

ARMADILLO DEPREDAATION OF "DUMMY" BOBWHITE QUAIL NESTS IN SOUTHWEST ALABAMA

by

Gary A. Breece and M. Keith Causey
Department of Zoology-Entomology
Agricultural Experiment Station
Auburn University
Auburn, Alabama

ABSTRACT

To explore the potential of armadillos as bobwhite quail nest predators, 75 "dummy" quail nests, containing four to six eggs each, were constructed in an area of recent armadillo activity in Clarke County, Alabama during June and July of 1973.

During 300 nest nights, armadillos accounted for 25 of 96 destroyed nests. Seventeen other nests contained armadillo signs, but the eggs were not broken. Eighteen of the 25 destroyed nests were located in one small area which might indicate that one armadillo was responsible for most of the nests being destroyed. One armadillo was observed eating eggs from two of the nests in this area of high nest mortality.

In all probability, armadillos will be of little importance as nest predators, but individuals within a population may feed on quail eggs.

INTRODUCTION

The spread of the nine-banded armadillo (*Dasypus novemcinctus*) into an extensive area of the Southeastern United States has caused concern to some people living in these areas. When any animal moves into territory that it has not previously occupied, there usually follows a rash of speculation relative to the exact role of the unfamiliar organism in the environment. New creatures, especially one as unusual as the armadillo, are usually viewed with suspicion and distrust. Attitudes toward the armadillo in its new range are no exception.

One of the fears that has arisen is the potential detrimental effect the armadillo poses to ground nesting birds. Armadillos are currently being blamed by hunters for low nesting success of wild turkeys (*Meleagris gallopavo*) and bobwhite quail (*Colinus virginiana*) in some areas of the South and Southwest.

Fuller (1927) and Smith (1915) both reported that armadillos did extensive damage to turkey nests in Texas; and these authors attributed an increase in local turkey populations to the destruction of armadillos in that area. Lacey (1911) stated that armadillos damage turkey nests by rolling the eggs out of the nest. Two cases of turkey egg destruction were reported to Kalmbach (1943), but subsequent examination of 281 armadillo stomachs did not indicate that eggs had been consumed.

Taber (1945) found that penned armadillos would ignore hen eggs unless they were broken. Baker (1943) examined 25 armadillo stomachs collected during May in Trinity and Polk County, Texas, but failed to find evidence that quail eggs had been eaten. Kennamer and Lunceford (1973) placed "dummy" turkey nests in areas of armadillo activity in the Mississippi Delta, but found no evidence that armadillos eat turkey eggs. However, several of the "dummy" nests were disturbed by feeding armadillos.

A thorough study of the biology of the nine-banded armadillo is being conducted in Southwest Alabama. Preliminary data from food habits studies of the

armadillo revealed that armadillos regularly swallowed whole lizard eggs on the study area. These data along with the report by Moll and Legler (1971) that nine-banded armadillo prey on eggs of the turtle, *Pseudemys scripta*, in Panama prompted the investigation of the potential predation of bobwhite quail nests by this animal. The eggs of the bobwhite are intermediate in size between those of the lizard eggs eaten in Alabama and the turtle eggs eaten in Panama.

DESCRIPTION OF STUDY AREA

The site selected for the study was a 33-acre quadrat located on the Fred T. Stimpson Wildlife Sanctuary in Southern Clarke County, Alabama on the east bank of the Tombigbee River approximately 13 miles south of Jackson.

The quadrat consisting of a 15-degree slope cresting at the northeast corner of the plot. One clearing of approximately one acre in size and 700 linear feet of dirt road are located within the study area. The clearing was planted in bahia grass.

Previous investigation had indicated a very high population density of armadillo in the area, and all of the individuals within the study quadrat had been captured and marked. Fourteen armadillo were known to inhabit the 33-acre study area.

The soil type is a gravelly loam enriched by decaying forest duff in the valleys and slopes, with sandy soils along the ridge-tops. The slope portion of the area was predominantly hardwood and mixed hardwood. Mature spruce pine (*Pinus glabra*), oaks (*Quercus spp.*), hickory (*Carya spp.*), and sweetgum (*Liquidambar styraciflua*) were the dominant overstory species. Understory species were dogwood (*Cornus florida*), blue beech (*Carpinus caroliniana*), buckeye (*Aesculus spp.*), hawthorn (*Crataegus spp.*), wild grape (*Vitis spp.*), and greenbrier (*Smilax spp.*). The only ground cover of any significance was *Uniola sessiliflora* which covered approximately 85 percent of the study area. The ridge top portion contained a four acre strip of loblolly pine (*P. taeda*). Leaf litter covered the wooded areas entirely, but varied in depth from less than one quarter inch under the pure pine stands to two inches or greater under the hardwoods. There are no permanent streams in the study area.

METHODS

A preliminary investigation was conducted in mid-June of 1973. In this study, 47 "dummy" nests were constructed and located intentionally in armadillo pathways or near burrow entrances where armadillos would almost surely come into contact with them. Another 28 nests was located in areas away from dens and runways, but in the vicinity of armadillo activity.

"Dummy" quail nests were constructed by placing a layer of loose soil approximately one inch thick and 36 inches in diameter on the ground. Four to six quail eggs were placed on a small amount of grass and leaves in the center of the soil layer, so that predators might possibly be identified by their tracks in the loose soil. No attempt was made to conceal the nests.

Following the preliminary investigation, 75 "dummy" nests were systematically placed at 100 feet intervals on compass lines transecting the study area. Three parallel lines (designated as lines A, B, and C) having 25 nests each (designated 1 through 25) were established. Each nest was marked and numbered with a strip of red plastic flagging.

These nests were constructed on the evening of 30 June 1973 and checked each morning of the four subsequent days for a total of 300 nest nights. Each destroyed nest and the cause of destruction was recorded. Broken or missing eggs were replaced daily. Diggings and tracks left in the loose soil layer were smoothed out each morning.

Visual observations were also made in the area during late evening hours when armadillo activity was greatest in an effort to observe actual nest predation by armadillos.

RESULTS

Results of the preliminary investigation are presented in Table I.

Table I. Summary of Predation on "Dummy" Bobwhite Nests on Nights of June 10-13, 1973 in Clarke County, Alabama.

	<u>Armadillo</u>	<u>Raccoon</u>	<u>Unknown</u>	<u>Total Nests Destroyed</u>
1st Night	5	5	1	11
2nd Night	19	13	3	35
3rd Night	22	3	2	27
4th Night	23	24	4	51
Total	69	45	10	124

One marked adult female was observed eating quail eggs from two adjacent nests. All of the nests destroyed by armadillos in the initial phase of the study were located in areas near burrows, runways or dens. Nests located in open areas were not disturbed by armadillos but did attract raccoons.

Results from second phase of the study are presented in Table II.

Table 2. Summary of Predation on "Dummy" Bobwhite Nests on Nights of July 1-4, 1973 in Clarke County, Alabama.

	<u>Predator</u>			<u>No.</u>	<u>No.</u>	<u>No. of Intact Nests</u>
	<u>Armadillo</u>	<u>Raccoon</u>	<u>Unknown</u>	<u>Destroyed</u>	<u>Unharmed</u>	<u>with Armadillo Sign</u>
1st Night	6	11	2	19	56	9
2nd Night	7	7	1	15	60	0
3rd Night	7	17	1	25	50	7
4th Night	5	31	1	37	38	1
Total	25	66	5	96	204	17

After 300 nest nights, 96 nests (32.0%) were destroyed. Armadillo accounted for 26% of the total nests destroyed. Raccoons accounted for 68.8%, and five (5.2%) were destroyed without any recognizable sign being left. Four nests (A1, A2, A3, and A4) were destroyed each night and accounted for 16 of the 25 nests destroyed by armadillos. Nest A7 was destroyed on the first and third night. Nest C7 was destroyed on the first and second night. Nests A6, A16, B1, B21, C8, and C10 were destroyed only once during the four day period. In the case of 17 unharmed nests, armadillo tracks were noted in the loose soil surrounding the nests. Five of the 25 destroyed nests appeared to have been trampled by armadillos and it did not appear that the eggs had been eaten. One visual observation was made of an armadillo destroying two nests and eating the eggs. This was the same animal observed eating eggs during the preliminary study.

The rate of nest destruction by armadillos remained fairly constant through the four night period, while the incidence of raccoon predation tended to increase each night. Only one raccoon was seen during the study, but an abundance of tracks and droppings indicated that many more were present on the area. Four to six different armadillos were observed each evening feeding within the study area.

DISCUSSION

The area used for this study could not be considered good quail habitat. No quail were seen on the area during the study. Had the study been conducted in an area that armadillo and quail had cohabited for a considerable period, different results may have emanated.

The study area has a dense population of armadillo. Fifty-one armadillos have been captured, marked, and released in a 150-acre area encompassing the 33-acre study area. Fourteen marked armadillos were known to frequent portions of the study area.

Two visual observations of the same armadillo eating quail eggs indicated that the armadillo first breaks the egg by stepping on it and then licks the contents while the egg is held to the ground with its front feet. This armadillo was never observed to pick an egg up with its mouth. On several occasions eggs were found as far as six feet from a nest indicating that the armadillo moved them by some method. The feeding method observed indicates that a cursory stomach analysis would fail to detect eggs since the shell would not be ingested. It is generally accepted that mammals that eat eggs do not ingest the shell. However, it seems reasonable to assume that developed embryos would be found in the stomach contents of some armadillos if they regularly preyed upon ground nesting birds' nests. The armadillo's method of feeding, by rooting through ground litter in a random manner would seem to indicate that finding a nest would be due more to chance than to their actually seeking out the nest.

Several of the destroyed nests appeared to have been stepped on and the eggs crushed without the eggs having been eaten. These broken eggs were usually found clustered together in the middle of the nest just as they had been placed. The shell would be broken and caved in, but in most cases the inner membrane containing the liquid portion of the egg would remain intact. The soil layer of the nest would be rooted up in most cases when the eggs were destroyed by armadillos.

Several of the dummy nests had distinct sets of armadillo tracks within fifteen inches of the nest, but with the eggs left unharmed. It appeared in these cases, that either the armadillo did not regard the eggs as a food item or that it was completely unaware of their presence.

One point of interest is whether or not armadillos would cause a nesting bobwhite hen to abandon her nest. Armadillos seem to show no type of aggression toward other animals, and it seems unlikely that they would attack a nesting hen. Armadillos are easily frightened and any type of nest defense by a bird would probably discourage an armadillo. This might be especially true in the case of a bird as large as a wild turkey.

Eighteen of the 25 nests destroyed by armadillo were located in one small area. Another nest (B1) was nearby. This area was near that portion of the preliminary study area which had the highest nest destruction rate. The one adult female seen eating eggs on two separate occasions might have accounted for all 19 destroyed nests within the area. This armadillo was seen on the study area every evening. The area where nest predation was high, was within this armadillo's home range although four other individuals were seen there also. It is not uncommon for certain individuals within a population to learn how to prey on nests while others of the same species do not recognize the eggs as a potential food source. The other destroyed nests were more randomly distributed over the study area.

Raccoon predation was much more severe than that by armadillo. This was expected since raccoons are known to be notorious nest predators.

These data serve only to show that armadillos will, under certain conditions, eat bobwhite eggs. The incidence of armadillo predation upon natural nests of bobwhite and other ground nesting birds is unknown and possibly insignificant.

Certainly this report cannot be regarded as the basis for extermination of the armadillo in areas where its range happens to overlap with ground-nesting game birds.

LITERATURE CITED

- Baker, Rollin H. 1943, "May food habits of armadillos in Eastern Texas." *Amer. Mid. Nat.*, 29: 379-380.
- Fuller, H. E. 1927. "The way of the wild turkey." *Outdoor Life and Rec.* 60 (6): 28-30, 46.
- Kalmbach, E. R. 1943. The armadillo: Its relation to agriculture and game. Texas Game, Fish and Ovster Comm. 61 p.
- Kenamer, James Earl and W. H. Lunceford, Jr. 1973. U. of Missouri. Armadillos tested as potential egg predators in the Mississippi Delta: Wild Turkey Management. Univ. Mo. Press. Columbia, Mo. p. 175-177.
- Moll, Edward O. and J. M. Legler. 1971. "The life history of a neo-tropical slider turtle, *Pseudemys scripta* (Shoepff) in Panama. Los Angeles Museum of Natural History. Bulletin No. 11 102 p.
- Smith, A. P. 1916. "Additions to the avifauna of Kerr Co., Texas." *AUK* 33: 184-95.
- Taber, F. W. 1945. "Contributions on the life history and ecology of the nine-banded armadillo." *J. Mammal.* 26: 211-26.