Survey of Hemoparasites in Scaled Quail from Elephant Mountain Wildlife Management Area, Brewster County, Texas

Russell Bradley
Alan M. Fedynich
Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, Kingsville, TX 78363
Scott P. Lerich
Elephant Mountain Wildlife Management Area, Texas Parks and Wildlife Department, Alpine, TX 79830

ABSTRACT

There is limited information on blood parasites in scaled quail (*Callipepla squamata*) from Texas. In August 2002, 48 scaled quail, representing 10 fledged hatch-year juveniles, 12 subadults, and 26 adults, were collected at Elephant Mountain Wildlife Management Area in Brewster County, Texas. Two thin blood smears were made from each bird using heart blood. Smears were stained in DiffQuik® and examined for 15 minutes each (30 minutes per bird) with a light microscope at 1,000x magnification. No blood protozoans were observed, but 12 (25%) scaled quail were infected with microfilariae. Microfilarid prevalence was 20%, 17%, and 31% in hatch-year, subadult, and adults, respectively. Microfilarid prevalence between scaled quail <1 year old (hatch-year and subadult; $n = 22$) and adults ($n = 26$) were similar ($P = 0.32$). Based on these findings, hematozoan infections were absent or at least not actively occurring in this population of scaled quail during the period in which host collections were made, whereas infections by microfilarids were evident.

KEYWORDS: *Callipepla squamata,* Elephant Mountain Wildlife Management Area, hemoparasites, microfilariae, scaled quail, western Texas

Scaled quail (*Callipepla squamata*) are important gamebirds in western Texas. Of the three published studies that surveyed scaled quail for hemoparasites (Campbell and Lee 1953, Hungerford 1955, Stabler et al. 1974), none sampled scaled quail in Texas. Given that avian hemoparasites can cause ecological and behavioral changes in host populations (van Riper et al. 1986), alter host sexual selection (Höglund et al. 1992), and induce morbidity and mortality in susceptible host individuals (see reviews of Atkinson 1991, Forrester 1991, Greiner 1991), it is necessary to examine scaled quail populations for hemoparasites. This study was conducted to survey scaled quail for hemoparasites from Elephant Mountain Wildlife Management Area in southwestern Texas.

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MATERIALS AND METHODS

The study was conducted at Elephant Mountain Wildlife Management Area (30° 2' 1.5" N, 103° 34' 2.9" W) in Brewster County, Texas. Texas Parks and Wildlife Department acquired the property in 1985. Calamity Creek on the west side, and Chalk Valley on the east side of Elephant Mountain are the two major drainages. Calamity Creek is a dry drainage except during periods of intense or prolonged seasonal rainfall and was dry during this study. In 2001, 205 mm of precipitation was recorded and through 31 August 2002, 195 mm of precipitation was recorded, of which 109 mm fell in July 2002. At the time of scaled quail collections, precipitation on the study area had been below average for >4.5 years (TPWD, unpublished data). Livestock water troughs and spreader dams (relatively low, 1–2 m earthen berms designed to catch and retain rainfall runoff) are available on certain portions of the study area.

Major plant communities on the Chalk Valley watershed vary from grama (*Bouteloua* spp.) and tobosa (*Pleuraphis* (Hilaria) spp.)-dominated grasslands to Chihuahuan Desert scrubland (Lerich 2002). Major plant communities on the Calamity Creek watershed include dropseed (*Sporobolus* spp.) and tobosa-dominated grasslands to mesquite (*Prosopis glandulosa*)-dominated shrublands (Lerich 2002). A thorough description of the study site's climate, hydrology, and vegetation is provided in Lerich (2002).

Scaled quail were collected by shooting during August 2002 in accordance with a scientific collection permit from Texas Parks and Wildlife Department (Permit No. SPR-0498-949) along with an entry permit for Elephant Mountain Wildlife Management Area issued by M. Pittman, Texas Parks and Wildlife Department Project Leader, Trans-Pecos Ecosystems Management Project (Permit No. 02-10). August was chosen for sample collection as more hosts were available due to the reproductive effort, which would increase the chances of density-dependent parasite transmission, and sufficient numbers of fledged juveniles were present on the study area at this time. The collection method was chosen to add an element of randomness into the sampling effort and avoid biases associated with using bait stations, which can artificially concentrate hosts and reduce sampling distribution of the host population (Weatherhead and Ankney 1984). The shooting collection method, however, samples "normal" birds (those capable of maintaining covey membership, pair bond status, etc.) and does not sample individuals that have previously been eliminated from the population or those too weak to maintain social relationships. Each bird was sexed by gonadal examination and aged as hatch-year juvenile, subadult, and adult. The subadult grouping was possible as determined by presence of white tips on primary coverts indicating birds <1 year old (Dimmick and Pelton 1996) as well as presence of developed gonads.

Two thin blood smears were made from each scaled quail using heart blood extracted with a disposable glass pipette immediately upon death of the bird. Smears were fixed in methanol for 1 minute and stained in DiffQuik®. Smears were scanned for 15 minutes each (30 minutes per bird) with a light microscope under 1,000x magnification (Glass et al. 2002) covering as much of the smear as possible within the prescribed time.

Motile embryos of filariid nematodes are reported as microfilariae. No attempts were made to further identify microfilariae because identification typically requires the adult nematode (Saunders 1959, Sonin 1974). Frequency data were analyzed for goodness of fit using Chi-square (PROC FREQ; SAS Institute Inc., 1990) to determine if hemoparasite prevalence varied by host age.

RESULTS AND DISCUSSION

Blood samples were collected from 48 scaled quail, which represented 10 hatch-year juveniles, 12 subadults, and 26 adults. No blood protozoans were observed, but 12 (25%) scaled quail were infected with microfilariae, which is reported for the first time in this host. Microfilarid prevalence was 20%, 17%, and 31% in hatch-year, subadult, and adults, respectively. Microfilarid prevalence between scaled quail <1 year old (hatch-year and subadult; $n = 22$) and adults ($n = 26$) were similar ($P = 0.32$). Microfilariae occur in a wide range of avian species (Greiner et al. 1975) and include several genera such as *Ornithofilaria*, *Sarconema*, and *Splendidofilaria* (Cohen et al. 1991, McDonald 1969, Sonin 1974). Actual prevalence was likely higher than reported in this study, since blood smears are not the best method of detecting microfilariae (Seegar 1979).

Findings from this study were surprising since there was an expectation to find *Haemoproteus*, which was reported in scaled quail from New Mexico (Campbell and Lee 1953) and Arizona (Hungerford 1955). Haemoproteids are transmitted by hippoboscid flies (Atkinson 1991); at least one species occurs in the area, *Pseudolynchia canariensis*, being found on scaled quail in the adjoining Pecos County (Howard 1981). Additionally, no *Plasmodium* spp. were found even though mosquitoes (which can serve as vectors for malaria) were observed occurring around spreader dams that contained water. It is possible that *Plasmodium* was present and was missed. Forrester et al. (1974) found a *Plasmodium* sp. was underestimated using blood smears from wild turkeys (*Meleagris gallopavo*), compared to the subinoculation technique. However, long scan times (30 minutes per bird) used in the present study substantially increased the chances of finding *Plasmodium* even at extremely low densities on the smear.

Possibly, a larger sample size would allow for detection of hematozoans occurring at extremely low prevalences; however, collecting large numbers of scaled quail prior to the hunting season on public wildlife management areas or on private properties is not politically feasible. Stabler et al. (1974) examined 23 scaled quail from Colorado and found none were infected, whereas Campbell and Lee (1953) found 11 of 678 (1.6%) scaled quail infected with *Haemoproteus lophortyx* and (or) *Plasmodium* sp. Also, Hungerford (1955) found *H. lophortyx* in 31 of 111 (28%) scaled quail. Lowest detection limit in the present study was 1 in 48 (2%). In any case, it is uncertain what ecological significance such low prevalences would have on the host population.

SUMMARY AND CONCLUSIONS

This study represents the first published survey for hemoparasites in scaled quail from Texas and is the first study to document microfilariae in scaled quail. Findings suggest that hemoparasites are uncommon in scaled quail occurring at Elephant Mountain Wildlife Management Area or at least they were not demonstrating active infections when the birds were sampled during a period of elevated host densities resulting from the breeding effort. No statistical difference in microfilarid prevalence was found by host age. Although *Haemoproteus* and *Plasmodium* were not observed in this study, more scaled quail should be examined, particularly from other geographic regions in Texas, before conclusions are made about the occurrence of these protozoans in scaled quail from Texas.

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