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DIAGNOSIS AND MANAGEMENT OF A SMALL EPIZOOTIC OF SALMONELLOSIS IN PASSERINES

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In late January 1998, a homeowner in Gilchrist County, Florida reported morbidity and mortality in Northern Cardinals (*Cardinalis cardinalis*) and Brown-headed Cowbirds (*Molothrus ater*). Several birdfeeders and birdbaths were present on the homeowner's property. Large piles of waste seed and feces were present on the ground below the feeders and no sanitation efforts had been undertaken. She had been feeding birds continuously for several years and had never experienced a problem prior to this time. Two weeks prior to observation of the first sick bird, the homeowner noted that a large number of Brown-headed Cowbirds (approximately 1000) had begun using her property as a congregation area. The cowbirds actively used the birdfeeders and bird baths on the property.

Sick and dead birds were first noted in mid-January. The clinical signs observed by the homeowner included: "fluffed-up feathers, dull eyes, and decreased alertness". Birds either disappeared or were found dead within 24 hours after first being noticed as sick. Six cardinals and 12 cowbirds were found dead over a two-week period. It is not known how many birds died that were not discovered.

Three birds which had recently died were submitted to the University of Florida College of Veterinary Medicine for necropsy (one cardinal and two cowbirds). At necropsy, the birds had a minor reduction of pectoral muscle mass. There was an obvious absence of subcutaneous and coelomic adipose tissue. No evidence of trauma was apparent. Gross lesions were limited to the esophagus, spleen, and brain. Granulomas filled with white caseous material were present in the wall of the esophagus of one cardinal and one cowbird. The spleens of all birds examined were moderately enlarged, friable and mottled white and red in color. A small white focus was present in the cerebral cortex in one cowbird.

Sections of spleen from one cardinal and one cowbird were submitted for aerobic culture and *Salmonella* sp. screening. Heavy growth of 100% *Salmonella* group B was cultured from both spleens. Cultures were sent to the National Veterinary Services Laboratory (Ames, Iowa) for serotyping. Both samples were serotyped as *Salmonella typhimurium* (Copenhagen).

Tissue sections were collected in 10% neutral buffered formalin, embedded in paraffin, sectioned at 5µm, and stained with hematoxylin and eosin for histopathologic examination. Necrotizing and inflammatory lesions with intralesional bacterial rods were observed in multiple tissues from all three birds examined including the spleen, liver, lung, kidney, esophagus, brain and pectoral muscle. The esophageal granulomas noted at necropsy contained massive accumulations of heterophils and rod shaped bacteria. Gram negative staining of the intralesional bacterial rods was seen on histopathologic sections stained with a tissue gram stain (Brown & Brenn). A diagnosis of bacterial septicemia due to *Salmonella typhimurium* (Copenhagen) was made based on gross lesions, culture results, and histopathologic findings.

Management recommendations were made to the homeowner based on the diagnosis of salmonellosis. These recommendations included temporary discontinuation of feeding stations and bird baths, removal of waste seed and fecal material from the ground underneath the feeders, and thorough disinfection of bird feeders and bird baths with a dilute bleach solution. Mortality decreased in frequency, but did continue (two more cardinals

were found dead) following institution of the above recommendations. Further communication with the homeowner revealed that only a portion of the recommended disinfection protocol had been followed (no bleach had been used). Mortality ceased following disinfection of the feeders with a 10% bleach solution and complete removal of waste seed and fecal material from the ground underneath feeders.

Salmonella typhimurium has been reported in many types of wild birds including waterfowl, cranes, gallinaceous birds, and passeriform birds (Steele and Galton 1971, Stroud and Friend 1987). In Florida, *Salmonella typhimurium* (Copenhagen) has been found in three raccoons (*Procyon lotor*) from Bay County, Florida in 1969-1971 (Bigler et al. 1974) and in an adult wild turkey (*Meleagris gallopavo*) from Levy County, Florida in 1977 (Forrester, unpubl. data). *Salmonella typhimurium* infection of passeriform birds is often associated with artificial feeding stations (Locke et al. 1973, Nesbitt and White 1974, Stroud and Friend 1987). Feeding stations are an important aspect of the epizootiology of salmonellosis for several reasons: (1) the feeders serve to concentrate large numbers of birds, (2) the build up of waste seed and fecal material provides an optimal bacterial growth medium, and (3) the feeding activity is conducive to transmission of bacteria which are normally acquired by ingestion.

The source of *Salmonella* sp. in bird feeder-associated epizootics is often thought to be via a carrier bird (Stroud and Friend 1987). The carrier bird deposits the bacteria in fecal material onto the common source of infection (the birdfeeder). There was evidence that the bacteria were introduced by a carrier bird in this case. The homeowner reported that morbidity and mortality began soon after a large number of cowbirds began using the feeders and birdbaths. Faddoul et al. (1966) found that among 187 specimens from 29 different avian species surveyed for *Salmonella* sp., Brown-headed Cowbirds were the most frequently infected species. It is possible that the bacteria responsible for this epizootic were introduced by a brown-headed cowbird.

Management of salmonellosis in wild populations of birds involves control of the common source of the bacteria. As contaminated feeders are often the common source of the bacteria for passeriform birds, sanitation of feeding stations should be a priority. Feeders should be disinfected routinely with household bleach solution and waste seed and fecal material should be periodically removed from feeding stations. In the case of an outbreak associated with mortality, discontinuation of feeding should be considered. Due to the fact that *Salmonella* spp. are a common cause of "food poisoning" in humans, care should be taken during disinfection of feeders and handling of sick or dead birds. We recommend that humans handling waste material and/or sick or dead birds should wear gloves and thoroughly disinfect their hands after handling those materials.

At the time that this epizootic was occurring in Florida in January of 1998, similar outbreaks of salmonellosis were occurring in several states in the midwest and northeastern United States including Illinois, Indiana, Michigan, Missouri, New Hampshire, New York, Pennsylvania, Vermont, and Wisconsin (Kimberly Miller, pers. comm). The underlying cause of the large number of *Salmonella* associated outbreaks in 1998 is not known. Despite the fact that outbreaks of salmonellosis are well documented and easily recognized by biological and veterinary personnel, public awareness of this disease appears to be lacking. The homeowner in this case had no idea that the tremendous build up of waste seed and fecal material at her feeding stations might be harmful to the birds. This demonstrates the need for public education concerning proper methods of disease prevention and sanitation at backyard bird feeders.

In summary, bacterial septicemia due to infection by *Salmonella typhimurium* was diagnosed as the cause of mortality of a small number of Northern Cardinals and Brown-headed Cowbirds in Gilchrist County, Florida. As is the case with many outbreaks of salmonellosis in passeriform birds, this case was associated with a backyard birdfeeder. The combination of poor sanitation, fecal contamination, and concentration of large numbers of birds at bird feeders provided optimal conditions for transmission of this highly patho-

genic bacterium. Control of salmonellosis is by disinfection of bird feeders and removal of waste seed and fecal material from the area. Those people maintaining bird feeders should be educated concerning the importance of sanitation for prevention of similar outbreaks.

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