BioOne COMPLETE

The Frequency of Sarcocystis spp. and Its Effect on Winter Carcass Composition of Mottled Ducks

Authors: Moorman, Thomas E., Baldassarre, Guy A., and Richard, David M.

Source: Journal of Wildlife Diseases, 27(3) : 491-493

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-27.3.491

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://complete.bioone.org/journals/Journal-of-Wildlife-Diseases on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

Journal of Wildlife Diseases, 27(3), 1991, pp. 491–493
© Wildlife Disease Association 1991

The Frequency of *Sarcocystis* spp. and Its Effect on Winter Carcass Composition of Mottled Ducks

Thomas E. Moorman,[1] Guy A. Baldassarre,[1] and David M. Richard,[2] [1] College of Environmental Science and Forestry, State University of New York, Syracuse, New York 13210, USA; [2] Fur and Refuge Division, Louisiana Department of Wildlife and Fisheries, Route 1, Box 20B, Grand Chenier, Louisiana 70643, USA

ABSTRACT: Macrocysts of the protozoan parasite *Sarcocystis* spp. occurred in 34 of 241 (14%) adult and 6 of 70 (8.6%) immature mottled ducks (*Anas fulvigula*) that were collected in southwestern Louisiana from 1987 to 1989. The prevalence of *Sarcocystis* spp. among immature ducks was higher than previously reported, possibly because of a longer exposure period. No differences in carcass composition variables were found between heavily infected and uninfected adult mottled ducks during the winter period of the annual cycle. We concluded that macrocysts of *Sarcocystis* spp. did not influence carcass composition and probably exert negligible effects on survival of parasitized mottled ducks during winter.

Key words: *Anas fulvigula*, carcass composition, mottled duck, parasite, *Sarcocystis* spp., wintering waterfowl.

Sarcocystis spp. are protozoan parasites found in at least 16 species of North American ducks (Hoppe, 1976). The obligatory two-host life cycle of these parasites consists of asexual muscle cysts that infect an omnivorous or herbivorous host (e.g., the mottled duck, *Anas fulvigula*), and sexual forms that appear in the intestine of a carnivorous final host (e.g., the striped skunk, *Mephitis mephitis*; Cawthorn et al., 1981, Wobeser, 1981).

Previous reports of *Sarcocystis* spp. in waterfowl largely have addressed the prevalence of macroscopically detectable forms of the parasite in various species (Chabreck, 1965; Hoppe, 1976; Costanzo, 1990). There was no evidence in these studies that the parasite adversely impacted the health of infected ducks (Chabreck, 1965; Wobeser, 1981; Costanzo, 1990). However, Tuggle (1987) suggested that heavy infections may result in weakened condition and reduced survival of infected birds. For example, *S. rileyi*, the species most frequently associated with waterfowl, may have contributed to the death of a northern pintail (*A. acuta*) in Minnesota (Erickson, 1940). Little information exists relative to the effect of endoparasites on the condition of birds (Blem, 1990), and speculations that sublethal effects of *Sarcocystis* spp. may impact the condition and survival of infected ducks have not been tested.

Birds use stored lipids to meet daily and seasonal energy requirements (Blem, 1990). Thus, macrocysts of *Sarcocystis* spp. may affect the energy budgets of infected wintering waterfowl if lipid reserves become reduced because of increased energy demands due to the parasite (Blem, 1990). Protein levels also may be affected because macrocysts of the parasite occur in the muscle of infected birds (Wobeser, 1981). We determined frequency of occurrence of the parasite by sex and age class of mottled ducks, and we tested for differences in winter carcass composition between adult mottled ducks heavily infected with macrocysts of *Sarcocystis* spp. and uninfected birds.

We collected 311 mottled ducks by shooting from September 1987 to July 1989 on Rockefeller Wildlife Refuge (29°20′N, 91°20′W; Cameron Parish, Louisiana, USA) as part of a project involving determination of carcass composition during various phases of the annual cycle of mottled ducks. Upon collection, we determined age (adult or immature) and sex (Hochbaum, 1942; Stutzenbaker, 1988), and recorded the period of the annual cycle in which the birds were collected (e.g., winter, nesting, flightless, etc.). We examined only the muscle of the breast and legs for presence of *Sarcocystis* spp. although macrocysts have been reported in various skeletal muscles

Downloaded From: https://complete.bioone.org/journals/Journal-of-Wildlife-Diseases on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

TABLE 1. Body mass and carcass components (g) of adult mottled ducks that were heavily infected and uninfected with macrocysts of *Sarcocystis* spp. during the winter, 1987 to 1989, in Louisiana.

	Males			Females		
	Heavily infected (n = 5) $\bar{x}$ (g) (S.E.)	Uninfected (n = 5) $\bar{x}$ (S.E.)	P-value	Heavily infected (n = 5) $\bar{x}$ (S.E.)	Uninfected (n = 5) $\bar{x}$ (S.E.)	P-value
Body mass	1,034.8 (20.9)	1,052.9 (24.5)	0.22	947.6 (46.3)	928.5 (48.2)	0.48
Carcass mass	956.0 (22.2)	951.2 (40.0)	0.53	885.5 (44.6)	860.0 (46.0)	0.42
Carcass fat	119.9 (17.1)	108.1 (20.9)	0.91	132.3 (33.1)	118.7 (21.1)	0.55
Carcass protein	172.3 (6.0)	174.9 (9.4)	0.86	161.6 (11.4)	150.6 (6.1)	0.94
Carcass water	616.6 (20.8)	629.3 (32.2)	0.66	553.9 (8.4)	545.2 (23.6)	0.18

(Wobeser, 1981). Infected birds were classified as heavily infected ("many" macrocysts) or lightly infected ("few" macrocysts).

Specimens were weighed to the nearest 0.1 g, plucked, and reweighed to determine plucked mass. Ingesta and excreta were removed from the alimentary tract and weighed. Body mass and carcass mass were determined by subtracting the mass of ingesta, excreta, bill, and feet from feathered body and plucked carcass mass, respectively. Birds then were frozen until preparation for carcass analysis. A carcass homogenate was obtained by passing the partially thawed carcass, minus the bill and feet, three times through a meat grinder equipped with a 5-mm sieve plate. A 100-g subsample of the homogenate was used for carcass component determination; the methods followed Alisauskas and Ankney (1985).

We used chi-square tests to compare proportions of infected birds in this study with those reported by Chabreck (1965), and also to compare proportions of infected individuals between age classes (Conover, 1980). Analysis of covariance (ANCOVA), with grams of ash as a covariate to correct for differences in body size, was used to test for differences in carcass composition between heavily infected and uninfected wintering adult birds (Steel and Torrie, 1980). Data were analyzed by sex because males average about 120 g heavier than females (Stutzenbaker, 1988). Only heavily infected adult birds (n = 5 of each sex) from the winter period (18 November to 28 February) were used to test for differences in carcass composition because samples from other periods (includes all immature birds) were too small (<3) to permit analysis. The winter period was subdivided into three periods (early, middle and late) based on the lower critical temperatures of mottled ducks. Carcass mass and composition of uninfected mottled ducks (n = 169) collected during this study did not vary significantly ($P > 0.05$, ANCOVA) between winter periods (T. E. Moorman, unpubl.), so we pooled infected birds from different winter periods to obtain an adequate sample size to compare with a random subsample (n = 5 adults of each sex) of uninfected specimens.

Macrocysts of *Sarcocystis* spp. were present in 17 of 101 (17%) adult males, 17 of 140 (12%) adult females, 4 of 27 (15%) immature males, and 2 of 43 (5%) immature females. No differences ($P > 0.05$) existed in the proportions of infected birds in each age class in this study. Additionally, proportions (both sexes combined) of infected adults and immatures were not significantly higher ($P > 0.05$) than values reported by Chabreck (1965) from the same region in southwestern Louisiana (11% for adults, 0% for juveniles).

Although not higher statistically, our larger percentage of infected juveniles warrants further discussion. Chabreck (1965) found macroscopic forms of the parasite in only two of 552 immature ducks of nine species he examined during the hunting season (November to January) in southwestern Louisiana. We found six of

Downloaded From: https://complete.bioone.org/journals/Journal-of-Wildlife-Diseases on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

70 immature mottled ducks with light infections. Immature waterfowl are believed to be infected at lower rates because there is inadequate time for development of macroscopic cysts in young birds, or because a suitable final host is absent from breeding areas (Wobeser, 1981). The mean date of collection of the infected immatures was 16 February. Given that the mean hatching period occurs in the last week of March and the first week of April (Stutzenbaker, 1988), an exposure period of approximately 11 months allowed light infection of the parasite to develop in some immature mottled ducks. Mottled ducks are sedentary and usually spend their entire lives within 50 km of their natal marshes (Chabreck, 1965; Stutzenbaker, 1988). Thus, the presence of *Sarcocystis* spp. in both adult and immature mottled ducks indicates that a suitable final host exists in the coastal marshes of Louisiana.

During the winter period, no differences ($P > 0.05$) were found in carcass composition between uninfected and heavily infected adult mottled ducks of either sex (Table 1). Therefore, heavy infections of macroscopic cysts of *Sarcocystis* spp. appear to have little effect on carcass mass or components measured in this study, which supports the contentions of other authors (Chabreck, 1965; Wobeser, 1981; Costanzo, 1990). Since no apparent effect on carcass composition due to the parasite occurs, losses attributable to the disease are probably negligible, and no management action is warranted to curtail infection of the birds.

LITERATURE CITED

ALISAUSKAS, R. T., AND C. D. ANKNEY. 1985. Nutrient reserves and the energetics of reproduction in American coots. Auk 102: 133–144.

BLEM, C. R. 1990. Avian energy storage. *In* Current ornithology, Vol. 7, D. M. Power (ed.). Plenum Publishing Corporation, New York, New York, pp. 59–113.

CAWTHORN, R. J., D. RAINNIE, AND G. WOBESER. 1981. Experimental transmission of *Sarcocystis* sp. (Protozoa: Sarcocystidae) between the shoveler (*Anas clypeata*) duck and the striped skunk (*Mephitis mephitis*). Journal of Wildlife Diseases 17: 389–394.

CHABRECK, R. H. 1965. Sarcosporidiosis in ducks in Louisiana. Transactions of the North American Wildlife Conference 30: 174–184.

CONOVER, W. J. 1980. Practical nonparametric statistics. John Wiley and Sons, New York, New York, 493 pp.

COSTANZO, G. R. 1990. *Sarcocystis* in American black ducks wintering in New Jersey. Journal of Wildlife Diseases 26: 387–389.

ERICKSON, A. B. 1940. *Sarcocysttis* in birds. Auk 57: 514–519.

HOCHBAUM, H. A. 1942. Sex and age determination of waterfowl by cloacal examination. Transactions of the North American Wildlife Conference 7: 299–307.

HOPPE, D. M. 1976. Prevalence of macroscopically detectable *Sarcocystis* in North Dakota ducks. Journal of Wildlife Diseases 12: 27–29.

STEEL, R. G. D., AND J. H. TORRIE. 1980. Principles and procedures of statistics. McGraw-Hill Book Company, New York, New York, 633 pp.

STUTZENBAKER, C. D. 1988. The mottled duck, its life history, ecology and management. Texas Parks and Wildlife Department, Austin, Texas, 209 pp.

TUGGLE, B. N. 1987. *Sarcocystis*. *In* Field guide to wildlife diseases—General field procedures and diseases of migratory birds, M. Friend (ed.). United States Fish and Wildlife Service, Resource Publication 167, Washington, D.C., pp. 153–158.

WOBESER, G. A. 1981. Diseases of wild waterfowl. Plenum Press, New York, New York, 300 pp.

Received for publication 11 September 1990.

Downloaded From: https://complete.bioone.org/journals/Journal-of-Wildlife-Diseases on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use