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Grazing Diets of Mature Ewes in the Flint Hills Contain a Significant Proportion of Sericea Lespedeza

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Abstract

Objective: The objective of this study was to characterize diets selected by sheep grazing sericea lespedeza (Lespedeza cuneata) infested native tallgrass pastures and contrast these diets to those of cattle grazing the same range earlier in the grazing season. Multi-species grazing may provide an additional tool to aid landholders in the control of sericea lespedeza compared to cattle grazing only.

Study Description: The study was conducted on 8 native tallgrass pastures grazed by more than 800 mature ewes. Pastures were infested with sericea lespedeza (basal frequency = 2.9 ± 2.43%) and stocked with yearling steers at a relatively high stocking rate (2.7 acres/steer) from April 15 to July 15 and subsequently grazed by sheep from July 30 to October 1. Fecal samples were collected from individual sheep on August 15 and on September 15 for 2 years. Samples were prepared and viewed under a compound microscope to identify and count plant fragments. These data were used to determine frequency at which each plant species appeared in diets selected by freely-grazing sheep.

The Bottom Line: Sericea lespedeza comprised approximately 1.5% of sheep diets. Consumption at that level is likely sufficient to control seed production by that plant. Grazing of small ruminants in addition to cattle in a grazing system may provide landholders an additional tool for control of sericea lespedeza.

Keywords

botanical composition, grazing, sericea lespedeza, sheep

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KANSAS STATE UNIVERSITY CATTLEMEN'S DAY

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Introduction

Sericea lespedeza (*Lespedeza cuneata*) is a noxious, perennial legume that plagues the Kansas Flint Hills prairie. Due to its reproductive fecundity, it continues to spread and is avoided by cattle due to its high condensed-tannin content. Conversely, small ruminants such as sheep are more tolerant of condensed tannins and have no aversion to the plant. The proportions of grasses and forbs in cattle and sheep diets also differ. Cattle tend to select mostly grasses (> 80%), whereas sheep consume about 50% grasses and 50% forbs and shrubs. Due to this dietary preference, landholders that have historically operated only cattle grazing systems may consider inclusion of sheep or other small ruminants to aid in the control of sericea lespedeza.

Microhistological analysis of feces allows characterization of herbivore diets by identifying plant fragments using a microscope. These plant fragments are counted and used to calculate frequency of individual plant species in the diet. Our objective was to characterize the diets of sheep that were grazing sericea lespedeza-infested pastures during the growing season, following intensive-early grazing of yearling steers. A similar analysis to characterize the diets of stocker cattle appears in this report.

Experimental Procedures

The study was conducted at the Kansas State University Bessner Range Research Unit, located in Woodson County, KS, during the summers of 2015 and 2016. Eight native tallgrass pastures were burned annually in April. Pastures were infested with sericea lespedeza (basal frequency = 2.9 ± 2.43%). Pastures were stocked with yearling steers at a relatively high stocking rate (2.7 acres/steer) from April 15 to July 15, prior to sheep introduction.

Approximately 95% of above-ground biomass on pastures used in our study was composed of the following forage species: big bluestem, little bluestem, switchgrass, indiangrass, blue grama, sideoats grama, buffalograss, sedge spp., purple prairie clover, leadplant, dotted gayfeather, heath aster, sericea lespedeza, Baldwin's ironweed, western ragweed, annual broomweed, and common ragweed. These 17 dominant plant species were collected for use as comparison standards for microhistological analyses. Each standard sample was derived by hand-clipping 10 to 20 individual plants from a

homogeneous stand of each plant type; samples were dried in a forced-air oven (131°F; 96 hours) and finely ground using a cyclone-style sample mill.

Mature ewes (n = 813 ± 0.46/year; initial body weight = 141 ± 9 lb) were obtained from 2 commercial sheep ranches located in western Kansas. Ewes were assigned randomly to graze 1 of 4 assigned pastures (0.5 acres/ewe); remaining pastures were not grazed from August 1 to October 1. Sheep were allowed a 2-week adaptation period before fecal samples were collected from 25 randomly-selected individuals on August 15. Collections from the same individuals were repeated on September 15 (i.e., 2 sampling dates). Wet fecal samples were placed into a plastic resealable bag and frozen (-4°F) pending further analysis. Pasture treatment assignments were fixed for the 2-year duration of the study.

Individual fecal samples were dried in a forced-air oven (131°F; 96 hours) then finely ground in a hammer mill. Next, 0.035 oz of each fecal sample and each comparison standard was soaked in 50% ethanol solution overnight, then washed for 5 minutes with de-ionized water through a No. 200 US-standard sieve. Samples were then soaked in 0.05 M sodium hydroxide for 20 minutes and washed again with de-ionized water through the sieve. Samples were placed onto microscope slides (5 slides/fecal sample and 3 slides/standard sample) with a dissecting needle. Two to 3 drops of Hertwig's solution were applied to slides which were then held over a propane flame until dry.

Slides were viewed under a compound microscope equipped with a digital camera (DC5-163, Thermo Fisher Scientific, Asheville, NC) at 100 × magnification. Twenty slide fields were randomly selected from each sample and each standard, photographed, and stored. Plant fragments in each photograph were individually counted and identified. The total number of occurrences of each plant species on a given slide were converted to frequency of occurrence ([total of individual species ÷ total of all species] × 100).

Results and Discussion

Selection of individual plant species by sheep was not influenced ($P \geq 0.23$) by pasture or by the interaction between pasture and month of collection (i.e., period); therefore, diet selection was reported by period (Table 1). Grass species constituted 57.4% and 58.4% of sheep diets during August and September, respectively. Major grass species in the diet included little bluestem and big bluestem. More than 99% of grass plants selected by sheep were represented by the 8 reference standards. Collection month did not influence ($P \geq 0.12$) selection of big bluestem, little bluestem, indiangrass, blue grama, sideoats grama, sedges, or unidentified grasses. In contrast, selection of buffalograss by sheep increased ($P < 0.01$) from August to September, whereas selection of switchgrass by sheep tended ($P = 0.06$) to decrease from August to September.

Forb species accounted for 42.6% and 41.6% of sheep diets in August and September, respectively (Table 1). Major forbs in the diet included purple prairieclover and Baldwin's ironweed. More than 99% of forbs selected by sheep were represented by the 9 reference standards. In addition, no differences ($P \geq 0.19$) between collection months were observed for any of the 9-forb reference standard. In contrast, the number of unidentified forb fragments decreased ($P = 0.04$) August to September. Sheep selected

1.5% sericea lespedeza in August and 1.6% sericea lespedeza in September; in a previous publication, we reported that this level of consumption was associated with significant depression in seed production by sericea lespedeza.

Implications

In this experiment, grasses comprised 57 to 58% of sheep diets, whereas forbs comprised 43 to 42% of sheep diets. Selection of grasses by sheep was slightly greater than that reported in previous research. Major grasses in sheep diets were big and little bluestem and major forbs in sheep diets were purple prairie clover and Baldwin's ironweed. Sericea lespedeza comprised approximately 1.5% of sheep diets. Consumption at that level is likely sufficient to control seed production by sericea lespedeza. Utilization of sheep in a grazing system with cattle may provide control of sericea lespedeza, whereas cattle grazing alone is not useful for sericea lespedeza control.

Table 1. Botanical composition of diets selected by sheep grazing Flint Hills native range during August and September

	Botanical composition (% of diet dry matter)		Standard error of the	
Item	August	September	mean	P-Value
Grass and grass-like				
Big bluestem	11.9	9.3	1.76	0.23
Little bluestem	20.5	20.0	1.31	0.76
Switchgrass	4.6	3.1	0.55	0.06
Indiangrass	5.8	5.6	1.10	0.81
Blue grama	6.5	8.6	0.12	0.12
Sideoats grama	1.0	0.9	0.19	0.53
Buffalograss	4.8	7.9	0.60	<0.01
Sedge	1.8	2.0	0.40	0.55
Unidentified grass	0.7	1.0	0.18	0.17
Forb and forb-like				
Purple prairieclover	12.2	12.1	1.33	0.90
Dotted gayfeather	2.3	2.7	0.49	0.54
Leadplant	0.4	0.3	0.10	0.70
Heath aster	1.0	1.2	0.13	0.22
Sericea lespedeza	1.5	1.6	0.20	0.45
Baldwin's ironweed	11.3	11.1	1.04	0.89
Western ragweed	5.3	4.6	0.54	0.26
Annual broomweed	0.2	0.1	0.08	0.19
Common ragweed	7.8	7.3	1.28	0.90
Unidentified forb	0.9	0.6	0.09	0.04
Total grass and grass-like	57.4	58.4	2.13	0.67
Total forb and forb-like	42.6	41.6	2.13	0.67