

FOOD HABITS OF BISON AND THEIR RELATIONSHIP
TO OTHER UNGULATES USING RANGELANDS
IN WIND CAVE NATIONAL PARK

Jewel K. Popp
Robert B. Dahlgren
Iowa Cooperative Wildlife Research Unit
Iowa State University

79029

Objectives

The range use patterns and food habits of Bison bison at Wind Cave National Park (WCNP) were observed during the winter, spring and summer of 1979. WCNP, a fenced area of 11,355 ha, is located in the southeastern portion of the Black Hills of South Dakota. Approximately 80 percent of the Park is in rolling mixed-grass prairie, and the remainder is rocky hills covered by Pinus ponderosa. Other major herbivores inhabiting the Park include elk (Cervus elaphus), pronghorn (Antilocapra americana), mule deer (Odocoileus hemionus), and black-tailed prairie dog (Cynomys ludovicianus). Information pertaining to the bison herd's use of range resources is necessary to make proper management decisions concerning the bison within the Park. In addition, because WCNP is a remnant representation of the mixed-grass floral and faunal complex, and because the bison are able to roam freely within the boundaries, this study was also an opportunity to describe the ways in which bison utilize some of the resources with which they evolved. Specific objectives of the study were to determine (1) seasonal food habits, key forage species, and differences in food habits between age and sex classes, and (2) interactions with other major ungulates using the range.

Methods

Range use was determined by routinely traveling through the Park along major highways and roads. Approximately 30 percent of the entire Park is visible for observation along these travel routes. Whenever bison were observed, the range site they were utilizing and their activity at that range site was recorded. The range sites considered can be categorized as warm season sites, cool season sites, and prairie dog towns. An average of 3,000 bison sightings was recorded in each season.

Food habit trends were determined by conducting at least two feeding site examinations per week. A feeding site exam was conducted on a area where bison had recently been grazing. Transects were run through the grazed area, and at regular intervals along the

transects the grazed species of plants were identified. The amount of each species eaten was also determined by counting the number of stems and/or leaves freshly bitten off each plant. A weekly average of 1,000-1,500 instances of use (number of leaves and/or stems bitten) was recorded.

Cool season grasses and grass-like species received values nearly equal to or greater than 1.0 throughout the entire year (Table 2). During mid and late summer, warm season grasses were associated with index values greater than 1.0 yet had values less than 1.0 the rest of the year. Shrubs and forbs had index values less than 1.0 throughout the year. Bison seem to have seasonal shifts in types of graminoids they select. Seasonal shifts in grazing preferences appear to coincide with the growing seasons of cool and warm season graminoids. Bison seem to be grazing vigorously growing grasses and sedges. This is especially evident during mid and late summer when bison begin to graze warm season grasses. Selection for vigorously growing plants is of obvious value because of the increased palatability and nutritive value of growing plants. Evidently, when bison inhabit rangelands as diverse and productive as those at WCNP, they will utilize the range resources selectively and maximize them. Perhaps free-roaming bison in historical times utilized similar feeding strategies.

Literature Cited

Krueger, W. C. 1972. Evaluating animal forage preference. Journal of Range Management 25: 471-475.

Acknowledgements

We wish to thank Lester F. McClanahan, Superintendent, and Richard W. Klukas, Wildlife Biologist, Wind Cave National Park, for their encouragement and assistance during the study. Mr. Klukas collected some of the field data. Funds for the study were supplied by the National Park Service through the University of Wyoming--National Park Service Research Center.

Table 1. Seasonal Relative Preference Indices for Range Use.

	Cool season sites	Warm season sites	Prairie dog towns
Spring	1.47	0.59	0.14
Early summer	1.21	0.56	1.08
Mid-summer	1.18	0.47	1.49

Late summer	0.87	0.52	2.33
Autumn	1.47	0.38	0.84
Winter	1.50	0.75	0.08

Food habits will also be determined by microscopic analysis of bison fecal samples. Samples from at least 50 fresh bison chips were collected each season. These samples were oven dried for 24 hours at 60 C and then the dried samples were ground with a Wiley mill having a 20-mesh screen. These samples will be composited by season and analyzed with a phase contrast microscope to determine what species of plants were eaten. A microscopic reference collection of the plant species found within WCNP was completed. The collection consists of 180 species of plants, representing 50 families. A key to the identification of these plants was prepared to aid in the micro-analysis of the bison fecal samples.

Forage availability was determined by two methods. Relative frequency of the various plant species available for bison to eat on each feeding site exam area was determined by running transects through the exam site and identifying plants encountered at each pace along the transects. Twice a month more intensive vegetation analysis was conducted on representative feeding site exam terminated at 40 random locations of a Daubenmeier frame along transects through the exam area.

Results and Discussion

Data collected in 1979 was compiled with that collected in summer and fall of 1978. Collection of field data is now complete.

A relative preference index (RPI) was computed to evaluate any seasonal preferences in either range or forage use. The index (Krueger 1972) is calculated in the following manner:

$$\text{Relative Preference Index} = \frac{\% \text{ range (or forage) type utilized}}{\% \text{ range (or forage) type available}}$$

An index value of greater than 1.0 would mean that bison were selecting for a particular range site or forage type; less than 1.0 would mean a lack of selection.

Cool season sites were associated with a index of greater than 1.0 during all seasons except late summer (Table 1). Throughout the year, warm season sites had index values less than 1.0. Prairie dog towns had index values greater than 1.0 in the summer seasons yet had values less than 1.0 at other times. There appears to be a change in range site preferences by bison during the summer. They

appear to be strongly attracted to prairie dog towns and less attracted to non-dog town areas. The reason that the dog towns are so attractive to the bison in the summer is unknown. Some researchers feel the towns are, in effect, a staging ground for the bison's breeding activities as their rut occurs in the summer. Yet other researchers feel the vegetation of the towns may be attractive to the bison. This preference between bison and prairie dogs may have existed historically.

Table 2. Seasonal Relative Preference Indices for Forage Use.

	Cool season grasses	Warm season grasses	Forbs and shrubs
Spring	1.37	0.53	0.06
Early summer	1.39	0.77	0.26
Mid-summer	0.99	1.32	0.52
Late summer	1.85	1.21	0.33
Autumn	1.51	0.63	0.38
Winter	1.07	0.88	0.26