

## HIGHLY PATHOGENIC AVIAN INFLUENZA (HPAI, FOWL PLAGUE)

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Birds, especially galliformes, anseriformes and struthioformes; humans	Directly (aerosol, body fluids, faeces) or indirectly (contaminated vehicles, material or persons)	In non-domestic birds usually none or mild respiratory signs; in poultry very high morbidity and mortality with peracute to acute course	HPAI has a high morbidity and mortality in domestic poultry; mortality in non-domestic birds has been very rarely described (common tern, young ostriches)	No treatment currently allowed	<i>In houses</i>  <i>in zoos</i> Vaccination of all susceptible birds (currently requires special permit); quarantine of susceptible birds, equids, pigs and pinnipeds; notifiable disease

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<p><b>Susceptible animal groups</b> <u>Domestic birds:</u> chicken, turkey, young ostriches (also for LPAI), peafowl, guinea-fowl, quails, ducks <u>Non-domestic birds:</u> order anseriformes, galliformes and struthioformes are the ones most likely to be susceptible to HPAI, but one case of high mortality in common tern (<i>Sterna hirundo</i>), order charadriiformes, in 1961 in South Africa is the only documented outbreak of HPAI in the wild; juvenile ostriches were affected by HPAI in the 1999/2000 outbreak in northern Italy. In contrast, LPAI probably affects all birds and has been isolated most frequently from anseriformes and charadriiformes, but also from psittacidae, passeriformes, struthioformes, turacos and many others.</p>	
<p><b>Causative organism</b> The group of avian influenzaviruses are orthomyxoviruses of the influenza A type. They are further characterised and numbered by their 15 types of haemagglutinin (H) and 9 types of neuraminidase (N). Any combination of these two protein types seems possible and most have been isolated from birds. A distinction is made between avian influenza viruses of low pathogenicity (LPAI) and of high pathogenicity (HPAI) with mortality in domestic birds up to 100%. The HPAI viruses have traditionally been restricted to subtypes H5 and H7, although not all viruses of these subtypes cause HPAI. In several cases, LPAI have mutated to HPAI, both in epidemics as well as in laboratory passaging of the virus. The current definition of HPAI differs in some details between the OIE and the EU (the latter uses intravenous pathogenicity index IVPI for assessment of pathogenicity).</p>	
<p><b>Zoonotic potential</b> Avian influenza is a classical zoonosis and this threat needs to be considered seriously since fatal disease in humans has occurred (The Netherlands 2003, Hong Kong 1997 &amp; 2003, Thailand and Vietnam 2003/2004); preventive medication with Tamiflu® (oseltamivir) was recommended and used in The Netherlands, Germany and Belgium in 2003 for those persons in close contact with infected birds. Additionally, vaccination against human influenza was recommended to reduce the risk of reassortment by coinfecting avian and human viruses.</p>	
<p><b>Distribution</b> World-wide</p>	

**Transmission**

By direct contact (aerosol, body fluids and excrements) and by indirect transmission (contaminated instruments, vehicles and persons). Indirect transmission by vehicles and persons, by contaminated faeces and by bird transport was proven to be important in the 2003 outbreak in The Netherlands and Germany, and other outbreaks. Transmission from carrier wild birds to domestic birds is very often assumed but –though suggestive data exist- there is little hard evidence published to prove this hypothesis.

**Incubation period**

Highly variable, from few hours to one week; OIE definition (for declaring a country status “free”) is 21 days

**Clinical symptoms**

Domestic birds: clinical symptoms are very variable, mainly affecting the GI and respiratory tract, and the CNS, but are usually associated with very high morbidity and mortality, both reaching up to 100%. Also domestic turkeys, quails, pheasants and peafowl succumb to HPAI. Pigeons are believed to be resistant or only minimally susceptible (Panigrahy et al., 1996).

Non-domestic birds: most species show no symptoms at all and some evidence exists that this is due to the lack of an enzyme –except in intestine and lungs- for cleavage of the hemagglutinin precursor, necessary for pathogenicity; however, evidence for replication of the virus in all major target organs has been proven for one species, i.e. muscovy ducks, *Cairina moschata*, (Capua & Mutinelli, 2001b); ostriches, common tern and muscovy ducks have become clinically ill with associated mortalities.

**Post mortem findings**

Congestion and necrosis in multiple organs, especially pancreas, liver, spleen, kidneys, focal and diffuse haemorrhages, enteritis. See Capua & Mutinelli 2001a.

**Diagnosis**

By suspicion, followed by culling, pathology and virology by recognised methods in national reference laboratories.

**Material required for laboratory analysis**

Samples of trachea, lung, intestine, CNS, blood (“acute sera”) plus cloacal and tracheal swabs. Send moribund and dead birds for pathological investigation. Send samples cooled and well protected to avoid any leakage and any potential spread of the virus (see reference “Centro Regionale per l'Epidemiologia Veterinaria, 2000”).

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**Treatment**

Usually not allowed by law. Amantadine has been used experimentally in birds but is claimed to develop resistencies. Broad spectrum antibiotics, supportive therapy and increasing surrounding temperature (virus is less resistant to higher temperatures) may help to reduce mortality.

**Prevention and control in zoos**

Vaccination of all susceptible birds  
Reduction of food supply for wild birds  
Avoidance of direct contact between susceptible birds and persons  
Control suppliers, enterprises, personnel for their contacts with potentially infected premises (cave: food suppliers are believed to have transferred the virus in The Netherlands and Germany in 2003)  
Quarantine of susceptible birds and animals in case of a nearby outbreak  
Complete isolation of the zoo in case of an outbreak inside the zoo, potentially culling of infected birds, subdivision of the zoo into epidemiological units  
General measures of epidemiological control, like increased rodent control etc.

**Suggested disinfectant for housing facilities**

According to national law and disinfectants registered for this use in each EU country (as specified by EU directive 92/40/EEC). Citric acid has been used in the past.

**Notification**

Any suspicion of HPAI has to be notified to the national veterinary authorities (OIE list A disease)



<b>Guarantees required under EU Legislation</b>
<b>Guarantees required by EAZA Zoos</b>
<b>Measures required under the Animal Disease Surveillance Plan</b>
<b>Measures required for introducing animals from non-approved sources</b>
<b>Measures to be taken in case of disease outbreak or positive laboratory findings</b> Positive laboratory findings need to be confirmed by haemagglutination inhibition (HI) test, which is specific for the haemagglutinin (H) involved. Only H5 and H7 strains can be considered HPAI with the current EU-definition; for further details see the laboratory procedures published by the OIE and the EU commission, respectively (see references). It is suggested to subdivide the zoo into quarantine areas with birds of different susceptibility housed separately. Clinically ill birds shed virus and therefore should be euthanased –with adequate protection of the personnel.
<b>Conditions for restoring disease-free status after an outbreak</b> This status can only be restored by the official veterinary service of the national government.
<b>Contacts for further information</b>
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