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Comparison of Crude Protein and Digestibility of Diets of Grazing Cattle at Different Sandhills Range Sites

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Summary

Diet samples were collected May through September (2003) and May through November (2004) using esophageally fistulated cows at ranches in the Sandhills and southwest Nebraska. Differences in CP between the two locations were significant. Diets collected in May and June had higher CP (P = 0.04) than those collected in August through November. No interactions were detected between year and location in diet digestibility and diet digestibility was similar for southwest Nebraska and Sandhills diets.

Introduction

Grazing native range pastures year-round is one way producers can decrease feed costs. Protein content and DM digestibility of diets consumed by grazing cattle varied among seasons (*1997 Nebraska Beef Report*, pp. 3-5). Diets consumed during the plant's growing season changed rapidly as the plants grow and mature. However, during the dormant season, diet digestibility and protein content were not as variable.

Differences in plant species and the proportion of each species among range sites can alter diet composition of grazing cattle making it difficult to compare diet quality among different range locations across Nebraska. The objective of this study was to compare diet CP and *in-vitro* IVOMD of two ranches in Nebraska.

Procedure

Diet samples were collected using three esophageally fistulated cows from May 2003 to September 2003; and May 2004 to November 2004. Pastures were sampled at the Gudmundsen Sandhills Laboratory (GSL) near Whitman, Neb. and the Maddux Ranch near Wauneta, Neb. Two pastures were sampled at the Maddux Ranch and one pasture was sampled at the Gudmundsen Sandhills Laboratory. Pastures in both locations were grazed during the collection periods only by the fistulated cows during the time of collection. Samples were collected every three weeks during the growing season and monthly during the dormant season (September through November). Eighteen samples were collected in 2003 and 24 in 2004 at each location.

Samples were immediately frozen after collection. They were then freeze-dried and ground through a Wiley Mill (1 mm screen), and analyzed for CP and IVOMD. The IVOMD procedure included 5 forage standards developed by Geisert et al., (*2007 Nebraska Beef Report*, pp. 109) with known *in vivo* digestibilities. Statistical analysis was conducted using the mixed procedures of SAS.

Results and Discussion

Diet samples have not been collected previously in southwest Nebraska; therefore, the analyses for these samples are presented separate from the GSL samples (Table 1). Digestibility of diets collected at Maddux differed (P < 0.01) by month. Diets collected in May and June had higher IVOMD than those collected in August through November. During May and June, the leaf to stem ratio is high and so is digestibility. Warm-season plants begin to mature and reproduce in July and early August. By September these plants are dormant and the mature plant material is lower in digestibility. Crude protein (Table 1) of diets collected at Maddux differed by month (P < 0.01). Protein was highest in May and June then decreased throughout the remaining summer and fall. Advancing season decreased CP of diets collected from grazing cattle. Similar trends for diet digestibility and CP in diets collected at GSL were reported by Lardy et al. (*1997 Nebraska Beef Report*, pp. 3-5). Digestibilities in that trial were not adjusted to *in vivo* values and were higher during the growing (63.8 %) and dormant (53.3 %) seasons than reported here.

No interactions ($P > 0.09$) between year, month and location were detected for CP, IVDMD, or IVOMD; therefore, the data from both locations are combined in Tables 2 and 3. There was a significant difference ($P = 0.04$) in CP between the two locations with average CP values of 10.8% and 12.9% for GSL and Maddux respectively (Table 3). Diets collected in May and June were higher in CP ($P = 0.04$) than those collected in the late summer and early fall (Table 2). This agrees with other pasture data from western Nebraska (*1997 Nebraska Beef Report*, pp. 3-5; *2007 Nebraska Beef Report*, pp. 109).

There was no effect of location on IVOMD (61.9% and 61.5 % for Maddux and GSL, respectively; Table 3).

Table 1. Composition (% of DM) of diet samples collected at Maddux ranch.

	Month							Statistics		
Variable	May	June	July	Aug	Sept	Oct	Nov	SEM	Month[a]	LSD[b]
IVDMD	60.6	63.0	60.7	56.7	54.2	46.1	42.3	2.5	<0.01	8.4
IVOMD	61.9	66.2	62.4	60.6	56.7	52.0	47.1	2.7	<0.01	7.8
CP	16.1	15.1	12.3	12.0	10.1	7.4	6.2	1.1	<0.001	4.6
NDF	62.8	56.4	64.1	66.6	63.6	72.6	75.9	3.6	0.09	11.6

[a]Probability value for effect of month.
[b]Least significant difference.

Table 2. Monthly CP, IVDMD, IVOMD and NDF (% DM) for diet samples collected at Gudmundsen Sandhills Laboratory and Maddux Ranch (significant month effect P < 0.05 for CP, IVDMD, and IVOMD).

	Month					Statistics		
Variable	May	June	July	Aug	Sept	SEM	Month[a]	LSD[b]
IVDMD	62.2	64.2	57.7	55.7	51.6	1.8	<0.01	5.9
IVOMD	65.3	66.8	60.5	59.5	56.5	1.7	<0.01	2.0
CP	14.1	13.7	11.5	10.3	9.6	0.7	0.04	2.2
NDF	62.8	56.4	64.1	66.6	63.6	2.4	0.62	6.0

[a]Probability value for effect of month.
[b]Least significant difference.

Table 3. Year and location effects for diet samples collected at the Gudmundsen Sandhills Laboratory and Maddux Ranch from May through September.

Variable	Year		Location		Statistics		
(% DM)	2003	2004	GSL	Maddux	SEM	Year[a]	Location[b]
CP	12.0	11.7	10.8[a]	12.9[a]	0.7	0.85	0.04
IVDMD	57.9	58.6	57.6	59.0	1.1	0.63	0.38
IVOMD	60.8	62.6	61.9	61.5	1.1	0.27	0.83
NDF	65.5	64.8	66.4	63.9	1.5	0.75	0.28

[a]*P*-value for year effect.
[b]*P*-value for location effect.

No differences (P = 0.27) were indicated between years on diet IVOMD.

Conclusion

Location affected diet CP, but not IVOMD. The below average annual precipitation at GSL in 2003 and 2004 and potential differences in the plant communities available for grazing may have influenced results. Diets were higher in digestibility and CP content in May and June as compared to those collected in August and September. These data suggest that diet quality of range in southeast Nebraska is similar to that in the Sandhills.

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