

OBSERVATIONS ON THE BREEDING HABITS OF THE COTTONTAIL

RABBIT, Sylvilagus floridanus mearnsii (Allen)

(A contribution from the Game Division, Michigan Department of Conservation)

The recorded information on the breeding of cottontails is more limited than might be expected from the wide distribution and abundance of this species and its allies. Audubon and Bachman (1849) say that in the northern states they have about three litters per season with from five to seven young in a litter. Kennicott (1857) states that young are produced three or four times a year and that there are usually from four to six at a birth. Evermann and Clark (1911) write that in northern Indiana the rabbit breeds at least twice in a season, producing one litter in early spring and another in July or even as late as September. Cory (1912) gives the number of young as from four to six and the number of litters as (often) three. Seton (1929) says that there are three or even four mating times a year. "The young are in number from 4 to 6 or 7, very rarely as many as 8, or as few as 3." Trippensee (1936) believes that there are at least two broods per season and possibly four. The average number of young in 27 litters was 5.04. The maximum was eight.

The gestation period of the cottontail is not definitely known. Seton points out that from analogy a period of about 30 days is to be expected. Dice (1929) experimented with cage-bred Sylvilagus floridanus alacer and concluded that on a basis of somewhat insufficient evidence the gestation period of that subspecies was probably 28 days or less.

The following records were obtained in the course of an ecological

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investigation* at the W. K. Kellogg Bird Sanctuary and Farm in Kalamazoo County, Michigan. This area is 500 acres of farmland and contains a pit lake of about 20 acres. Plantations of conifers and extensive natural brush coverts make the territory ~~very~~ favorable to cottontails.

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Breeding Season

A total of 11 litters of young rabbits were examined in the course of this work. Of these, two litters were in the nest and 9 were embryos. The average number of young in this series was 5.1. In table 1 are given the results of 20 autopsies on female rabbits during late winter and spring of 1935, 1936, and 1937. It will be seen that of eight females examined in January and February only one was pregnant. This autopsy on February 21, 1936 is the earliest breeding record obtained in this study. Trippensee (1936) gives records to show that breeding occurs much earlier than this. He quotes one report for southern Michigan of four pregnant females on January 25, 1933. The same author found a nest of young near Ann Arbor on March 24, 1932. My earliest record for young rabbits is April 4, 1936. A neighbor's cat brought in a dead one on this date, and on April 28 it obtained another which it brought in alive. The first young out of the nest normally were seen on April 30 in 1935, April 19 in 1936, and April 20 in 1937. The latest indication of breeding obtained in this study was

*A study made by the Game Division of the Michigan Department of Conservation from September, 1935 to August, 1937. The area is owned and operated by Michigan State College. A few records are included from the spring of 1935 which were secured incidental to studies under a fellowship in zoology at the Kellogg Bird Sanctuary.

a young rabbit evidently just out of the nest seen during the last week in July, 1936. Other investigators have found evidence that breeding sometimes occurs later in the season. Dice (1920) found four 70-millimeter embryos in a female autopsied on July 21, 1919. Trippensee (1936) quotes a record from R. E. Yeatter on a nest of young as late as September 30.

From three years of observation at the Kellogg Farm it appears that most of the breeding and bearing of cottontails occurred during the six months period from February to July inclusive. Although coition may at times take place during January and young may be born after July, it is very improbable that much early and late breeding occurred on the area here discussed during this study. Field work was intensive during two years and had many young indicative of such breeding been present, there is a good chance that at least a few would have been observed.

Nesting and Care of Young

Most rabbit nests, while occupied by the young, are nearly invisible, and hence are very difficult to find. Several empty nests were discovered but only two ^{was still occupied by the litter} had the litter still present. One of these, which was dug out by workmen, was located under the leaves in a pocket in a low bank near the edge of the lake on April 18, 1935. The ground was much disturbed and the mother evidently never returned. The five young were dead on the following day. This hollow was about 4 inches deep and was carefully lined with rabbit fur and bits of dry leaves. It was covered with fur, leaves, and grass. The mat of fur and grass that usually covers rabbit nests is very effective both for concealment and shelter. I have on two occasions examined nests of young after a protracted rain and found them to be

dry and warm.

Much better records were obtained on a nest on the lawn near the laboratory at the sanctuary. It was first noticed by Dr. M. D. Pirnie on the morning of April 3, 1937, beside a ground juniper near the drive. This nest was shaped roughly like a shoe, having the opening at one end, and consisted of a tunnel about 8 inches long extending under the sod. It was lined with grass, and at first the freshly dug earth, which made discovery possible, was conspicuous beside the hole. The nest was covered with a mat of rabbit fur and oak leaves. The young were blind, helpless, and thinly covered with short sparse hair when first found. They were disturbed as little as possible, but on the second day one was removed and weighed. On this date (April 4) it weighed 46.2 grams. On April 9 one of the young, selected at random, weighed 72.5 grams. By this time the fur was thick and brown. The eyes of these rabbits were first open on April 13, or ten days after the nest was found. On this date one of them weighed 89 grams. These young were in the nest every day until April 18. They evidently left during the night of April 17 and did not return.

Seton gives the weight of a new-born Kansas cottontail as 24 grams. The average weight of nine still-born Michigan cottontails examined by Trippensee was 32.8 grams. As the young rabbit in the aforementioned nest weighed only 46.2 grams on the second day after discovery, it is doubtful whether this brood was more than a day and a half old when the nest was found. It is very probable that the eyes of these young rabbits opened on the eleventh day and they left the nest on the sixteenth day after birth.

This nest was well situated to be under fairly close observation. The

mother was never seen near it in daytime. Several times, however, a rabbit was observed close to the nest at dusk or after nightfall.

On April 20, two days after the nest was found empty, two very young cottontails were seen less than 100 feet from the site of the nest. From their size it appeared very probable that they belonged to this litter. One of these juvenals was seen nearly every day until June; as it lived under the junipers in front of the laboratory and fed upon wheat and grass in the peafowl pen located there. It was often out feeding at any hour in the daytime but was usually seen in late afternoon and evening. One or sometimes two other young rabbits similar in size and probably from the same brood occasionally fed with it. Evidently only one rabbit was here constantly, however, as it became tame and could be approached to within a few feet. It showed no fear of the peafowls and often fed within easy pecking distance of the birds. On May 27 at 5:30 p. m. a box trap was set in the junipers 20 feet from where the rabbit was feeding. In an hour it was in the trap. Its weight on this date was 463.8 grams. If this rabbit was one of those from the nest, and I believe that it was, it was probably very near 57 days old. This agrees fairly well (for a rabbit that has fed upon wheat and laying mash) with Trippensee's (1934) growth curve, which indicates that a rabbit eight weeks old should weigh about 400 grams.

Trippensee (1936) states that the growth of young cottontails is rapid and that they may make limited excursions out of the nest and eat grass when two weeks old. Burroughs (1900) tells of finding a rabbit nest on a newly mowed lawn. The young scattered from the nest once but were back again the next day. Although the rabbits from the nest on the sanctuary may have been out and returned

at night, it is quite certain that they never returned after the nest was found empty on April 18. As to subsequent care by the mother, Seton says, "She may suckle them individually when she meets them during the few days following the dispersal; but there is no evidence to show that she ever gathers them together, or cares for them as a brood, after once they have left the nest."

In this respect I had an opportunity to make some pertinent observations in Ann Arbor, Michigan during May, 1929. A rabbit nest with four young had been located on the lawn of a fraternity house. The nest was a shallow pocket in the sod, lined with grass and covered with a mat of fur and grass. It was quite invisible from a distance of six feet. One morning the nest was empty, the young having left during the preceding night. As the lawn was very large and open, the only cover within fifty yards in any direction was formed by some small well-spaced clumps of lilac sprouts. Investigation disclosed that in three of these clumps a single young rabbit was crouched down in the oak leaves lodged among the stems. Two of the rabbits were twenty yards apart and the other was about 30 yards from the nearest of these. The fourth animal was not found. They were returned to their hiding places and on the following day one of them was again located in a lilac clump; but after this none was seen. Whether the young had found this cover independently or whether the mother had been instrumental in hiding them is not indicated, but these juvenals were definitely scattered on the day following their abandonment of the nest.

Sex Ratio

Probably the largest series of rabbits of which the sexes are known is that of Gerstell (1937), who examined 6,394 animals caught in live traps in Kansas and shipped to Pennsylvania for restocking purposes. Of these 50.8 percent were females and 49.2 percent were males. In a sample of 93 rabbits, taken by box trapping at the Kellogg Farm during the fall of 1936 before any shooting was done, 48 were males and 45 were females, giving a sex ratio of 48.3 females to the total number sexed. Records obtained by M. B. Trautman (Trippensee 1934) in Ohio and Gerstell in Pennsylvania indicate that female rabbits are more likely to hole up during cold weather than males. Thus the sex ratio among animals taken by shooting in winter may not be a reliable index of the ratio existing in the population. On the area discussed there was a tendency for more male rabbits than females to be shot on cold days. However, in the total of 383 rabbits sexed in this study, which were taken by trapping, shooting, and other methods, 195 were males and 188 were females; giving a ratio of .49. The actual sex ratio in the wild is very probably 0.5.

Summary

In eleven litters of cottontail rabbits from Kalamazoo County, Michigan the average number of young was 5.1. The regular breeding season lasts from February through July, although some breeding evidently occurs earlier and later than this. Young rabbits are born blind and helpless and sparsely covered with short hair. Records from one nest showed that the eyes opened on about the eleventh day and the young left the nest on about the sixteenth day. Young rabbits

of two litters scattered after leaving the nest and there was no evidence of further care by the mother. The sex ratio in a series of 383 rabbits taken chiefly by box trapping and shooting was 0.49 females. The true sex ratio in the wild is probably 0.5.

TABLE 1
 Rabbit Litters as Recorded from Nests and Breeding Season
 Autopsies on Females

Date	No. of Young	Size	Evidence
1/10/37	-	-	Not pregnant
1/13/37	-	-	" "
1/18/37	-	-	" "
2/17/37	-	-	" "
2/17/37	-	-	" "
2/19/37	-	-	" "
2/21/36	5	4 mm	Embryos
2/28/37	-	-	Not pregnant
3/ 1/37	-	-	" "
3/ 3/37	6 (?)	Minute	Uterine enlargements
3/ 3/37	-	-	Not pregnant
3/12/37	4	3 mm	Embryos
3/16/35	4	11 mm	"
3/17/37	5	3.5 mm	"
3/23/36	5	13.5 mm	"
4/ 3/37	5	-	Young in nest
4/10/35	4	-	Embryos
4/18/35	5	-	Young in nest
4/19/36	7	7 mm	Embryos
5/17/37	7	21 mm	"

Average number of young in 11 litters -- 5.1

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