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SALMONELLOSIS IN A WILD TURKEY FROM FLORIDA

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The Wild Turkey (*Meleagris gallopavo*) is an important game bird in Florida. Legal hunting occurs in each of Florida's 67 counties and in 1997 more than 12,000 were killed (Linda 1998). An understanding of the health and diseases of Wild Turkeys is important in order to manage this species properly. A synopsis of disease conditions found in Wild Turkeys in Florida from 1969 to 1990 (Forrester 1992) included little on their bacterial diseases. We describe a fatal case of salmonellosis that occurred concurrently with avian pox and leucocytozoonosis in a Wild Turkey from Florida.

On 22 January 1997 a juvenile female Wild Turkey was found in a weakened condition on a private ranch managed for cattle and wildlife near Three Lakes Wildlife Management Area in Osceola County. The bird was captured easily by hand, and died shortly thereafter. The carcass was refrigerated and submitted the next day to our laboratory for determination of the cause of death. It weighed 2.0 kg. A healthy juvenile female Wild Turkey from Florida at this time of year should weigh around 3.4 kg. (Powell 1965).

Samples of skin, liver, spleen, lung, kidney, pancreas, duodenum, and cecum were fixed in 10% buffered formalin, embedded in paraffin, sectioned at 5 µm, and stained with Hematoxylin and Eosin. Sections of liver and skin were also stained with Periodic Acid Schiffs stain and Brown and Brenn stain. Thin films of heart blood were prepared, fixed with absolute methanol, and stained by standard Giemsa technique at a dilution of 1:10 and pH 7.0 or 7.2 for 1 h. A sample of liver tissue was cultured for aerobic bacteria including *Salmonella* spp. A *Salmonella* isolate was submitted to the U.S.D.A. National Veterinary Services Laboratory (Ames, Iowa) for serotyping.

The pectoral muscle mass was severely reduced. There were pox-like lesions at the base of the bill and within the dorsal surface of the pharynx involving about one half of the choanal slit. There were also nodules on about 30% of the skin of the head, the lateral commissure of the right eye, and the neck. There were nits of chewing lice (Mallophaga) on the wing feathers and around the cloaca. The liver was firm and reddish black with sharp margins and diffusely distributed light tan foci on both the capsular and cut surface. Many of these foci had central depressions. The cecae were distended and contained white firm caseous cores.

The skin sections were characterized by dermatitis with eosinophilic intracytoplasmic inclusion bodies in the epidermis, diffuse severe hyperkeratosis, and chronic ulcerative necrosis, which were consistent with avian pox. Branching septate fungal hyphae extended from the superficial crusts into the dermis. Cecae were distended with fibrinonecrotic cores with large colonies of short gram-negative bacterial rods. The liver was characterized by severe multifocal to bridging hepatic necrosis with similar bacterial colonies. Sinusoids were congested with erythrocytes, mixed leucocytes, and many cells with intracytoplasmic protozoans consistent with *Leucocytozoon* sp. A few hepatocytes contained protozoal schizonts. There were moderate accumulations of brown pigment in Kupffer cells. Bacterial colonies and necrotic foci were also found in the kidney and spleen. No protozoal organisms were seen in the liver or cecal sections.

Blood smears were positive for the protozoan blood parasites *Leucocytozoon smithi* and *Haemoproteus meleagridis*. *Salmonella tallahassee* was isolated from the liver in almost pure culture. Two other gram-negative enteric rods, *Staphylococcus aureus*, two other *Staphylococcus* spp. and a non-hemolytic *Streptococcus* were present in less than 1% of the culture.

The primary cause of death of this turkey was considered to be salmonellosis. Avian pox infection and leucocytozoonosis may have been contributing factors, however, the lesions were not severe enough to cause death. The other bacteria, fungi, and protozoans were considered to be incidental findings.

This is the first definitive diagnosis of salmonellosis in Wild Turkeys from Florida. There are two other presumptive (unconfirmed) cases. One was an adult gobbler from Lake X (Osceola County) in 1970 and the other was an adult gobbler from Myakka River State Park (Manatee County) in 1977. *Salmonella miami* was isolated from the Lake X bird and *S. braenderup* from the Myakka bird (F. W. White and D. J. Forrester, unpubl. data, J. A. Popp and D. J. Forrester, unpubl. data).

Salmonellosis has been reported also as individual cases in Wild Turkeys in other southeastern states (Alabama, Georgia, Virginia; Davidson and Wentworth 1992, Howerth 1985). Howerth (1985) reported miliary pinpoint foci in the liver of a turkey infected with *Salmonella typhimurium*, unlike the large foci of hepatic necrosis (i.e., dead tissue) in our case. Both birds had enlarged cecae with fibronecrotic cores. Because of the similarity of the gross lesions to histomonosis, we recommend that salmonellosis be considered as a differential diagnosis in such cases.

Salmonellosis is probably uncommon in this species and of little consequence to turkeys at the population level. Non-pathogenic enteric infections of Wild Turkeys with various serovars (varieties) of *Salmonella* are more common in Florida. Between 1969 and 1982 intestinal contents of Wild Turkeys from Florida were cultured for *Salmonella* organisms (Akey 1981, White et al. 1981, F. H. White and D. J. Forrester unpubl. data). Thirteen serovars were identified in 23 (5%) of 478 turkeys; positive birds were found in 6 of 19 counties (Alachua, Glades, Hendry, Levy, Osceola, Sarasota). The relationship of *Salmonella* infections in turkeys, range cattle, and other birds was studied by White et al. (1981) from 1969 to 1979 at Fisheating Creek (Glades County). They identified a number of serovars of *Salmonella*, four from songbirds (Eastern Towhees [*Pipilo erythrophthalmus*], Common Grackles [*Quiscalus quiscula*], American Crows [*Corvus brachyrhynchos*], and Northern Cardinals [*Cardinalis cardinalis*]) and one from range cattle that occurred also in Wild Turkeys, which may mean that some of the serovars are cycling among these hosts. The only other reports of *Salmonella tallahassee* from wildlife in Florida were those of Bigler et al. (1974) and White et al. (1975) of infections in raccoons (*Procyon lotor*) from Collier County. These ecological relationships need further study.

Although not severe in this instance, avian pox infections are common in Wild Turkeys throughout the southeastern U.S. (Forrester 1991, Forrester 1992) and frequently cause mortality. It was more difficult to assess the significance of the leucocytozoonosis in this case. *Leucocytozoon smithi* is transmitted to Wild Turkeys by a number of species of black flies (genus *Simulium*) (Pinkovsky et al. 1981) and is distributed throughout Florida with prevalences as high as 100% in some areas (Forrester et al. 1974). Byrd (1959) conducted experimental infections and concluded that *L. smithi* was not a serious primary pathogen for Wild Turkeys. The importance of this parasite may be in its role as a stress factor or in additive effects in cases where other parasites and disease agents are present (Borg 1953, Simpson et al. 1956). More information is needed on the effects of combined infections of various disease agents on Wild Turkeys in Florida and elsewhere.

Summary: The primary cause of death of a free-ranging juvenile female Wild Turkey (*Meleagris gallopavo*) from Osceola County, Florida was salmonellosis. *Salmonella tallahassee* was isolated from the liver in almost pure culture. Salmonellosis appears to be uncommon in Wild Turkeys and is probably of little importance at the population level. This bird also had concurrent infections of avian pox and leucocytozoonosis.

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