Animal & Plant Health Agency

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Penrith Veterinary Investigation Centre
Tel: 01768 885295 **Fax:** 01768 885314
Email: Penrith@apha.gsi.gov.uk

VIC Information Leaflet
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Avian botulism in UK wild waterbirds

Introduction

Avian botulism is a paralytic and often fatal disease caused by ingestion of toxin produced by the bacterium *Clostridium botulinum.* Avian botulism outbreaks in wild waterbirds occur relatively frequently in England and Wales. Large numbers of birds may be affected which can result in hundreds of deaths. Outbreaks of avian botulism can last for several weeks and may recur. *C. botulinum* is an anaerobic (oxygen intolerant) bacterium that multiplies in putrefying plant and animal material and is thus often found in lakes in periods of anoxic conditions and poor water quality. *C. botulinum* toxin Type C is considered to be responsible for most avian botulism outbreaks in the UK. The toxin produced is relatively stable and persistent in the environment, and in animal and insect tissues (including maggots feeding on dead birds).

The Animal and Plant Health Agency (APHA) Diseases of Wildlife Scheme (DoWS) and the APHA Avian Influenza Wild Bird Surveillance project examine incidents of suspected botulism in waterbirds on an annual basis. Incidents can occur anywhere in Britain and in any month. However, they are more frequent in warm summers. The clinical signs of a progressive flaccid paralysis are characteristic and provide a presumptive diagnosis. Affected birds are unable to use their wings and legs resulting in a loss of ambulation and inability to fly. Birds with paralysis of the neck muscles lose the ability to hold their heads normally (so-called limberneck). Birds can remain in this state for a number of days. Death is due to respiratory failure and / or drowning. Laboratory diagnosis of avian botulism is difficult as the tests used are relatively insensitive.

Due to the paralytic nature of the disease and numbers of birds involved, the disease can be a frequent cause of concern for the public and public authorities. Incidents of mortality in wild birds should be reported to the Defra Helpline phone - 0345 933 5577.

Risks to human health

Type C avian botulism has not been reported to be associated with human disease. The risk to human health from Type C botulism is therefore considered to be very low. However, other types of botulism, and other water-borne diseases associated with stagnant or poor quality water can cause human illness and consequently consideration of precautionary principles should apply, such as not swimming or bathing in affected waters, not drinking water from lakes and waterways, and avoiding water sports in lakes / waterways where affected / dead birds have been found. Preventing pets accessing the water should also be considered.

Diagnosis of avian botulism

The clinical signs of a progressive flaccid paralysis are characteristic of avian botulism. Laboratory confirmation of avian botulism can be difficult as affected birds may only have tiny quantities of toxin in their bodies. Following ingestion, toxin is concentrated in the neuro-muscular junctions and not readily detected in blood or tissues.

Investigations performed by APHA at Veterinary Investigation Centres are based on the submission of typically affected live and / or dead wild birds. Live birds are assessed clinically for characteristic signs, and are humanely euthanased following examination. A veterinary post-mortem examination is undertaken on the euthanased birds and on the dead birds, and samples are taken. Tests are performed

to exclude other diagnoses including notifiable and exotic diseases: Highly Pathogenic Avian Influenza virus and West Nile virus infections. Diagnosis of algal and cyanobacterial intoxications is problematic in dead wild birds and should be undertaken in conjunction with water quality specialists. Persons submitting birds receive copies of the post-mortem examination reports.

The APHA no longer offers diagnostic tests for botulinum toxin. Samples from live affected and dead wild birds may be sent for testing at laboratories elsewhere in Europe. However, these tests are not validated for use in wild birds.

Overall, presumptive diagnosis can be made based on the clinical and epidemiological presentation of the disease and absence of other obvious causes of death on post-mortem examination and laboratory testing.

Management, control, and prevention of botulism outbreaks

All dead birds should be promptly removed as these are a potent source of toxin. The toxin may frequently be found in maggots feeding on dead birds and these represent an important way of toxin dispersal to feeding waterbirds. Sick birds should be removed, either for humane veterinary euthanasia or (with prior consultation) to a wildlife rehabilitation centre. Treatment regimes, including careful oral administration of warm water to flush toxin from the gastro-intestinal tract in early cases, and nursing can be effective. People handling or caring for affected wild birds should undertake appropriate personal hygiene measures and use suitable personal protective equipment.

Caution: People handling live birds need to be aware that the birds can peck and some birds (for example, gulls and crows) may attempt to peck at the carer's eyes.

There are several techniques and water engineering devices that may prevent avian botulism incidents or reduce the severity of avian botulism outbreaks:

Treatment of lakes

C. botulinum bacteria and resistant bacterial spores are present in rotting material and in the lake sediments / silts. The following steps have been taken, particularly by London Royal Park authorities, and have prevented the recurrence of the disease or reduced its effects.

Preventative measures

- Maintaining good circulation of water.
- Maintaining healthy communities of oxygenating plants.
- Prevention of the water level falling in the lake, preventing deoxygenation and the exposure of putrefying material.
- Removal of decaying plant material (including leaves) from the water. In particular removing vegetative material that collects on branches dipping into the surface of the water. These branches should be removed.
- If appropriate, removal of silts by pump action (in the face of an incident this may temporarily exacerbate the disease due to agitation of material).
- Searching and removal of dead animals in high risk periods e.g. warm summer months.
- The aim is to keep water levels high and reduce or lower the levels of silt.

Responses in the face of an avian botulism outbreak

- Vigilance for and removal of all dead birds, as before – these are a potent source of toxin and toxin-contaminated maggots (such maggots can be eaten by waterbirds and cause disease).
- Sick birds should be removed, either for humane veterinary euthanasia or (with prior consultation) to a wildlife rehabilitation centre. Treatment regimes, including careful oral administration of warm water to flush toxin from the gastro-intestinal tract in early cases, and nursing can be effective.
- Increasing oxygenation of the lake by e.g. increasing circulation or raising the water level in the lake although care needs to be taken.
- Prevention of addition of organic materials to the water e.g. suspending public feeding of birds where practicable during periods of high risk.

More intensive environmental treatments for park settings

The following measures are more intensive and therefore may be considerably more expensive, and should be considered in severe and / or regularly recurring avian botulism outbreak sites and / or in relation to outbreak mortality and perceived risks.

The objectives are to produce movement of the water (circulation) and to aerate the water in stagnant zones. The London Park authorities (which have had avian botulism outbreaks since 1969) have advised that these methods, including the use of pumps 24 / 7, have been effective (the level of operational pump power is related to perceived risks).

There are commercial companies in the UK now that advise and provide water quality services. These companies can be found through internet searches. Effective procedures include:

- Drain the lake completely and remove silt and mud. This is easier in lakes with concrete bases. With the use of barrages, sections of the lake can be drained at a time with the water being pumped through special filter bags.
- Identify stagnant areas (dead areas) of the lake where toxin may be concentrated and target these areas for water circulation and oxygenation.
- Make the lake deeper by dredging, or by extracting silt using pumps; this slows the increase in water temperature (increasing water temperatures encourages toxin production).
- Employ large gauge (30 cm diameter mains) pumps. These are used to improve water circulation and to remove water from 'dead areas' and pump it to other areas using large bore pipes. Movement of this water over boulders / stones facilitates aeration of the pumped water.
- Some lakes in London have wide bore pipes with inlet and outlet valves running the length of the lake, improving circulation of water and water oxygenation.
- Inlet valves on the pumps and pipes which mechanically add air to the pumped water.
- Employ floating pumps (like those used in fish farms). These remove water from the bottom levels and 'dead areas', and pump it over a 'weir' on the float causing aeration of water.

Summary of disease

1. Avian botulism outbreaks in wild waterbirds occur relatively frequently in England and Wales.
2. The clinical signs are of a progressive flaccid paralysis. Affected birds are unable to use their wings and legs resulting in a loss of ambulation and inability to fly.
3. Large numbers of birds may be affected resulting in hundreds of deaths. Outbreaks can last for several weeks and may recur.
4. Affected birds may be paralysed for several days before dying or recovering, and this is a cause of concern for the public and public authorities.
5. There are no reported human health threats associated with Type C botulism in the UK. Prevention of drinking, swimming, bathing and water sports should be considered.
6. Environmental management and water engineering methods can be used to prevent environmental factors conducive to production of botulinum toxin in water bodies.
7. Report incidents of mortality in wild birds to the Defra Helpline phone - 0345 933 5577.

APHA Wildlife Expert Group, APHA Penrith (01768-885295) paul.duff@apha.gsi.gov.uk

APHA DoWS was set up by Defra (MAFF) in 1998 to deliver wildlife disease surveillance for wild animals and birds in England and Wales. The Scheme chairs the GB Wildlife Disease Surveillance Partnership and coordinates wildlife disease surveillance activities across Great Britain for all wild vertebrate species