

# ZOO AND EXOTIC FOWL: A REVIEW OF COMMON MEDICAL DISORDERS

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## INTRODUCTION

Exotic "fowl" include a variety of species from the orders Galliformes (e.g. chicken, turkey, quail, partridges, pheasants, guineafowl, curassows, guan, ptarmigan, and francolins) and Anseriformes (e.g. ducks, geese, swans, screamers, and magpie goose). These birds are commonly housed in both zoological and private "backyard" collections. Although published information on disorders for each exotic species may be limited, a variety of diseases/disorders have been documented in domestic fowl, and knowledge from these sources may be extrapolated to their exotic counterparts. An important point to remember when assessing disease risks and treatment in an exotic bird is its taxonomic relationship to domestic species. For example, crested screamers (*Chauna torquata*) are more closely related to ducks than chickens, and many exotic Galliformes are more closely related to turkeys than chickens. Thus, usage of the chicken for a disease susceptibility model in some species may not be the most prudent course of action.

## INFECTIOUS DISEASES

### Avian Influenza

Though not common, the disease remains important from an awareness perspective. Historically, hosts have been from the orders Anseriformes and Charadriiformes (wading/shore birds, gulls, etc.), which are minimally affected. However, the viruses infect a wide variety of other avian and mammal species, causing clinical disease ranging from mild, nonspecific signs to peracute death. When disease is present, multiple individuals are typically affected, and differentials should include other infectious diseases leading to flock morbidity/mortality. Specialized laboratories generally perform diagnostic testing for AI. Currently, any H5/7 AI subtypes are immediately notifiable to state, federal, and international authorities. Prevention relies on exclusion of wild birds and their feces. Effective general sanitation and hygiene measures will help prevent fomite transmission.

### Avian Bornavirus

ABV has been identified in waterfowl, which appear to be the primary reservoir. Long-term intermittent shedding in apparently healthy birds has been documented, and appears to be of low pathogenicity to most waterfowl. Prevalence rates are higher in brain tissues than oropharyngeal or cloacal sampling sites. Histologic characteristics of a nonsuppurative encephalomyelitis and ganglioneuritis are found in clinically ill waterfowl. Carriers should be

considered a source of infection to other birds. Clinically affected waterfowl present as weak, unable to fly, neurologically impaired, and potentially have an impacted GI tract. Antemortem detection may be performed using RT-PCR on crop biopsies, or freshly plucked feathers that include the calamus. Neither cloacal or vent swabs nor fecal samples are recommended because of intermittent viral shedding. Postmortem detection using RT-PCR is performed on brain tissue, proventricular tissue, or both.

### Aspergillosis

Caused by the fungal organism *Aspergillus fumigatus*, infection occurs through exposure to ubiquitous airborne spores. Immunosuppression, poor ventilation, and moldy feed are all considered to contribute to pathogenesis. Clinical signs include dyspnea, vocal changes, weight loss, or acute death. Diagnosis is often made through pre-existing clinical suspicion, paired with abnormalities on radiographs and serology. Blood testing for galactomannan (component of fungal cell wall) may support infection. Treatment consists of antifungal therapeutics (e.g. itraconazole, terbinafine, amphotericin-B) and supportive care. Infection in air sacs or other poorly-vascularized locations may be refractory to medical treatment. Surgical removal of granulomas may be indicated in certain cases.

### Avipoxvirus

Nodular or granulomatous lesions on unfeathered skin are common in the cutaneous form. In the diphtheritic form, which affects the upper GI and respiratory tracts, lesions occur from the mouth to the esophagus and on the trachea. The virus is present in large numbers in lesions and is usually transmitted by contact through abrasions of the skin. Mosquitoes and other biting insects may serve as mechanical vectors. Diagnosis is by observing characteristic gross and microscopic lesions and PCR. Vaccination can prevent the disease and limit spread in affected flocks.

### Chlamydiosis

Infections with *Chlamydochlamydia psittaci* are contracted through exposure to respiratory secretions and fecal-oral contact. Typical clinical signs are representative of sinusitis, conjunctivitis, diarrhea, and neurologic dysfunction. Diagnostic antemortem testing consists of paired antibody titers, culture, or antigen-based tests for PCR from fecal, cloacal, tracheal, or choanal swabs. Patients will often exhibit hepatomegaly, splenomegaly, pneumonia and airsacculitis. Clinical suspicion of disease should initiate prudent use of personal protective equipment, as zoonotic infections are well documented. Treatment is targeted at intracellular components of the infection, and typically include doxycycline or tetracycline drugs. Some states consider the disease reportable.

### Salmonellosis

Typically caused by *S. typhimurium* or *S. paratyphi*. It is contracted through fecal-oral exposure or vertically via fecal contamination of eggs. If the density of animals in managed care is high, environmental contamination may contribute. Prevalence in managed care is higher than the wild and mostly affects chicks/ducklings. Clinical signs include lethargy, severe watery/foamy/ bloody diarrhea, ataxia, conjunctivitis, or peracute death. Diagnostic imaging or post-mortem evaluation often reveals hepatosplenomegaly and/or multifocal necrosis of the liver. In acute cases there may be no gross lesions. Culture of the organism from parenchymal lesions is diagnostic. Treatment is controversial, as patients may resolve without therapy, and antimicrobial efficacy may be equivocal. Lifetime carrier-status may result in those individuals that survive infection.

### Mycobacterial Disease

Avian mycobacteriosis is most often attributed to infection with *M. avium*, *M. genovense*, and *M. intracellulare*, although others have been isolated from avian infections. Although all birds are considered susceptible to mycobacteriosis, fowl (notably water birds) are considered especially susceptible, and disease has been reported worldwide. Generally, disease prevalence is low, and infections are typically opportunistic. Disease is most common in large flocks of zoological collections. Clinical abnormalities are often subtle until late in the course of disease, with birds continuing to eat and behave normally despite marked weight loss. Hematologic abnormalities may be minimal at first, but typically progress to exhibit marked heterophilia. Diagnostic imaging is variably successful in confirming mycobacteriosis. Culture remains the gold standard, but may be difficult, depending on site of infection. Fecal culture and acid-fast cytology testing has been utilized, but is neither sensitive nor specific. Due to the challenges in diagnosis, clinicians must keep the disease as a differential diagnosis for non-specific loss of body condition and/or unexplained leukocytosis. Mycobacteriosis is not easily transmitted bird to bird, and environmental reservoirs are usually required for collection outbreaks. Although generally of low zoonotic concern, immunosuppressed individuals may experience a higher disease risk in a contaminated environment.

### Parasitic Disease

Coccidiosis – Typically of the genus *Eimeria*, coccidia are found primarily in the intestinal tract but are also responsible for renal infections in some species. The location in the host, appearance of lesions, and the size of oocysts are used in determining the species present. Most common in young birds, but can affect any age. Signs include bloody diarrhea, general malaise, and death. Treatments include amprolium and sulfonamides, among others.

Capillaria – Widely distributed and cause such nonspecific signs as general unthriftiness, inactivity, depressed appetite, and retarded growth; in severe cases, death may result.

Just a few ascarids may depress weight, while larger numbers may block the intestinal tract. Region of infection (i.e. crop vs intestinal tract) varies by species. Some require an intermediate host (i.e. earthworm) and some do not. Albendazole and/or ivermectin may be considered as first-line treatments.

Heterakis/Histomoniasis – Occurring in the cecum, *Heterakis gallinarum* may be found in many exotic Galliformes species. It is significant due to its role in histomoniasis, which can cause significant disease in any gallinaceous bird. No drugs are currently approved for use as treatments for histomoniasis. Treatment with benzimidazoles helps reduce exposure to heterakid worms that carry the infection.

### NON-INFECTIOUS DISEASES

#### Pododermatitis

Also known as “bumblefoot,” pododermatitis ranges in severity. The initial appearance presents as a smoothed, erythematous region of tissue on the plantar surface of the foot. Without intervention, it gradually can progress to ulceration, abscessation, osteomyelitis, and tenosynovitis. Once advanced, pododermatitis and the associated sequelae carry a grave prognosis for the affected bird. The chronic inflammation of pododermatitis has also been linked to multisystemic amyloidosis in waterfowl. It is typically associated with birds in managed care. Factors leading to its development include concrete or other hard and/or abrasive substrates, insufficient environmental disinfection, and obesity. Treatment may be frustrating, and resolution is unlikely without improvement of husbandry-related issues. Depending on the severity and chronicity of lesions, treatment includes thorough debridement and cleaning of lesions, padded bandaging of the feet, and long-term antibiotic therapy. Surgical resection of affected lesions, with advancement flap closure, can provide resolution when combined with adjunctive medical treatment and husbandry modifications.

#### Nutritional

Carpometacarpal Rotation (“Angel Wing”) – Associated with excess dietary protein. Manganese deficiency and excess dietary energy also implicated. Leads to lateral rotation of the distal carpometacarpus & inability to fly. Occurs both in managed care and in the wild. Correction can be achieved if intervention occurs early. Manage through taping into normal position and modifying diet.

#### Toxicoses

Heavy Metal (Lead, Zinc) – Both can cause weakness, emaciation, ataxia, and other neurological abnormalities. Anemia is a common clinicopathologic finding. Typically occurs when foreign substances are ingested (e.g. lead shot, sinkers, pennies minted after 1983, galvanized metal, etc). Diagnosis is via blood metal testing and possibly with radiographic evidence. Treatment consists of supportive care and chelation, +/- removal.

**Amyloidosis**

Predominantly an issue in Anseriformes, amyloid deposition occurs secondary to chronic inflammatory conditions. Chronic pododermatitis and *Aspergillus* infections have been associated with cases of amyloidosis. Swans appear sensitive to this syndrome, especially trumpeter and mute swans. Organs that are most affected include the liver and spleen, with kidneys and other organs affected to a lesser degree.

**Reproductive**

The most frequently diagnosed reproductive diseases in exotic fowl are salpingitis, yolk coelomitis, dystocia (“egg-binding”), cloacal prolapse. These may occur separately or as a

constellation of co-morbidities. In cases of oviductal stasis/impaction, secondary infections are common and most often due to infection with coliform bacteria. Obesity and excessive dietary energy may predispose to these issues. Treatment through contraceptive techniques may be the only means of permanently resolving the issues. This can include use of GnRH agonists (e.g. deslorelin), although efficacy may vary and an initial increase in laying can occur due to the negative-feedback mechanisms. Ovariosalpingohysterectomy is curative but is technically challenging, especially in obese or cycling individuals. Cases of yolk coelomitis typically carry a guarded short-term prognosis, and those whose survive carry a higher risk for long-term secondary issues.