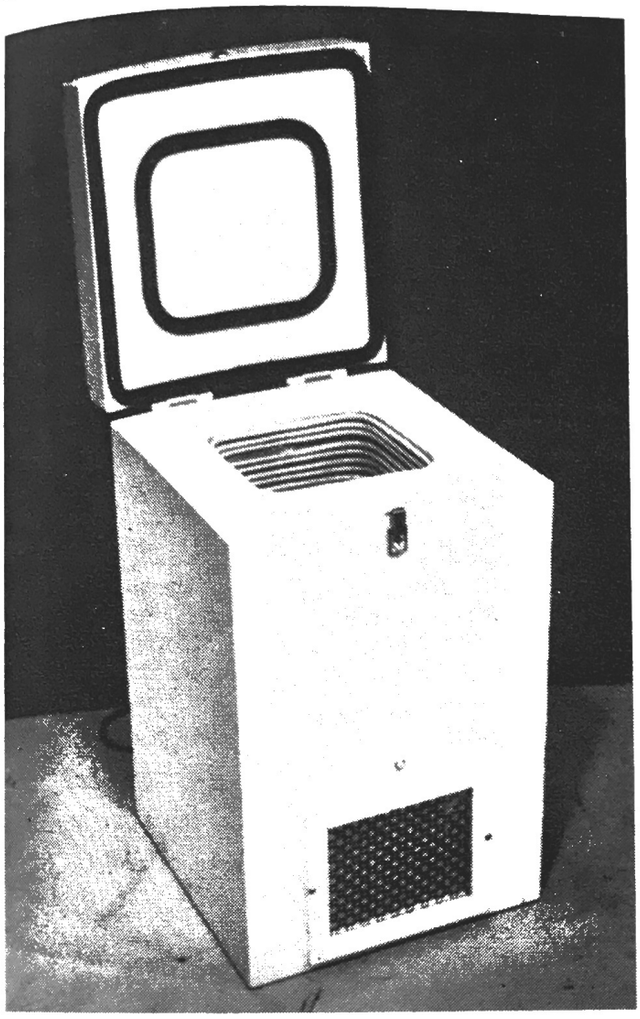

Figure 4: The finished freezer

other. A test button is mounted in the front of the cabinet just above the grille so that the operation of the alarm system can be checked.

Table 1 shows an approximate estimation of the purchase price for parts. Figure 4 shows the completed freezer, while Figures 1-3 give construction details.

Results with the Freezer's Use

The prototype unit was tested for temperature stability under load at the local Red Cross laboratory. Later, cryoprecipitate was stored and serially assayed for retention of potency at Vanderbilt University. The unit performed satisfactorily in all respects. At present several of the freezers are in home use. Two patients are on prophylactic care, and five are on early demand therapy. The good clinical results indicate satisfactory performance of the freezer in home use.

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FOODS OF THE GRAY FOX (*UROCYON CINEREOARGENTEUS*) ON EUROPEAN WILD HOG (SUS SCROFA) RANGE IN EAST TENNESSEE [1]

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Abstract

Stomach contents of 24 gray foxes (*Urocyon cinereoargenteus*) collected January to July, 1966-68, were examined to determine food habits of foxes on the Tellico Wildlife Management Area in southeast Tennessee. Food items were identified to the lowest taxonomic category possible. Cottontail (*Sylvilagus floridanus*), arthropods, small mammals, wild hogs (*Sus scrofa*), and birds in that order made up 84 percent of the diet. Scavenging was responsible for at least 18 percent of the food items. Wild hog in the diet was believed to be carrion as hogs consumed were adults. No evidence was found of predation on piglets.

The study was conducted to obtain information on food habits of the gray fox (*Urocyon cinereoargenteus*) in southeast Tennessee and represents the first study of fox food habits on wild hog (*Sus scrofa*) range. A primary interest was to determine the extent to which gray foxes preyed upon piglets. This report is based on an examination of the stomach contents of 24 gray foxes trapped on the Tellico Wildlife Management Area

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from January to July during the years 1966-1968. The authors are indebted to Dr. Ralph W. Dimmick, The University of Tennessee, for criticism of the manuscript. The specimens examined were collected by L. A. Hunt and D. J. Morris.

Description of Study Area

The Tellico Wildlife Management Area is located on the Cherokee National Forest, Monroe County, Tennessee. The area encompasses 78,500 acres, and is characterized by rugged mountain peaks, steep slopes, narrow valleys dissected by fast moving streams, and forests in advanced stages of succession (Matschke and Hardister, 1966). An extremely variable climate, influenced by elevation, presents moderately cold winter temperatures, warm summer days with cool nights, and one of the highest rainfalls (averaging 56 inches) in the United States. Logging operations are limited to timber stand improvement. Access into the area includes unimproved roads and trails as well as some all-weather roads. Farmland occupies less than one percent of the area and is restricted to private lands bordering the area.

Materials and Methods

Foxes were captured in #2 double-spring steel traps by personnel of the Tennessee Game and Fish Commission. The traps were set at elevations ranging from 2,000 to 4,400 feet. The number of traps set each day varied from 1 to 11. A total of 626 trap nights resulted in 22 captures. The remaining animals utilized in the study were obtained by hunting. Stomachs were removed and preserved in a 10 percent formalin solution prior to analysis.

Stomachs were opened and the contents examined with a binocular microscope. Contents consisted largely of hair, feathers, bone fragments, and particles of arthropod exoskeletons. Food items were separated and identified to the lowest possible taxonomic category.

Hairs were identified by the following methods: (1) using a key to guard hairs (Stains, 1958); (2) comparing gross features with known hair samples using a binocular microscope, and (3) comparing fine hair structure with that of known hair samples using a compound microscope. *Sus scrofa* remains were verified to be European wild hog by tip structure of guard hairs (Henry, 1969). Arthropods were identified when sufficient remains were present. Bird remains consisted of a few down feathers and identification beyond class was impossible. Most stomachs contained large quantities of debris eaten at the trap site, precluding analysis of plant foods.

Specimens collected during January, February, and March (the winter period) were compared with those collected during May, June, and July (the summer period). Data were presented by frequency of occurrence, e.g., the number and percent of stomachs containing a particular food item.

Results and Discussion

Of the 24 stomachs examined, 21 (88 percent) contained a total of 56 food items. As foxes remained alive in traps for a period of time, an absence of food in stomachs may have resulted from digestion rather than a lack of available food.

Five principal food types (cottontail, small mammals, arthropods, wild hogs, and birds) made up 84 percent of the food items (Table 1). Errington (1935) believed that stomach analysis reveals relative abundance of prey. Other factors, however, such as weather conditions and cover characteristics, influence prey availability and the consequent dietary pattern of a predator.

Gray foxes on the Tellico Wildlife Management Area apparently obtain significant amounts of food by scavenging. At least 10 items (18 percent of the total) occurring in the stomachs were obtained in this manner. European wild hog, ranking fourth in the diet, was believed to be taken solely by this manner of feeding. Errington (1935) stated that carrion was readily accepted throughout the winter months. Refuse occurred in three stomachs indicating the lure of trash heaps. Other items in the diet may have been picked up by scavenging also, but the extent of this is not known.

The cottontail was the principal food of the gray fox, occurring in 54 percent of the stomachs. Although no data is available on the relative abundance of prey species, it is significant that the cottontail was the principal prey because trapping occurred at the higher elevations of the Appalachians, which is very poor cottontail habitat. Whether this represents food preferences or prey vulnerability is a matter of speculation. Foxes at Tellico fed on cottontails more heavily during summer than during winter, as cottontail remains appeared in 65 percent of foxes collected in summer and only 29 percent of those in winter. Increased feeding on cottontails in summer coincides with peak production of young cottontails.

Arthropods, chiefly insects, occurred in 50 percent of the specimens. Feeding on these animals was greatest during June and July when 75 percent of the stomachs contained arthropods, often in large numbers. Typically they were in advanced stages of digestion and only broken portions of the exoskeleton remained. A few

TABLE 1: Stomach contents of 24 gray foxes collected during January-July, 1966-68 on the Tellico Wildlife Management Area, Monroe County, Tennessee

Items	Frequency of Occurrence					
	Winter (n=7)		Summer (n=17)		Total (n=24)	
	No.	%	No.	%	No.	%
Mammalia						
Suidae						
Sus scrofa	3	43	4	24	7	29
Leporidae						
Sylvilagus floridanus	2	29	11	65	13	54
Mustelidae						
Spilogale putorius	1	14	0	0	1	4
Sciuridae						
Tamias striatus	0	0	1	6	1	4
Zapodidae						
Zapus hudsonicus	0	0	1	6	1	4
Cricetidae						
Microtus pinetorum	1	14	1	6	2	8
Peromyscus maniculatus	1	14	0	0	1	4
Peromyscus gossypinus	0	0	1	6	1	4
Sigmodon hispidus	1	14	0	0	1	4
Unidentified	0	0	3	18	3	13
Aves	3	43	1	6	4	17
Reptilia						
Serpentes	1	14	0	0	1	4
Arthropoda						
Adults	3	43	9	53	12	50
Eggs	0	0	2	12	2	8
Vegetation						
Seeds	1	14	1	6	2	8
Refuse	1	14	2	12	3	13

were identified as grasshoppers, crickets, and beetles. It is believed that numerous species of the larger arthropods (ant size and above) were included. In Missouri, Korschgen (1957) found that nearly one-third by volume of summer foods and one-ninth of the fall diet consisted of insects, although they made up only 2.8 percent of the food in the total yearly diet. Predation on small mammals was similar during winter and summer, Table 1).

Hair from European wild hogs was found in 29 percent of the stomachs. Hog remains were found in 43 percent of the winter sample, and were also present in nearly one-fourth of the summer sample. Wild hogs, fatally wounded during the managed hunts in October and November, may have been the major source of this food item during winter. Poachers may supply foxes with occasional carcasses throughout the year. Natural mortality factors provide another source of carrion. Hairs examined were all from adult hogs indicating that predation on piglets is slight or nonexistent.

Birds were frequently eaten during winter, occurring in 43 percent of the stomachs. In summer, however, birds were a minor food item and made up only 6 percent of the diet. Korschgen (1957) found birds were an important food of foxes in Missouri, occurring in 26 percent of the specimens and making up 16 percent of the yearly volume. In Missouri, however, the volume eaten in summer was three to four times that for other seasons.

Other foods comprised only 10 percent of the diet. Spotted skunk (*Spilogale putorius*) and snake remains each occurred once. Arthropod eggs were found in two specimens. In each a large number of eggs were present, but total volume was small. Fox hair was identified in most stomachs. It is assumed that this hair resulted from grooming habits and attempts to contend with the trap.

The large amount of debris eaten by most specimens after being trapped precluded analysis of plant foods. One stomach contained a quantity of corn. Nuts were consumed by another fox. These were the only items in the series of stomachs readily distinguishable as plant foods.

Conclusions

The gray fox was not a significant predator upon European wild hog piglets on the Tellico Wildlife Management Area. However, carrion of *Sus scrofa* significantly contributed to the fox diet on the study area. The cottontail was the principal food of the gray fox.

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