Introduction

Avian pasteurellosis (avian cholera) is an infectious disease of birds. In North America, avian pasteurellosis is responsible for major mass mortality events in wild waterbirds in wetland populations. The disease may also cause mass mortality in domestic birds, particularly farmed geese. In Australia, in common with many other areas of the world, avian pasteurellosis is not commonly associated with mass mortalities of wild birds. In 2013, avian pasteurellosis was associated with mortalities in wild waterbirds in Victoria.

Aetiology

Avian pasteurellosis (also known as avian cholera) is a contagious disease of birds caused by the gram negative bacterium *Pasturella multocida*. Different strains of the bacterium vary significantly in their pathogenicity (Samuel et al. 2007).

Natural hosts

*Pasturella multocida* is found in many vertebrate species including humans however the strains causing disease in mammals do not typically result in disease in birds. Different serotypes are generally found in poultry and wild birds (Friend 1999).

More than 190 wild and domesticated bird species, from at least 47 families, are reported to have been naturally infected with *P. multocida* - for a comprehensive list see Samuel et al. (2007). Waterfowl including Anseriformes and other types of waterbirds (such as coots [*Fulica* sp.]) are the species most commonly involved in *P. multocida* mass mortality events (Friend 1999). Scavenger species such as crows, raptors and gulls are also considered susceptible. Outbreaks in species other than water birds are considered uncommon (Friend 1999).
World distribution

Avian pasteurellosis is found in many countries of the world. Since the 1970s it has been considered a significant disease for wild waterbird populations throughout North America, where major outbreaks (some killing more than 50,000 birds) occur almost annually (Samuel et al. 2007). In North America it is considered an emerging disease, as outbreaks are increasing in number and expanding in geographic range, in part due to diminished wetland habitat and increasingly concentrated waterbird populations (Samuel et al. 2007). There are scattered reports of mass mortalities affecting wild birds outside North America (Friend 1999).

Occurrence in Australia

Avian pasteurellosis is recognised in domestic poultry, ducks and turkeys in Australia. It is considered an emerging issue for broiler chicken producers and the free range poultry industry in Australia (Turni 2012). Until recently, *P. multocida* had only been reported a small number of single wild bird deaths in Australia (Ladds 2009; Hoque et al. 2012) and eWHIS, and it had not been reported as a cause of mass mortalities in free-living native birds (Ladds 2009). A related pathogen, *Riemerella (Pasteurella) anatipestifer* was identified in one mass mortality event involving approximately 600 juvenile black swans in Tasmania (Munday et al. 1970).

In 2013 *P. multocida* was diagnosed in wild waterbirds in Victorian wetlands, associated with mortality events (Grillo et al. 2013; Whiteley 2013).

Epidemiology

*P. multocida* may act as a primary pathogen, leading to acute disease outbreaks and sudden death in wild waterbirds. It may also act as a secondary pathogen in wild birds with concurrent disease (Ladds 2009). Avian pasteurellosis is highly infectious and can spread rapidly through susceptible avian populations with little warning. Outbreaks are generally associated with densely concentrated populations of susceptible species of birds.

Infected birds shed large numbers of bacteria, particularly in secretions and from the gastrointestinal tract. Carcasses of birds dying from pasteurellosis also contain vast numbers of organisms. Environmental contamination from diseased birds is considered the most common source of infection. High bacterial loads are found in water bodies for weeks after deaths and wetlands may become significantly contaminated during outbreaks (Friend 1999).

Transmission can occur via close bird-to-bird contact, inhalation or ingestion of contaminated materials (e.g. food, water, maggots, flies). Bacteria usually enter the host’s body via the mucous membranes of the respiratory tract, oral cavity or eye (Friend 1999; Samuel et al. 2007). Birds may remain infected for life and may act as a reservoir for the organism. In North America, migratory waterfowl may act as carriers of the disease (Friend 1999).

A number of factors are considered important in the development of an outbreak, including host density, distribution, nutrition and immunity; environmental conditions; and pathogen virulence (Friend 1999). Outbreaks in poultry typically occur in late summer, autumn and winter. In North America, outbreaks in wild waterbirds follow typical annual trends at each location, but there is no overall seasonal pattern to outbreak events (Friend 1999).
Although several subspecies and serotypes of *P. multocida* are described, there is no clear relationship between serotypes and host species affected (Samuel et al. 2007). Studies in the United States have shown that *P. multocida* isolates can be exchanged between wild birds and poultry, however the relationship between wild birds and disease outbreaks in poultry is uncertain (Friend 1999; Samuel et al. 2007). Bacterial isolation from outbreaks is required to further characterise isolates and determine potential transmission pathways.

Mortalities during outbreaks reflect the type of avian species and the numbers of each species present in the ecosystem during the acute phase of the outbreak (Friend 1999).

In North America, the frequency, high fatality rate and volume of numbers involved in avian *P. multocida* mortality events in wild birds has raised concerns about the potential population level and biodiversity impacts of the disease (Friend 1999).

**Clinical signs**

In acute outbreaks, wild waterbirds in good body condition may be found dead with few or no clinical signs within hours of exposure (Friend 1999; Samuel et al. 2007; Ladds 2009). Clinical signs, when seen, are generally non specific and may include lethargy, nasal discharge and a range of neurological signs (e.g. erratic swimming and flight, convulsions). Scavenger bird species typically die 1-2 weeks after infection, often distant from the geographical site of exposure (Friend 1999).

**Diagnosis**

Diagnosis is suspected during a typical mortality event, in susceptible species and at recognised environmental “hot spots”. Confirmation occurs through gross and histopathological examination of carcases and isolation of the agent, generally from bacterial culture of liver samples.

**Clinical pathology**

There are no reports of clinical pathology changes seen in wild birds in Australia.

**Pathology**

Dead birds are generally in good body condition. Haemorrhages are often found on the surfaces of heart and gizzard. Small necrotic foci are seen on the surface of the liver (Friend 1999). Gross changes are less obvious if birds have died per-acuteely. There may be thick nasal discharge and thick yellow fluid in the distal intestine.

Typical histopathological findings include signs of severe, acute septicaemia, including multifocal hepatitic necrosis with intra-lesional bacteria and granulomatous hepatitis (Friend 1999).

**Differential diagnoses**

Duck viral enteritis (duck plague) is exotic to Australia, but is considered a primary differential in North America when mass mortalities occur in susceptible wild birds (Friend 1999). In Australia, differentials would include avian influenza virus (AIV) and avian paramyxovirus (APMV) infection and avian botulism. Exclusion testing for AIV and APMV will most likely be undertaken by state diagnostic laboratories.
Laboratory diagnostic specimens

Where possible, whole fresh carcases should be submitted to the laboratory for investigation. If this is not possible, heart and liver can be collected from carcases in a sterile manner and submitted chilled to the lab for bacterial culture. The organism persists for several weeks in bone marrow, and thus the wings of decomposed or scavenged carcases can be submitted for this purpose.

Representative samples of tissues (particularly liver, heart and intestine) should be fixed in formalin and submitted for histopathological investigation (Friend 1999).

Laboratory procedures

Histopathological investigation and bacterial culture are the primary methods employed.

Treatment

Outbreaks in domestic waterfowl have been treated with injectable and oral tetracycline antibiotics (Friend 1999). Treatment of wild birds would generally not be considered feasibly unless they were brought into captive care. Consideration would need to be given to the high bacterial loads shed by sick birds.

Prevention and control

Prevention and control of avian pasteurellosis in wild waterbirds in North America focuses on early detection of an outbreak through regular surveillance of known “hot spots”. Control measures will be most effective during the early stages of an outbreak and should be focused on minimising both environmental contamination and exposure of waterbirds and scavengers to the organism, primarily through prompt collection and incineration of carcases. Bodies should be picked up head-first, so that secretions do not leak from the oral cavity, and immediately placed into plastic bags. Care should be taken to avoid cross contamination of “clean” areas from infected areas (Friend 1999; Samuel et al. 2007).

Vaccination has been used in domestic waterfowl and in some free-ranging wild geese in North America, however there are no practical methods to immunise large numbers of wild birds against avian pasteurellosis (Friend 1999). More specific methods for outbreak control can be found in Friend (1999).

Surveillance and management

Regular and targeted monitoring of wetlands can facilitate early detection of outbreaks, allowing initiation of appropriate action before serious mortalities occur.

Wildlife disease surveillance in Australia is coordinated by the Wildlife Health Australia. The National Wildlife Health Information System (eWHIS) captures information from a variety of sources including Australian government agencies, zoo and wildlife parks, wildlife carers, universities and members of the public. Coordinators in each of Australia’s States and Territories report monthly on significant wildlife cases identified in their jurisdictions. NOTE: access to information contained within the National Wildlife Health Information System dataset is by application. Please contact admin@wildlifehealthaustralia.com.au.
Research

Further research is required into the epidemiology of *P. multocida* infections in free-ranging wild birds in the Australian context, including interactions with domestic birds, especially free-range chickens, turkeys and ducks.

Human health implications

Avian pasteurellosis is not considered to be a high risk disease for humans (Samuel et al. 2007). Nevertheless, given the high levels of bacteria involved in mass mortalities in birds, it is recommended that operators utilise appropriate personal protective equipment and ensure adequate ventilation. Please consult with your local health care professional.

Conclusions

In the Australia context, avian pasteurellosis has not historically been associated with wild bird mass mortalities. However, in 2013, mortality events within waterbirds in Victoria were attributed to *P. multocida*. The epidemiological factors leading to these mass mortality events remain poorly understood, however *P. multocida* should be considered as a differential diagnosis in mass mortality events in wild waterbirds, particularly waterfowl and coot species, in Australia.

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References


To provide feedback on this fact sheet

We are interested in hearing from anyone with information on this condition in Australia, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

Wildlife Health Australia would be very grateful for any feedback on this fact sheet. Please provide detailed comments or suggestions to admin@wildlifehealthaustralia.com.au. We would also like to hear from you if you have a particular area of expertise and would like to produce a fact sheet (or sheets) for the network (or update current sheets). A small amount of funding is available to facilitate this.

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