to pastures where diets were to be collected. Cows were fitted with solid bottom bags after removal of the esophageal plug, and introduced to the pasture, then allowed to graze for about 20 minutes.

Samples were separated into a liquid and fibrous portion for lab analysis. Immediately after separation, diet samples were frozen and stored at -20°C. Fibrous samples were lyophilized, ground to pass a 1-mm screen in a Wiley mill. Samples were analyzed for CP, NDF content using the Van Soest et al., (1991) method, and IVOMD using the Tilley and Terry method with the modification of adding 1 g of urea to the buffer and ashing the residue to calculate organic matter, then adjusted to *in vivo* values. Results were analyzed using the PROC MIXED procedure of SAS (SAS Institute, Inc., Cary, N.C.) with experimental unit being cow.

Results

Greater CP was observed in non-grazed pastures on June 17, July 2, July 11, July 18, July 26, and Sept. 27 than grazed pastures ($P < 0.10$, Table 1). This suggests less difference in protein content during August and early September between grazed and non-grazed pastures. Non-grazed pastures had greater IVOMD on July 15, July 31, Aug. 7, Aug. 22, and Sept. 27 than grazed pastures ($P < 0.10$). Non-grazed pastures tended to be greater in IVOMD on June 17 ($P = 0.12$) and Aug. 12 ($P = 0.11$) than grazed pastures. Non-grazed pastures had lower NDF on July 2 ($P < 0.10$) than grazed pastures and tended to be lower on June 17 ($P = 0.15$), July 11 ($P = 0.13$), and July 22 ($P = 0.11$). No other statistical differences were observed on all other sampling dates for NDF. These data suggest grazing, and most specifically grazing pressure, have the most impact on diet quality both early and late in the grazing season when the majority of new growth occurs. In the previous year of this study, similar results were observed in that diet quality was most affected by grazing early in the growing season; however, samples were not taken as late in the season (*2014 Nebraska Beef Cattle Report,* pp. 50-51).

Early in the growing season when cattle are first introduced into a pasture, they consume the highest quality forage available. When the

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Table 1. CP, NDF, and IVOMD values of masticate samples from Sandhills meadow between non-grazed and grazed pastures.

	CP			NDF			IVOMD			Grazing
Date[2]	Non-grazed	Grazed	SEM[1]	Non-grazed	Grazed	SEM[1]	Non-grazed	Grazed	SEM[1]	Pressure[3]
17-Jun	14.8[a]	10.5[b]	0.93	55.1[a]	63.7[a]	2.63	68.9[a]	65.4[a]	0.94	2.0
26-Jun	10.2[a]	9.9[a]	0.38	67.5[a]	68.6[a]	2.23	69.2[a]	66.3[a]	1.98	7.1
2-Jul	16.2[a]	8.0[b]	1.12	51.9[b]	66.4[a]	3.04	60.0[a]	64.1[a]	2.93	18.9
11-Jul	10.9[a]	8.9[b]	0.59	65.9[a]	76.3[a]	2.90	62.1[a]	62.2[a]	3.03	4.5
15-Jul	9.6[a]	7.8[a]	0.60	68.4[a]	73.6[a]	1.68	68.3[a]	60.9[b]	1.30	2.2
18-Jul	8.8[a]	7.7[b]	0.39	69.9[a]	71.6[a]	2.98	66.3[a]	67.0[a]	1.78	3.9
22-Jul	6.7[a]	6.5[a]	0.29	68.9[b]	75.3[a]	2.04	64.8[a]	65.7[a]	1.49	3.6
26-Jul	8.3[a]	6.5[b]	0.34	67.4[a]	67.4[a]	1.72	66.8[a]	64.6[a]	1.85	2.6
31-Jul	8.3[a]	6.4[a]	0.63	66.5[a]	75.3[a]	3.03	63.7[a]	55.7[b]	1.70	3.0
7-Aug	8.0[a]	9.1[a]	0.63	68.9[a]	66.4[a]	3.05	65.2[a]	56.4[b]	1.74	6.4
12-Aug	7.9[a]	8.3[a]	0.41	64.1[a]	67.2[a]	3.22	62.8[a]	55.2[a]	1.90	3.9
6-Sep	8.2[a]	9.7[a]	0.60	60.5[a]	64.7[a]	3.07	52.3[b]	61.8[a]	2.22	6.1
27-Sep	9.0[a]	6.7[b]	0.45	63.3[a]	67.0[a]	3.16	61.2[a]	52.3[b]	1.62	7.9

[a,b]Different subscript between ungrazed and grazed signifies a significant difference within nutrient analysis with a P-value < 0.10.
[1]Standard error of the least squares mean.
[2]Date pasture was sampled using esophageally fistulated cattle.
[3]Grazing pressure expressed as animal units per ton of available forage.

highest quality forage is consumed, cattle consume lower quality forage, which creates a change in diet quality over time independent of change in nutrient content of the forage. The lower quality forage could result from consuming more stem or consuming growth from the previous year. With greater grazing pressure, the new growth may become less available more rapidly, expediting the consumption of old growth. This would account for the decline in CP that was observed earlier in the growing season. As the growing season progresses, ample forage becomes available and grazing pressure may not have as great an impact on diet quality, so averaging the values of the pastures before grazing and after grazing may be practical. For example, on July 22 there was less than 1 percentage unit difference between the grazed and the ungrazed pastures TDN averaging about 65%, which is relatively high and would meet the energy requirements of a 1,200 lb cow. However, the average of the CP is about 6.6% which would result in a supply of DIP of about 4.6% which is below the required amount of 8.45% DIP. Later in the growing season, as regrowth of the cool-season grass species occurs and higher quality diet may become more available, grazing pressure may once again impact the duration that the new growth is available, and cattle are once again forced to eat older growth.

It is likely stocking rate plays a role in differences in nutrient content between grazed and ungrazed pastures (*2015 Nebraska Beef Cattle Report,* pp. 48-50). In this study, cattle were rotated to new pastures relatively quickly, resulting in light stocking rates and lower grazing pressures. If the same study were to be conducted under normal or heavy stocking rate conditions, larger differences in nutrient content of grazed compared with ungrazed pastures would be expected. By mid-summer with low protein values, supplementation may be needed, especially in a May calving system.

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