



---

Food and Dens of the Opossum (*Didelphis virginiana*) in Northeastern Kansas

Author(s): Lewis L. Sandidge

Source: *Transactions of the Kansas Academy of Science (1903-)*, Mar., 1953, Vol. 56, No. 1 (Mar., 1953), pp. 97-106

Published by: Kansas Academy of Science

Stable URL: <https://www.jstor.org/stable/3626198>

#### REFERENCES

Linked references are available on JSTOR for this article:

[https://www.jstor.org/stable/3626198?seq=1&cid=pdf-reference#references\\_tab\\_contents](https://www.jstor.org/stable/3626198?seq=1&cid=pdf-reference#references_tab_contents)

You may need to log in to JSTOR to access the linked references.

---

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



JSTOR

Kansas Academy of Science is collaborating with JSTOR to digitize, preserve and extend access to *Transactions of the Kansas Academy of Science (1903-)*

## Food and Dens of the Opossum (*Didelphis virginiana*) In Northeastern Kansas

LEWIS L. SANDIDGE  
University of Kansas, Lawrence

Various aspects of the ecology of the opossum (*Didelphis virginiana* Kerr) have been studied in different parts of the United States. In Kansas, however, no results of such studies have been reported. Regional differences in habits are to be expected in the opossum because it has a wide geographic range which includes diverse environments. The study here reported upon was made with the aim of understanding the opossum's feeding habits, general ecology, and economic importance, in northeastern Kansas.

The writer is indebted to Dr. Rollin H. Baker and Dr. Henry S. Fitch for guidance, in the field work and laboratory analysis of stomach contents, and acknowledges critical assistance from them and Professor E. Raymond Hall in preparation of the manuscript. Help in identifying food items and parasites was received from Dr. Asa Chandler (cestodes), Dr. Edward H. Taylor (reptiles and amphibians), Dr. W. H. Horr (seeds) and Mr. Charles F. Smith (nematodes). Mr. C. W. Ogle, a fur buyer in Lawrence, Kansas, kindly made available records and specimens of opossums that he had purchased from local trappers. The Kansas Forestry, Fish and Game Department granted me a permit to take opossums at times other than the prescribed trapping season.

Specimens were obtained for this study by Mr. Forrest H. Jones and the writer, within the six month period, September 1949 through March, 1950. Opossums were caught in steel traps, set at openings to dens, in trails and in other situations where opossums were expected to occur. Usually the traps were baited with canned dog food.

The digestive tract of each opossum taken was preserved in a 10 per cent formalin solution. Later, each tract was opened for its entire length and its contents removed and spread on paper towels to dry for three days at 70° F. The dried contents were weighed on a platform balance. Then, with the aid of a dissecting microscope, the food items were separated and weighed. Finally the volume of each item was computed by the amount of water it displaced in a graduated cylinder.

To determine numbers of available den sites in the various habitats found in Douglas County, transects measuring 1320 feet in length and six feet in width were used.

Six major types of habitat in which the opossum lives were recog-

nized in Douglas County. These habitats are defined on the basis of vegetation and availability of food and denning sites. There are three more or less distinct woodland habitats: the upland oak-hickory association; the mixed woodlands association principally along smaller streams; and the willow-cottonwood association along the Wakarusa and Kansas rivers. A pasture habitat is mostly sown to tame grasses although some native grasslands are still present. The cultivated habitat is more extensive than all the others combined, and includes several different types of land used for a variety of crops. A sixth habitat, the suburban, exists in the vicinity of townsites. Further description of these environmental types is given by McGregor (1948). Den sites were most abundant in the woodland areas especially in the oak-hickory and mixed woodlands associations where clefts in rocky ledges, dens among tree roots in cut banks, and tree hollows were readily available. In the suburban habitat, den sites were present in cracks and holes in and under foundations of houses and other buildings. Fewer den sites were found in pasture and cultivated areas; the willow-cottonwood association had abundant den sites but most of these were temporary because of frequent inundations in time of floods. The natural food supply was possibly less in the pasture and cultivated types than in the others.

#### **Food Habits**

The food habits of the opossum were investigated by field observations and by the analysis of the contents of digestive tracts of 62 opossums collected between September 25, 1949, and March 27, 1950. Two contained no food. Food items recorded from intestinal tracts (see Table 1) include insects of ten families: metallic wood borers (*Buprestidae*), ground beetles (*Carabidae*), lady bird beetles (*Coccinellidae*), horned passalus (*Passalidae*), lamellicorn beetles (*Scarabaeidae*), carrion beetles (*Silphidae*), stink bugs (*Pentatomidae*), assassin bugs (*Reduviidae*), crickets (*Gryllidae*), and short-horned grasshoppers (*Locustidae*); at least six mammalian genera and species: the white-footed mouse (*Peromyscus* sp.), cottontail rabbit (*Sylvilagus floridanus*), muskrat (*Ondatra zibethicus*), prairie vole (*Microtus ochrogaster*), mole (*Scalopus aquaticus*), and opossum (*Didelphis virginiana*); five species of birds: domestic chicken (*Gallus*), yellow-shafted flicker (*Colaptes auratus*), cardinal (*Richmondia cardinalis*), meadowlark (*Sturnella* sp.), and starling (*Sturnus vulgaris*); five species of fruits and seeds: winter wheat (*Triticum aestivum*), goosefoot (*Chenopodium* sp.), wild grape (*Vitis* sp.), apple (*Pyrus malus*), and pear (*Pyrus communis*); three species of reptiles and one amphibian: five-linked skink (*Eumeces fasciatus*), Dekay's snake (*Storeria dekayi*), worm snake (*Carphophis*

*amoenus*), and the leopard frog (*Rana pipiens*); a single species of land snail (*Triodopsis albolabris*); a crayfish (*Orconectes* sp.); and centipedes. The separate habitat samples with 10 tracts each were too small to be adequately representative. Time of collection may have differed enough to cause some of the apparent differences between samples from different habitats. The opossums from which the samples were obtained may have obtained food in one or more habitats other than those in which the animals were trapped. The most noteworthy differences between the samples from different habitats are mentioned below.

*Insects:* Of the various food items, insect remains constituted the greatest part of the total volume (42.2 per cent) and of the total weight (42.6 per cent), and also had the greatest frequency of occurrence (found in 56 of the 60 stomachs). Insect remains were most frequent from animals captured in the pasture habitat, and least from those captured in the mixed woodland habitat.

The two families which occurred most frequently and which constituted the greatest volume and weight of the insect remains were the Carabidae and the Locustidae. The latter were in 52 of the stomachs and were represented most frequently by the short-horned grasshoppers, *Melanoplus femur-rubrum* and *M. differentialis*. The Carabidae were in 44 tracts, but constituted only 3.8 per cent of the total volume and 4.4 per cent of the total weight. Although all 10 families of insects were found in the digestive tracts of opossums trapped in the autumn, only the Locustidae and Carabidae were represented outstandingly in tracts from opossums trapped in the winter. Locustid remains were most prominent in material from the pasture habitat, constituting 67.9 per cent of the total volume and 66.2 per cent of the total weight. Carabid remains were of greatest importance in the suburban habitat (12.9 per cent of the total weight and 10.9 per cent of the total volume).

*Mammals:* The percentage of mammalian remains in the digestive tracts approximated the percentage of insect remains, constituting 41.4 per cent of the total volume and 39.4 per cent of the total weight, but were recorded in only 20 of the 60 food samples.

Mammalian remains occurred least frequently in specimens from the pasture habitat and most frequently in those from the oak-hickory habitat, ranking first in volume and weight from this area. Mammals were of greater importance in the diet in the winter months than in the fall, when insects and fruits were more available. Birds and mammals killed by severe winter storms and preserved in natural "cold storage" were an important source of food in the season of scarcity.

The cottontail rabbit was the most important mammalian item by

all criteria, with 18.0 per cent by volume, 14.7 per cent by weight, and frequency of occurrence of 15. This species was recorded from all habitat divisions, with the greatest frequency of occurrence (5 times), total volume (25.5 per cent), and total weight (21.0 per cent) in the mixed woodland habitat. Flesh and fur were the most frequent of rabbit remains with but few bone fragments. I follow Reynolds (1945) in considering the remains of the larger mammals, *Sylvilagus*, *Didelphis*, and *Ondatra*, to be carrion, because they were accompanied by carrion-feeding silphid beetles in 12 of the 19 occurrences.

*Fruits:* Fruits occurred in only eight tracts, but constituted 10.3 per cent of the total weight and 8.6 per cent of the total volume of the diet (see Table 1). In the late fall and winter, pears represented the largest single dietary item in weight and volume. Four of the six opossums taken near orchards had eaten this fruit. Pears left on the ground beneath the trees are readily available at a time when certain other foods are scarce. Wild grapes were utilized also in late fall and early winter.

*Birds:* Remains of birds in the 60 digestive tracts examined, amounted to 2.8 per cent of the total weight and 3.1 per cent of the total volume of the diet; of the 13 occurrences nine were of domestic chicken, and one each was of cardinal, starling, meadowlark, and flicker (see Table 1). Remains of chicken were found in opossum tracts taken in all habitats, except the oak-hickory habitat but were most frequent from the suburban habitat, where they occurred in four digestive tracts. These remains consisted of feathers, bones, and fragments of egg-shell. The probable source was carrion or garbage which in every case was found in the area from which the specimen was taken. I think that none of the chickens was killed by the opossums.

*Miscellaneous:* The three species of reptiles and one amphibian found in digestive tracts were the common five-lined skink, Dekay's snake, worm snake, and leopard frog.

Centipedes constituted 1.6 per cent of the total weight and 1.6 per cent of the total volume of the diet, and occurred more frequently than any other invertebrates except insects. Centipedes were in 23 of the digestive tracts and were most frequent in those from the oak-hickory habitat. Crayfish of the genus *Orconectes* occurred in two tracts from the willow-cottonwood habitat. This genus of crayfish lives in smaller streams and ponds throughout the area and is active in warm periods throughout the fall and winter. The land snail was found in the digestive tract of an opossum taken from the oak-hickory habitat.

The only seeds utilized were those of goosefoot; they occurred in six opossums, and constituted 1.3 per cent of the total weight of the food

and 1.3 per cent of the total volume of the diet (see Table 1). Although opossums were collected where they had ready access to corn, it was not found in their digestive tracts. Traces of wheat were in two tracts. In central Missouri, Reynolds (*op. cit.*:373) found that corn was the only food of any importance utilized in the winter. Furthermore, Wiseman and Hendrickson (1950:334), on the basis of studies in Iowa, stated that "During the winter, corn appeared to form the bulk of the opossum's diet, and many scats consisted almost entirely of corn refuse."

Material thought to have been ingested accidentally was: debris used to cover traps (fragments of dry leaves, twigs, mud, and decayed wood), in 49 of 60 stomachs; opossum hair in every stomach; and carrion beetles (family Silphidae) in 12 of 60 stomachs.

Distinct preference was noted for certain of the foods that were used as bait. Reynolds (*op. cit.*:373) found from his analysis of food and feeding experiments with captives that the opossum had a distinct preference for "animal material, particularly for insects." I disagree with the opinions, of earlier investigators, that opossums make no choice of food and consume anything edible. However, the opossum's adaptability in utilizing various foods probably is an important factor in its success as a species.

**Table I. Comparative volumetric and weight analysis of foods from sixty opossum intestinal tracts taken from September 1949 to February 1950, in Douglas County, Kansas.**

	Percentage of total volume	Percentage of total weight	Number of occurrences
Short-horned grasshoppers .....	38.3	38.1	52
Cottontail rabbit .....	18.0	14.7	15
Opossum .....	10.9	10.2	3
Pear .....	6.7	8.1	4
Mole .....	5.8	6.8	1
Ground beetles .....	3.8	4.4	44
White-footed mouse .....	3.3	3.8	3
Muskrat .....	1.8	2.1	1
Starling .....	1.9	1.6	1
Centipedes .....	1.6	1.6	23
Prairie vole .....	1.5	1.8	2
Apple .....	1.4	1.7	1
Goosefoot .....	1.3	1.3	5
Dekay's snake .....	1.1	1.1	1
Wild grape .....	.5	.5	3
Land snail .....	.3	.4	1
Crayfish .....	.3	.3	2
Crickets .....	.1	.1	12
Meadowlark .....	.1	.1	1
Worm snake .....	.1	.1	1
Leopard frog .....	.1	.1	1
Carrion beetles .....	tr.	tr.	12
Metallic woodborers .....	tr.	tr.	9
Stink bugs .....	tr.	tr.	6
Lamellicorn beetles .....	tr.	tr.	3
Winter wheat .....	tr.	tr.	2
Ground beetles .....	tr.	tr.	1
Horned passalus .....	tr.	tr.	1
Assassin bugs .....	tr.	tr.	1
Domestic chicken .....	tr.	tr.	1
Yellow-shafted flicker .....	tr.	tr.	1
Cardinal .....	tr.	tr.	1
Five-lined skink .....	tr.	tr.	1

**Habitat Preference and Denning Habits**

Impressions concerning the habitat preference of the opossum were gained from the varying success in trapping the animal in different situations and from the distribution of tracks and other signs. Availability of suitable den sites, and of food and water, are obvious factors controlling the distribution of opossums, and probably their numbers. Dens were counted on transects, each 1320 feet long and six feet wide, May 9-12, 1950. Counts were made in a total of 18 such transects, three in each of the six habitat divisions. Each set of three transects included one well within the habitat type and typical of it, one closely paralleling the edge of an adjacent habitat division, and one extending to the edge of an adjacent habitat. Den occupancy was assumed when entrances were worn smooth and hairs were present. The den counts probably are not directly indicative of population density; in the course of its nightly activity an individual may briefly enter many cavities other than the one in which it lives.

In the 18 transects, totaling about 3.3 acres in area, 60 dens were found; 43 showed signs of recent use, and 33 of these had been used by opossums. Of this group 23 were underground, 13 of which were in cavities along rocky outcrops, which occur near the tops of hills throughout this entire region. These limestone outcrops provide abundant den sites in which the occupants are well protected from inclement weather and natural enemies. Such sites were utilized five times in the mixed woodland habitat and four times in the pasture and oak-hickory habitats. Six other underground dens were in abandoned woodchuck burrows, three in the willow-cottonwood habitat, one in the pasture habitat, and two in the cultivated habitat. Of the remaining four underground dens, two were abandoned burrows of muskrat and two seemed to be abandoned dens of the striped skunk. The remaining ten dens occupied by opossums were situated as follows: 1 in a tree in an old squirrel nest, 2 in upright trees, 2 in large brush piles, 2 in logs on the ground, 2 under the foundations of houses, and 1 under a garage foundation. Of the other ten dens, which were occupied by different species, four were dens of woodchucks, two of spotted skunks, two of striped skunks, and two of cottontail rabbits.

The habitat most favored by the opossum was the mixed woodland, where trees with roots partly exposed by stream banks provided natural den sites. An incident worthy of note was the finding of a den housing an opossum and a woodchuck. Hairs of both animals were found at the entrance, and trapping on successive nights yielded first a woodchuck and then an opossum. Reynolds (*op.cit.*:374) "at no time . . . found

[opossums] occupying dens with other species of mammals." Lay (*op.cit.*:157) recorded an instance of a large male opossum and a male armadillo inhabiting a den of characteristic armadillo-construction. Yeager (1936) made no mention of finding opossums occupying dens with other species.

The counts on the transects revealed one opossum den to 0.121 woodchuck den and 0.091 den of the striped skunk, spotted skunk, and cottontail rabbit. The sample revealed also that for every unused den, there were two dens used by opossums. Close correlation exists between the position of den entrances and the presence of heavy cover nearby. Of the used dens only those in the suburban habitat and those in the pasture habitat were unprotected by cover. But, eight of the 17 unused dens had no cover in the vicinity of the den.

In several instances dens where traps were set yielded more than one opossum suggesting that two or more animals live together, in the same den or in closely adjacent dens. At one den a male was trapped on September 26 and another on September 27. At another den a female was trapped on October 29 and another on October 30. At still another den a male and female were trapped at separate entrances on November 8, and on the following night a female was trapped at the same entrance where the male was previously taken. The abundance of cavities, suitable for dens, along rock outcrops, and the animal's ability to adapt itself to a wide variety of other dens, lead me to think that no critical den shortage ever exists in the study area.

The greatest distance between any den and a source of drinking water was approximately 1,200 feet, although in most instances water was available within 420 feet of the den. Near most potential den sites water is readily accessible within a few hundred feet at most; therefore, I do not regard water as a limiting factor on the opossum population in the study area. Lay (*op. cit.*:149), however, found that the distribution of surface water was a factor in determining the distribution and number of individuals in southeastern Texas.

#### **Sex Ratio**

The sex ratio of the 560 opossums (302 male and 258 females) examined in this study was 53.9 per cent males to 46.1 per cent females. Of these 560 opossums, 426 were pelts examined through the courtesy of Mr. C. W. Ogle; the sex ratio of these pelts were 239 males (56 per cent) to 187 females (44 per cent). For the 62 animals obtained by Jones and me in steel traps, the sex ratio was 27 males (44 per cent) to 35 females



(56 per cent). The examination of 16 pouch young and 56 opossums caught in live-traps yielded an equal sex ratio.

#### Parasites

*Ectoparasites.* The opossums collected for this study were relatively free of external parasites. Those animals trapped in the winter were entirely free of ectoparasites, but some parasites were on the animals collected in the spring and fall. Four species of fleas were collected from 23 of the 106 opossums examined. The cat flea, *Ctenocephalides felix*, was found on 10 of the 23 opossums, the dog flea, *Ctenocephalides canis*, on six specimens, the rat flea, *Nosopsyllus fasciatus*, on four specimens, and the human flea, *Pulex irritans*, on three specimens. The American dog-tick, *Dermacenter variabilis*, was found on the ears of five specimens.

*Endoparasites.* A few species of internal parasites were plentiful in the intestinal tracts. A cestode, *Mesocostoides latus*, was found in one opossum. Two nematodes, *Physaloptera turgida* and *Cruzia tentaculata*, were found in abundance in the stomach and caecum, respectively, of all opossums examined. Intestinal tracts contained as few as 12 of these worms and as many as several hundred.

#### Economic Importance

*As a fur-bearing animal.* The opossum is one of the important furbearers in North America. Despite efforts of the fur trade to popularize the so-called long-haired furs of which the opossum pelt is one kind, there has been a decline in the demand for such furs, including that of the opossum, in the years since World War II. In Kansas, the annual catch of opossums dropped from 124,042 in 1947–1948 to 61,424 in the 1948–1949 season (Ashbrook, 1950:9); the average price per pelt dropped from 60 cents in the 1947–1948 season to 35 cents in the 1948–1949 season. Despite this low figure, trappers in favorable localities make substantial incomes because of the large numbers of captures and relative ease in catching and preparing these animals. The opossum is the most numerous fur animal in Kansas; nevertheless, the value of the annual catch is exceeded by that of muskrat and also by that of skunks.

*Food for human consumption.* Mr. C. W. Ogle reports that approximately 200 opossums are sold by him each year for human consumption. Because the opossum is known to eat carrion and garbage, many persons prefer not to eat the opossum. I consider it fine food, worthy of greater utilization.

*Damage to poultry.* The opossum's reputation as a poultry-killer and egg-eater is not borne out by my study of its food habits. Egg shells and remains of chicken were found in the intestinal tracts of nine speci-

mens, but a thorough examination of the areas in which the opossums were captured revealed that the source might have been garbage and carrion, and no domestic chickens were seen within one-half mile of the places where the opossums were collected. In addition, fourteen opossums were trapped in areas where they had ready access to chickens and eggs, but no remains of either were found in the intestinal tracts.

### Summary and Conclusions

Ecology of the opossum was studied in Douglas County, northeastern Kansas, in 1949 and 1950. Field work was done in diverse habitats including cultivated fields, pastures, woodlands, riverbanks, and townsites. The contents of the digestive tracts of 62 opossums were identified. In the autumn, insects were the major item in the diet of the opossum. Of the ten families of insects represented in the digestive tracts, Locustidae (short-horned grasshoppers) were present most frequently and constituted the bulk of insects taken for food. Mammals and fruit also were represented in considerable bulk. Only four wild birds, of as many species, were present in the food material. Even in winter, insects occurred more frequently than any other food, but their relative scarcity caused the opossum to utilize other kinds of food. This was reflected in the increased percentage, by weight and by volume, of mammals. Domestic chicken was recorded from nine digestive tracts, but in every case was traceable to waste or carrion. In general, the food habits of the opossum are beneficial to man, but occasionally the beneficial effect is offset by the taking of poultry.

Trapping, den counts on random transects, and other field observations indicate that the opossum prefers the mixed woodland habitat, especially areas along small streams, where exposed roots of partly undermined trees provide natural den sites. On the transects, there was one opossum den to 0.121 woodchuck den and 0.091 den of striped skunks, spotted skunks and cottontail rabbit. For every unused den, there were two dens used by opossums. Because the opossum utilizes such a wide variety of den sites, it is unlikely that a den shortage limits its numbers or distribution in the general area where this study was made. The sex ratio among 560 opossums examined was 302 males (53.9 per cent) to 258 females (46.1 per cent).

The external parasites found were one tick and four species of fleas. A single cestode and two nematodes were the only species of internal parasites recorded. The opossum is of positive economic importance in northeastern Kansas as a fur-bearer and as food for human consumption. Although it may occasionally damage poultry, the opossum is definitely a beneficial species. Habitat improvement cannot be economically justified, but

various measures for preventing wasteful trapping of opossums would increase the total population in this area.

#### Literature Cited

- ASHBROOK, FRANK G. 1950. Annual fur catch in the United States. USDI, Fish and Wildlife Service, Wildlife Leaflet 315:1-23.
- LAY, DANIEL W. 1942. Ecology of the opossum in eastern Texas. *Journ. Mamm.*, 23:147-159, 2 figs., 3 tables.
- MCGREGOR, RONALD L. 1948. The flora of Douglas County, Kansas. *Trans. Kansas Acad. Sci.*, 51:77-106, 1 fig.
- REYNOLDS, HAROLD C. 1945. Some aspects of the life history of the opossum in central Missouri. *Journ. Mamm.*, 26:361-379, 5 tables.
- WISEMAN, GEORGE L., and HENDRICKSON, GEORGE O. 1950. Notes on the life history and ecology of the opossum in southeast Iowa. *Journ. Mamm.*, 31:331-337, 1 table.
- YEAGER, LEE E. 1936. Winter daytime dens of opossums. *Journ. Mamm.*, 17: 410-411.