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Assessment of Nutrient Content of Kansas Grasslands Enrolled in the Conservation Reserve Program

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Abstract

Kansas had 1.9 million acres enrolled in the Conservation Reserve Program (CRP) for the year 2023. The objective of this ongoing study was to evaluate the forage quality of standing CRP for grazing beef cattle to assist producers and advisors in making supplementation decisions. Monthly forage samples were collected from cooperator producers' locations across 19 counties in Kansas to determine nutrient quality throughout the year. Samples were classified as east or west Kansas based on the location of the tract from which they were collected. The samples were analyzed for nutrient content based on the region of the state, as precipitation and soil type are likely influencing factors. While variation exists between regions, data suggest CRP forage quality generally follows a pattern typical of warm-season grasses.

Introduction

The Conservation Reserve Program (CRP) was established in the 1985 Farm Bill through the Farm Service Agency (FSA) that places environmentally sensitive land out of agricultural production and into conservation. Kansas had 1.9 million acres enrolled in CRP during 2023, which can be released for grazing or haying depending on specific local conditions each year. There are limited data on the quality of CRP forages harvested for hay, but even less information is available on nutrient content levels regarding standing CRP forages for grazing beef cattle.

Information on standing forage quality is necessary for accurate supplementation and feeding recommendations for producers, thereby allowing for more efficient and economical use of resources. Previous data (Harmoney et al., 2002) indicated that crude protein content of both tall grasses and short grasses increases during early- to mid-summer and then decreases as dormancy approaches. Soil type, years of enrollment in CRP, average annual precipitation, and management history may all impact forage quality. While emergency haying and grazing of CRP lands can be done during drought, programs may allow for use by the producer under non-drought conditions. The objective of this collaborative field study was to evaluate the quality of standing CRP forages throughout the year and compare samples collected from different regions across the state.

Experimental Procedures

This project was a collaborative initiative among K-State Research and Extension (KSRE) Extension Agents and Specialists who are part of the Livestock Program Focus Team. Agents and specialists identified cooperating producers within local Extension units and collected monthly forage samples beginning winter 2023. A prearranged set of dates was determined to limit the variation of times that samples were collected within months. Samples were taken at cooperating producer locations in 19 counties across the state, and locations were classified as either western or eastern Kansas. Random locations within the specific tracts were selected, and samples were collected by hand clipping forage to a height of approximately 1-in above the ground in 10.8 ft^2 quadrats. Samples were dried for 48 hours at 131°F using a forced air oven, then ground and sent to a single laboratory for analysis (SDK Laboratories, Hutchinson, KS). Data from a total of 206 forage samples ranging from February 2023 to July 2024 were analyzed using SAS 9.4 (SAS, Cary, NC), with relatively equal proportions between east (n = 102) and west (n = 104) regions. Probability values less than or equal to 0.05 were considered significantly different.

Results and Discussion

Crude protein (CP) and fiber component content data are reported in Table 1. Crude protein did not differ between regions within a sampling month. Acid detergent fiber was different for the month of July ($P \leq 0.05$) and December ($P \leq 0.05$) for the two regions. Neutral detergent fiber was treated with amylase to remove any starch interference with the sample and did not differ between months or regions. Total digestible nutrients were different for February ($P \leq 0.05$), March ($P \leq 0.05$), and July ($P \leq 0.05$) for the two regions.

Forage sample mineral data are reported in Table 2. Calcium was different for the month of December ($P \leq 0.05$), and phosphorus was different for May ($P \leq 0.05$). Potassium was different for the months of May ($P \leq 0.05$) and October ($P \leq 0.05$). Magnesium was different for samples collected in February ($P \leq 0.05$), August ($P \leq 0.05$), September ($P \leq 0.05$), October ($P \leq 0.05$) and December ($P \leq 0.05$). This is an ongoing study of which additional data will be added to account for year-to-year variation in forage quality.

Implications

Understanding the nutrient quality of CRP lands that are released for haying or grazing is critical for making informed supplementation and feeding decisions with producers. These data will contribute and add to the existing body of research of nutrient content of forages for grazing.

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References

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Table 1. Protein and fiber content of forage samples (dry matter basis) by month[1] and region

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Crude protein, %												
East	3.52	2.93	4.28	5.78	8.68	6.61	5.31	5.26	5.11	4.24	5.12	3.77
West	---	2.99	4.85	4.69	5.25	10.8	4.53	4.64	3.79	3.55	3.35	3.19
SEM[2]	---	.050	1.69	1.58	1.82	2.56	0.67	0.86	1.73	0.57	0.92	0.40
P-value	---	0.91	0.74	0.49	0.08	0.16	0.26	0.50	0.47	0.26	0.09	0.18
Acid detergent fiber, %												
East	48.92	48.10	49.26	44.92	39.26	38.41	39.28	44.47	43.80	47.41	47.77	45.84
West	---	50.91	50.63	47.90	44.40	34.71	45.78	43.59	44.37	46.84	47.48	51.46
SEM	---	1.34	0.99	3.87	3.54	6.69	1.85	1.65	2.64	1.34	3.16	2.37
P-value	---	0.08	0.19	0.45	0.17	0.60	0.01	0.61	0.83	0.68	0.93	0.05
Neutral detergent fiber, %												
East	72.21	66.86	66.48	65.54	61.72	61.82	63.17	62.94	63.94	67.99	66.51	65.46
West	---	70.30	67.68	67.72	65.31	51.78	66.24	64.71	65.48	66.79	67.94	70.44
SEM	---	2.46	2.37	3.54	3.31	6.14	1.91	1.78	1.64	1.15	3.78	6.66
P-value	---	0.21	0.62	0.56	0.29	0.15	0.13	0.35	0.37	0.32	0.71	0.48
Total digestible nutrients, %												
East	36.51	42.15	40.15	41.85	51.22	50.70	50.13	42.46	41.69	38.54	35.55	36.71
West	---	33.82	36.10	38.20	43.83	55.69	44.81	46.44	42.06	39.31	37.86	33.08
SEM	---	1.74	1.91	5.12	4.05	9.04	2.19	3.08	2.64	1.81	4.23	3.57
P-value	---	0.01	0.05	0.49	0.09	0.60	0.03	0.23	0.89	0.67	0.60	0.34

[1] Jan = January; Feb = February; Mar = March; Apr = April; Jun = June; Jul = July; Aug = August; Sep = September; Oct = October; Nov = November; Dec = December.
[2] Standard error of the mean.

Table 2. Mineral content of forage samples (dry matter basis) by month[1] and region

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Calcium, %												
East	0.64	0.07	0.81	0.59	0.44	0.63	0.53	0.50	0.51	0.61	0.59	0.51
West	---	0.29	0.51	0.48	0.46	0.87	0.41	0.42	0.44	0.46	0.48	0.39
SEM[2]	---	0.23	0.19	0.14	0.11	0.25	0.13	0.06	0.06	0.08	0.10	0.05
P-value	---	0.17	0.13	0.45	0.86	0.39	0.37	0.22	0.29	0.07	0.34	0.03
Phosphorus, %												
East	0.06	0.05	0.07	0.12	0.20	0.16	0.13	0.15	0.12	0.09	0.08	0.08
West	---	0.04	0.06	0.06	0.08	0.29	0.11	0.14	0.08	0.11	0.08	0.05
SEM	---	0.01	0.02	0.05	0.05	0.09	0.03	0.05	0.04	0.02	0.03	0.02
P-value	---	0.86	0.70	0.31	0.02	0.20	0.44	0.84	0.28	0.42	0.83	0.28
Potassium, %												
East	0.15	0.11	0.16	0.72	1.45	1.46	1.07	0.98	0.61	0.43	0.34	0.19
West	---	0.22	0.27	0.49	0.38	2.69	0.87	1.04	0.80	0.78	0.59	0.32
SEM	---	0.06	0.11	0.41	0.33	1.17	0.19	0.20	0.17	0.12	0.21	0.08
P-value	---	0.11	0.36	0.58	0.01	0.34	0.28	0.74	0.27	0.02	0.28	0.13
Magnesium, %												
East	0.09	0.09	0.12	0.09	0.13	0.17	0.15	0.15	0.16	0.16	0.12	0.11
West	---	0.05	0.07	0.11	0.09	0.35	0.10	0.10	0.09	0.10	0.09	0.07
SEM	---	0.01	0.04	0.04	0.03	0.13	0.03	0.02	0.02	0.02	0.02	0.01
P-value	---	0.01	0.19	0.69	0.13	0.23	0.06	0.03	0.01	0.01	0.21	0.01

[1] Jan = January; Feb = February; Mar = March; Apr = April; Jun = June; Jul = July; Aug = August; Sep = September; Oct = October; Nov = November; Dec = December.

[2] Standard error of the mean.