Diets of Desert Cottontail on Prairie Dog Colonies in Western South Dakota

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Abstract

Fecal pellets of desert cottontail (*Sylvaligus audubonii*) were collected during 1981 in May, June, July, August and September for dietary analysis to determine composition of forage plants. Four plants made up 70 percent of the total diet. Forage plants, in order of significance, were western wheat grass (*Pascopyrum smithii*), fescue (*Festuca* spp), squirretail (*Sitanion hystrix*), and plains muhly (*Muhlenbergia cuspidata*). The most common forb in diets was scarlet globemallow (*Sphaeralcea coccinea*) and the shrub, plains pricklypear (*Opuntia polyacantha*). Grasses in the diet ranged from 65 percent to 88 percent while forbs and shrubs ranged from 11 percent to 31 percent, 1 percent to 6 percent, respectively. Botanical composition in the plant community varied throughout the season.

Key words: food selection, forage, lagomorphs, rabbits, rangeland

Introduction

Dietary information of the desert cottontail (*Sylvaligus audubonii*) related to diets of other wildlife and large herbivores is integral to understanding forage use and sustaining our natural resources on rangelands. The most common wild herbivores in Conata Basin and Badlands area in western South Dakota are lagomorphs (*Lagomorpha*), black-tailed prairie dog (*Cynomys ludovicianus*), pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*) and livestock that compete for the same available forage resources. Bison (*Bison bison*) are forage competitors and are present in the Badlands National Park only. Dietary information for the desert cottontail (*Sylvaligus audubonii*) is essential for resource managers to quantitative asses the dietary overlap of the herbivores to determine compliance with desired plans for sustaining or increasing vegetation conditions and to implement guidelines.

Lagomorphs are often associated with disturbed, grazed or subclimax plant communities (Flinders and Hansen 1975, Hansen and Gold 1977). Flinders and Hansen (1975) found that desert cottontails are associated with livestock grazing at a moderate level on the shortgrass prairie. Desert cottontails commonly inhabit prairie dog towns on western rangelands (Hansen and Gold 1977, Sharps and Uresk, 1990). Dietary information for black-tailed prairie dogs and cattle (*Bos taurus*) has been document for the Conata Basin and Badlands National Park since the 1970's (Fagerstone et al. 1977, Summers and Linder 1978, Fagerstone et al. 1981, Uresk 1984, Uresk 1986). However, dietary habits of the desert cottontail have not been evaluated for this region.

The purpose of this study was to determine the seasonal diets of desert cottontails associated with prairie dog towns, livestock and Bison grazing that have free choice of forage plants on the rangeland in western South Dakota.

Study Area

The study area was located on the Buffalo Gap National Grasslands and Badlands National Park about 13 km south

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of Wall in west central South Dakota. The climate is characterized by cold winters and hot summers and is classified as semiarid continental. Mean annual temperature was 10^0 C and ranged from -5^0 C in January to 26^0 C in July based on data gathered over 12 years from the weather station at Cedar Pass Visitor Center in Badlands National Park. Average annual precipitation was 40 cm. During the growing season, precipitation occurs as scattered thundershowers.

Gently undulating grasslands on the National Grasslands and Badlands National Park area made up the major portion of the study area. Soils of this area are derived from sedimentary deposits of clay, silt, gravel, and volcanic ash (Raymond and King 1976). Grasses which dominated the graminoid vegetation included blue grama (*Bouteloua gracilis*), buffalograss (*Buchloe dactyloides*), needleleaf sedge (*Carex eleocharis*), and western wheatgrass (*Pascopyrum smithii*). Major forbs were scarlet globemallow (*Sphaeralcea coccinea*), bigbract verbena (*Verbena bracteata*), Patagonia Indianwheat (*Plantago patagonica*), and prairie dogweed (*Dyssodia papposa*) (Uresk 1984).

Large free-ranging herbivores (*Bison bison*), pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) graze the study area year round. In addition, the National Grasslands are grazed by cattle from mid-May to the end of October.

Methods

Eighteen study sites were established on 15 prairie dog colonies ranging in area from about 12 ha to 283 ha. Three replications, each with six permanent sites (0.2 ha) were established. All cottontail pellets were initially cleared from each site prior to the two day sampling period. Fresh fecal pellets of the desert cottontail were collected over a two-day period during May, June, July, August, and September in 1981. The six sites collected for fecal pellets were combined within each of the three replications.

All fecal material from each site was dried at 60 degrees centigrade for 48 hours and ground through a Wiley mill (1-mm screen) to insure thorough mixing. Five microscope slides were prepared monthly from composited fecal pellets from each of the three replicated sites. All fecal material was washed over a 0.1 mm screen (Sparks and Malechek 1968). Fecal material was cleared of chlorophyll and other compounds with Hertwig's solution. Hoyer's solution was used as a mounting medium (Baumgartner and Martin 1939), and the slides were dried for approximately 72 hours at 60 degrees centigrade.

Twenty microscope fields per slide were systematically located, magnified 100 times, and all recognizable plant fragments were recorded. Frequency of occurrence was determined by dividing the number of microscopic fields in which a given species occurred by the total number of fields observed X 100 (Curtis and McIntosh 1959) and converted to percent relative density (Sparks and Malechek 1968). Test slides were prepared for samples of known plant species to measure the ability of technical staff to properly and consistently identify plant fragments. Testing was applied according to the procedures outlined by Rogers and Uresk (1974). All values were summarized by means for each of the three replications for analyses. All plants >1 percent were selected for analyses and results.

Results

Definite changes in composition of forage plants occurred in diets of the desert cottontail throughout the 5 month growing season (Table 1). A total of 47 plant species were identified in the diet of cottontails. Twelve genera and/or species comprising >1 percent, accounted for 86 percent of the diet in May; twelve plants made up 96 percent in June; eleven forage plants provided 94 percent of the diet in July. However, only ten forage plants accounted for 88 percent composition in August, and eight plants provided 81 percent of the diet in September.

The proportion of grasses in the diets of cottontails increased from 72 percent

Table 1. Average relative density of desert cottontail diets (%) with standard errors (in parentheses) for common plant species (>1%) over five months in 1981 and average composition by category in western South Dakota.

Category and Species	May	June	July	Aug	Sept	Average
Grasses and sedges						
Western wheatgrass *Pascopyrum smithii*	48.5(18.6)	57.4(8.3)	52.8(16.1)	56.8(4.7)	49.4(22.8)	53.0(6.0
Brome *Bromus spp.*	0.8(0.4)	2.0(1.6)	0.5(0.5)	0.0(0.0)	5.3(4.3)	1.7(0.9)
Buffalograss *Bouteloua dactyloides*	1.6(0.4)	0.4(0.4)	3.5(3.5)	0.4(0.2)	0.0(0.0)	1.2(0.7)
Sedge *Carex spp.*	2.1(1.7)	2.0(0.6)	0.4(0.3)	0.0(0.0)	0.8(0.8)	1.1(0.4)
Fescue *Festuca spp.*	6.5(1.8)	10.8(4.0)	7.9(4.5)	5.1(4.1)	0.1(0.1)	6.1(1.6)
Plains muhly *Muhlenbergia cuspidata*	4.2(2.1)	6.3(4.0)	8.7(4.1)	4.9(3.6)	3.5(2.0)	5.6(1.3)
Squirreltai *Sitanion hystrix*	4.1(1.3)	2.3(1.4)	7.0(1.2)	9.6(4.2)	5.4(2.3)	5.7(1.1) l
Sand dropseed *Sporobolus cryptandrus*	2.0(0.5)	1.4(0.2)	1.1(0.7)	1.0(1.0)	0.0(0.0)	1.1(0.3)
Needlegrass *Stipa spp.*	1.9(1.4)	2.7(1.5)	3.8(3.6)	2.2(0.5)	0.1(0.1)	2.1(0.8)
Grasses & Sedges Total[1]	**72**	**86**	**88**	**88**	**65**	**79**
Forbs						
Aster *Aster spp.*	0.0(0.0)	0.2(0.2)	0.3(0.3)	0.0(0.0)	5.0(5.0)	1.1(1.0).08
Lambsquarters *Chenopodium album*	2.9(2.1)	0.8(0.8)	0.3(0.3)	1.2(1.2)	5.6(5.1)	2.2(1.1)
Kochia *Kochia scoparia*	0.2(0.2)	2.1(1.1)	3.1(1.6)	3.9(2.0)	0.6(0.2)	2.0(0.6)
Stickseed *Lappula redowskii*	5.3(4.0)	3.3(3.1)	0.3(0.3)	0.7(0.7)	0.0(0.0)	1.9(1.1)
Woolly plantain *Plantago patagonica*	0.9(0.9)	1.6(1.6)	1.5(1.1)	1.0(1.0)	0.5(0.5)	1.1(1.1)
Scarlet globemallow *Sphaeralcea coccinea*	1.9(1.6)	3.7(0.6)	3.8(1.4)	3.0(1.7)	4.1(3.4)	3.3(0.8)
Forbs Total[1]	**22**	**13**	**11**	**11**	**31**	**17**
Shrubs						
Plains pricklypear *Opuntia polyacantha*	5.1(3.8)	0.6(0.3)	1.2(0.7)	0.7(0.7)	2.8(2.7)	2.1(0.9)
Shrubs Total[1]	**6**	**1**	**1**	**1**	**4**	**4**

[1] Total diet composition of all plants within category.

in May to a high of 88 percent in July and August, then declined to a low of 65 percent in September (Table 1). Western wheatgrass was the most common species in the diet and ranged from 49 percent to 57 percent. Other grasses common in the diet included fescue (*Festuca* spp) (less than 1% to 11%), plains muhly (4% to 9%) and squirreltail (*Sitanion hystrix*) (2% to 10%). Fescue was utilized consistently from May to August and was present in trace amounts in September. Plains muhly (*Muhlenbergia cuspidata*) was more common in June and July in the diet. Squirreltail was greatest in August. Other grass species within the cottontail diet comprised less than 1percent of the total diet during the 5 month growing season.

Forbs in the diet declined from 22 percent in May to 11 percent in July and August (Table 1). However, forbs provided 31 percent of the desert cottontail's diet in September. Scarlet globemallow was the most important forb in the diet followed by lambsquarters (*Chenopodium album*) and kochia (*Kochia scoparia*). Other forbs were minor in the desert cottontail diet. Shrubs ranged from 1 percent to 6 percent of the diet (Table 1). Plains pricklypear (*Opuntia polyacantha*) varied from 1 percent to 5 percent within the cottontail diet. The greatest amount of shrubs in the diets of cottontails occurred in May. Over the five months (May-September), four grasses, western wheatgrass, fescue, plains muhly and squirreltail provided 70 percent of the desert cottontail's diet.

Discussion

Cottontails consumed a wide variety of plants. As in other studies, the desert cottontail in this study consumed mostly grasses and sedges (Hansen and Gold 1977, MacCraken and Hansen 1984, deCalesta 1979, Johnson 1979). Forbs were important in September, and a similar trend was observed by MacCracken and Hansen (1984). Monthly changes in diet composition is expected to be related to moisture content for metabolic water, nutrition requirements, and changes in maturity of the various plant species to meet the sustainable requirements of the desert cottontail.

Many of the forage species consumed by the desert cottontail in this study were similar to those consumed by desert cottontail on prairie dog towns in Colorado (Hansen and Gold 1977). Sedges were dominant in the earlier studies whereas western wheatgrass was predominant in this study. Desert cottontails are commonly associated with prairie dog towns (Sharps and Uresk 1990, Hansen and Gold 1977).

Although desert cottontails on prairie dog towns consumed a variety of plant species, grasses specifically western wheatgrass were clearly predominant. Forbs were seasonally important, with scarlet globemallow the most common in the diet. Scarlet globemallow was also common in diets (10%) of the black-tailed prairie dog and cattle on the study area (Uresk 1984, Uresk 1986). Shrubs were less important than either grasses or forbs. Dietary analysis revealed clear preferences of the cottontail for certain foods especially as the season progressed. Management for desert cottontail populations is strongly related to four grass species that made up 70 percent of the diet that includes western wheatgrass, fescue, plains muhly and squirreltail.

The study suggests that forage competition for plant species is expected to occur among prairie dogs, cattle, bison, pronghorn, and deer that are common to the area. Information obtained from this study is important for resource managers to be in compliance with desired management plans that will include both plant and animal sustainability and to implement guidelines.

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