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Food Item Use by Coyote Pups at Crab Orchard National Wildlife Refuge, Illinois

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ABSTRACT

Use of food items by coyote (*Canis latrans*) pups at a den site in Crab Orchard National Wildlife Refuge, Illinois, was examined in June 1986. Fawn white-tailed deer (*Odocoileus virginianus*) was the most frequently occurring item (85.9%) in pup scats. In contrast, small mammal was the most frequently occurring item (58.1%) in adult coyote scats, but was found in only one pup scat. Additionally, adults used a greater diversity of food items. Adult coyotes appear to selectively bring food items to pups. Fawns probably constituted an energetically efficient item for feeding pups due to relatively large size, digestibility, and availability.

INTRODUCTION

Coyote food habits have been extensively documented (e.g., Bekoff 1982). However, use of items by different age classes has received relatively little attention (Harrison and Harrison 1984). Young pups that are being weaned are supplied with food by adults. Therefore, a reasonable assumption is that pups and adults feed on similar items. This hypothesis was tested by comparing food item use by pups at a den site to that of adult coyotes using the same area.

STUDY AREA AND METHODS

An investigation of coyote foraging ecology was conducted from 1986-1989 on an approximately 300 km^2 study area that encompassed Crab Orchard National Wildlife Refuge (CONWR) in Williamson and Jackson Counties, Illinois. CONWR was established in 1947, primarily as an wintering area for Canada geese (*Branta canadensis*). Habitat diversity is high due to past and current land-use patterns. Numerous food items are available to coyotes and include white-tailed deer, eastern cottontails (*Sylvilagus floridanus*), small rodents, deer and goose carrion resulting from fall harvests and natural

mortality, and wild fruits such as persimmon (*Diospyros virginiana*), American plum (*Prunus americana*), and black cherry (*P. serotina*) (Cypher 1991).

Use of food items by coyotes was determined from analysis of scats. A coyote den site was located in the northwest section of CONWR in May 1986. Pup scats, distinguished from adult scats by small size, were collected from this site in mid and late June. Adult coyote scats were collected along refuge roads in this same section of CONWR, also in mid and late June. All scats were oven-dried at 60°C for 24 hr to facilitate handling.

Mammalian remains in scats were identified from teeth and bone fragments (Glass 1981, Roest 1986) and guard hair characteristics (Stains 1958, Adorjan and Kolenosky 1969, Moore et al. 1974). Avian remains were identified based on feather, bill, and foot characteristics. Seeds of fleshy fruits were identified by comparison to known specimens (U.S. Department of Agriculture 1974).

Frequency of occurrence of items in scats was compared between adult coyotes and pups. Contingency table analysis employing a chi-square statistic was used to test the hypothesis that proportional use of items with ≥ 5% frequency of occurrence did not differ between pup and adult coyotes. Dietary diversity was compared by calculating a Shannon diversity index (Brower and Zar 1974):

$$H' = - \sum p_i \log p_i$$

where p_i is the proportional occurrence of item i in the sample. A t-test was used to test the hypothesis that the diversity of food items in scats did not differ between adult coyotes and pups (Hutcheson 1970).

RESULTS AND DISCUSSION

Small rodent (primarily prairie voles [*Microtus ochrogaster*] and southern bog lemmings [*Synaptomys cooperi*]), eastern cottontail, fawn, and bird were the most frequently occurring items in adult coyote scats in June 1986 at CONWR (Table 1). Small rodent and cottontail were the two primary items used annually by coyotes at CONWR, and apparently were dietary staples (Cypher 1991). Conversely, fawn and American plum were the most frequently occurring items in pup scats. Small rodent, cottontail, and bird all occurred relatively infrequently in pup scats. Other items occurring in pup scats included adult deer, woodchuck (*Marmota monax*), raccoon (*Procyon lotor*), Canada goose, and unidentified bird. Other items occurring in adult scats included adult deer, woodchuck, squirrel (*Sciurus* spp.), muskrat (*Ondatra zibethica*), raccoon, unknown bird, bird egg, reptile egg, American plum, black cherry, cow, beaver (*Castor canadensis*), opossum (*Didelphis virginiana*), grasshopper (Orthoptera), crayfish (Decapoda), blackberry (*Rubus* spp.), and unknown fruit.

Proportional item use differed significantly between adult coyotes and pups ($\underline{X}^2 = 179.5$, 9 df, $\underline{P} < 0.01$). Twenty items were found in adult coyote scats versus nine items in pup scats. This difference in dietary diversity also was reflected in the significantly higher Shannon index for the adults ($\underline{t}_{2,391} = 8.41$; $\underline{P} < 0.01$). The greater diversity of items in adult coyote scats and the difference in proportional item use between adults and pups both indicate that adult coyotes selectively bring items back to pups at den sites.

Fawns apparently were the most frequent food items brought to pups. Fawns may have constituted an energetically efficient item to bring to pups for three reasons. First, by selecting large items such as fawns, fewer trips back to the den are required to meet food requirements of pups. Harrison and Harrison (1984) drew this same conclusion after observing that fawns also were the primary item brought to dens by coyotes in Maine. Second, larger items have a greater proportion of digestible biomass than do smaller items which have a higher proportion of indigestible materials (e.g., hair, bone) (Floyd et al. 1975). Thus, larger items may provide more calories per unit weight than smaller items. This hypothesis that smaller items may be suboptimal for supplying food to pups is supported by the fact that small mammals occurred in over 50% of adult scats but in only one pup scat. Third, fawns are relatively abundant in June and are vulnerable due to small size and inexperience. Thus, they are easily obtained prey for adult coyotes. The plums consumed by pups probably were not brought by adults. Plum trees were abundant near the den site. Therefore, the presence of plums in pup scats probably was a result of foraging efforts by pups.

A potential limitation in this analysis was that pup scats were obtained from only one den. Also, the area around the den from which adult scats were collected was small enough that most of the samples probably were from the parents of the pups, but some samples likely were from other coyotes. Comparisons of pup and adult food habits warrant further investigation using data from multiple family groups.

CONCLUSIONS

Reproducing coyotes may optimize foraging efforts to provision pups by selecting large, easily obtained items. This is consistent with numerous reports of increased predation on livestock by coyotes during pup rearing (e.g., Young and Jackson 1951, Wade 1980).

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Table 1. Occurrence and diversity of food items in adult and pup coyote scats, June 1986, Crab Orchard National Wildlife Refuge, Illinois.

	Occurrence			
	Pup (n=185)		Adult (n=93)	
Item	No.	%	No.	%
Adult deer	3	1.6	9	9.7
Fawn deer	159	85.9	28	30.1
Eastern cottontail	8	4.3	29	31.2
Small rodent	1	0.5	54	58.1
Woodchuck	7	3.8	6	6.5
Squirrel	-	-	2	2.2
Muskrat	-	-	6	6.5
Raccoon	10	5.4	2	2.2
Canada goose	6	3.2	-	-
Unknown bird	9	4.9	11	11.8
Bird egg	-	-	5	5.4
Reptile egg	-	-	2	2.2
American plum	20	10.8	4	4.3
Black cherry	-	-	3	3.2
Other	-	-	7[a]	7.5
Number of Items	9		20	
Shannon Diversity Index	0.419		0.907	

[a] One occurrence each of cow, beaver, opossum, grasshopper, crayfish, blackberry, and unknown seed.