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Author: Costanzo, Gary R.

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Sarcocystis in American Black Ducks Wintering in New Jersey

Gary R. Costanzo, New York Cooperative Fish and Wildlife Research Unit, Department Natural Resources, Fernow Hall, Cornell University, Ithaca, New York 14853, USA

ABSTRACT: Macrocysts of a protozoan parasite, *Sarcocystis* sp., were found in 28 of 173 American black ducks (*Anas rubripes*) examined during winters 1984–1985, 1985–1986 and 1986–1987 in south coastal New Jersey (USA). No macrocysts were detected in 80 juvenile black ducks. In adults, the prevalence of macrocysts increased from 3% (1 of 37) in 1984–1985, to 36% (12 of 33) in 1985–1986, and 65% (15 of 23) in 1986–1987. This increase could result in a greater number of harvested birds being discarded, or a change in the attitudes of waterfowl hunters towards black ducks.

Key words: American black duck, *Anas rubripes*, macrocysts, New Jersey, parasite, *Sarcocystis* sp., wintering waterfowl.

The protozoan parasite *Sarcocystis* sp., known to infect wild waterfowl, has an obligatory two-host life cycle. Asexual muscle cysts infect intermediate herbivorous or omnivorous hosts, in this case black ducks (*Anas rubripes*), and sexual stages develop in the small intestine of a carnivore final host (Wobeser, 1981). Uncertainties exist about *Sarcocystis* sp. life cycles, and many animals, including man, can be considered as potential hosts (Wobeser, 1981). *Sarcocystis* spp. are not known to cause mortality in waterfowl and usually are not associated with any clinical disease in the host.

The species generally thought to infect waterfowl is *Sarcocystis rileyi* (Wobeser, 1981). This species commonly occurs in ducks as rice grain-sized, yellowish-white macrocysts in the breast and other striated muscles. Infections are most often found in adults. Juveniles rarely contain macrocysts, possibly because of limited exposure or the length of time required for macrocyst development (Cornwell, 1963; Chabreck, 1965). Microscopic cysts also have been found in waterfowl, but may represent a different *Sarcocystis* sp. (Drouin and Mahrt, 1979; Wobeser, 1981).

Dabbling ducks have a higher prevalence of *Sarcocystis* sp. macrocysts than diving ducks. Chabreck (1965) detected *Sarcocystis* sp. macrocysts in nine species of dabbling ducks in Louisiana, but he did not examine black ducks. He found macrocysts in 36% of adults and <1% of juveniles. Similarly, Hoppe (1976) found 9% of adult dabblers from North Dakota had macrocysts compared to <1% of juveniles. The highest prevalences have been reported in adult North American shovelers (*Anas clypeata*), ranging from 31% (Hoppe, 1976) to 78% (Chabreck, 1965). Additional reports of *Sarcocystis* sp. in waterfowl include Erickson (1940), Cornwell (1963), Munday et al. (1977, 1979), and Drouin and Mahrt (1979), but little information is available for black ducks. Beaudette (1941) described *Sarcocystis* sp. macrocysts in a black duck shot in New Jersey in 1940.

Inquiries by New Jersey waterfowlers concerning *Sarcocystis* sp. encouraged me to study its prevalence in black ducks wintering in New Jersey. The study was conducted on the Brigantine Division of the Forsythe National Wildlife Refuge in south coastal New Jersey (USA; 39°27′N, 74°27′W). The area has the highest winter concentrations of black ducks in the Atlantic flyway, with approximately 70,000 birds wintering and over 60,000 more passing through during migration (Alpaugh and Ferrigno, 1973; Steiner, 1984).

Black ducks collected in the winters of 1984–1985, 1985–1986 and 1986–1987 for a food habits and energetics study (Costanzo, 1988) were examined for macrocysts. Birds ($n = 140$) were shot from groups observed feeding. In addition, 33 birds were contributed by hunters. Sampling was conducted during early (1 to 15 December), mid (1 to 15 January), and late (15 to 28 February) winter. Except for early

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winter 1986–1987 when no birds were collected, between 7 to 14 adults and 7 to 14 juveniles were examined during each winter period. *Sarcocystis* sp. macrocysts were detected by dissection and examination of the pectoral and leg muscle masses.

There were one of 37 (3%), 12 of 33 (36%), and 15 of 23 (65%) adults infected with *Sarcocystis* sp. macrocysts in 1984–1985, 1985–1986 and 1986–1987, respectively. A test for a linear trend in proportions (Snedecor and Cochran, 1980) showed a significant increase ($P < 0.001$) in adult infection rates over the 3-yr period. No significant difference in macrocyst prevalence was found between time periods within the same year. No macrocysts were found in any of the 80 juvenile black ducks examined during the 3 yr.

Sarcocystis sp. macrocysts are visually unappealing, and although there is no evidence that properly-cooked parasitized ducks are harmful to humans (Raier and Newman, 1961; Tuggle, 1987), infected birds are often discarded by hunters (Cornwell, 1963; Hoppe, 1976; Wobeser, 1981). Wobeser (1981) suggested that macrocysts may not be noticed if birds are plucked rather than skinned, because cooking renders the cysts "invisible." He noted that many infected birds probably are consumed unknowingly. Chabreck (1965) reported that 20% of hunters in Louisiana were aware of *Sarcocystis* sp. and about 25% of these discarded infected ducks. In North Dakota, 14% of hunters surveyed also were aware of the parasite and discarded infected ducks, and Hoppe (1976) concluded that the numbers of discarded ducks could be substantial.

A hunter survey was not conducted in New Jersey, but most hunters contacted were unaware of the parasite. Those who were familiar with *Sarcocystis* sp. had seen it only recently and had discarded infected birds.

Black ducks may have acquired *Sarcocystis* sp. in New Jersey or elsewhere. Several black duck migration corridors converge in New Jersey (Bellrose, 1980), and *Sarcocystis* sp. may be or could become widespread in the Atlantic Flyway. Although *Sarcocystis* sp. rarely causes mortality in waterfowl, and is probably not a factor in recent black duck population declines, the increased prevalence of the parasite could influence black duck harvest rates. An increased awareness of the parasite could result in changes in the attitudes of waterfowl hunters towards black ducks. As a result, harvest rates might decrease if black ducks became less preferred, or conversely, increase if birds were shot but not retained.

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