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Botanical composition of diets grazed by beef cows in the Kansas Flint Hills during winter

Abstract

Analysis of microscopic plant fragments recovered from the gut of wild herbivores (i.e., microhistological analysis) has been used to estimate diet composition, but there is debate as to whether microhistological analysis of fecal samples is an appropriate method for characterizing diets of grazing beef cattle. Therefore, our goal was to determine whether this approach could effectively quantify the botanical composition of diets grazed by mature beef cows in the Kansas Flint Hills during winter.

Keywords

Cattlemen's Day, 2010; Kansas Agricultural Experiment Station contribution; no. 10-170-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 1029; Beef Cattle Research, 2010 is known as Cattlemen's Day, 2010; Beef; Plants; Grazing; Botanical composition

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Botanical Composition of Diets Grazed by Beef Cows in the Kansas Flint Hills During Winter

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Introduction

Analysis of microscopic plant fragments recovered from the gut of wild herbivores (i.e., microhistological analysis) has been used to estimate diet composition, but there is debate as to whether microhistological analysis of fecal samples is an appropriate method for characterizing diets of grazing beef cattle. Therefore, our goal was to determine whether this approach could effectively quantify the botanical composition of diets grazed by mature beef cows in the Kansas Flint Hills during winter.

Experimental Procedures

Mature, nonpregnant beef cows ($n = 10$; average initial weight = 1,150 lb) were maintained on a single, dormant, native tallgrass pasture at the Kansas State University Commercial Cow-Calf Unit. Approximately 95% of above-ground biomass on these pastures was composed of the following forage species: big bluestem, little bluestem, sideoats grama, blue grama, switchgrass, Indiangrass, lead plant, heath aster, dotted gayfeather, and purple prairie clover. Fecal samples were collected after a 30-day grazing period, cleaned, decolorized, and mounted on microscope slides.

Dried slides were evaluated with a compound microscope at 10x magnification. The microscope was equipped with a digital camera, and each slide field was photographed for comparison with standard slides. Twenty fields per slide were selected randomly from the entire slide view and used to measure the frequency with which plant fragments appeared. Plant fragments were identified by comparing their characteristics with standards prepared from pure stands of each plant. Plant fragment prevalence in slide fields was assumed to be equivalent to prevalence in fecal samples and in grazed diets on a dry matter basis.

Results and Discussion

Dietary composition data are shown in Table 1. Although cattle in this study were of the same class (i.e., mature cows) and age (i.e., 4 years), there were differences ($P < 0.01$) among animals in the proportion of various range plants grazed. Only 3% of grass-plant fragments could not be positively identified as one of the six predominant grasses in the Flint Hills. A preference for sideoats grama and Indiangrass was apparent within this particular group of cattle.

A significant proportion of cow diets (32.32%) was composed of forbs despite the fact that the experiment was conducted on dormant winter range and most forbs were difficult to locate visually. Only 2.66% of forb fragments could not be identified as one of the four predominant forb species in the Flint Hills. Altogether, plant fragments that could not be positively identified composed 5.66% of the diet. We interpreted these data to mean that a relatively minor proportion of all plant fragments in fecal samples could not be classified according to plant species.

Implications

Microhistological characteristics of plant fragments recovered from fecal material were a viable means of identifying botanical fragments of forages grazed by mature cows during the winter in the Kansas Flint Hills. Approximately one third of the recognizable plant fragments were forbs.

Table 1. Identifiable botanical fragments in feces of beef cows that grazed Kansas Flint Hills range during winter

Species	Botanical composition, % of diet dry matter	SEM ¹	CV ¹ , %
Grasses			
Big bluestem	8.91	0.141	7.01
Little bluestem	8.07	0.127	6.97
Sideoats grama	15.06	0.128	3.76
Blue grama	8.88	0.107	5.34
Switchgrass	8.14	0.129	7.24
Indiangrass	12.95	0.135	8.54
Unidentified grasses	3.00	0.161	1.46
Forbs			
Lead plant	7.89	0.111	6.04
Heath aster	7.00	0.095	3.25
Dotted gayfeather	4.18	0.085	9.01
Purple prairie clover	13.26	0.124	4.14
Unidentified forbs	2.66	0.144	1.81

¹ SE, standard error of the mean for each individual grass species; CV, variation between grass species.