GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Avian Influenza Virus***

Avian Influenza Virus **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Virus				Orthomyxovirdae

Common name fowl plague (English), bird flu (English), HPAI (English), LPAI (English)

Synonym

Similar species *Infectious laryngotracheitis (ILT), Acute Fowl Cholera, Chronic Respiratory Disease (CRD), Newcastle disease virus (NDV)*

Summary Asian Influenza is a highly contagious disease caused by type A influenza virus. Waterfowl are natural hosts of the disease and are usually asymptomatic. There are two forms of AI: Highly Pathogenic Avian Influenza (HPAI), which causes rapid mortality particularly in domestic poultry, and Low Pathogenic Avian Influenza (LPAI), which is a milder form. AI can be transmitted through the respiratory secretions or faeces of infected birds and also through contact with contaminated materials or items such as clothing, equipement and vehicles (Horimoto and Kawaoka, 2001).

view this species on IUCN Red List

Species Description
AI viruses have a similar structure and consist of two glycoprotein spikes, hemagglutinin (HA) and neuraminidase (NA) and a limited number of M2 proteins that project from the viral surface (NIAID, 2004). The virus is highly pleomorphic, roughly spherical, and filamentous (NIAID, 2004). Inside the virion are eight single-stranded RNA segments waiting to be copied by a host (NIAID, 2004).

Notes
LPAI can rapidly mutate into HPAI (Perdue *et al.* 1998) and its ability to cause fatal infections in humans (Horimoto and Kawaoka 2001; Guan *et al.* 2004) is of serious concern. If a human is simulataneously infected with human and AI viruses it is possible a new virus may emerge which could be transmitted from human to human. This has not occurred and the risks of this taking place are small, but the implications would be extremely serious (pandemic)

Lifecycle Stages
The virus replicates itself once inside a host cell. AI uses the genetic material of the host for energy and for the replication process. After viral components are made inside the host cell, the components are released (Sander, 2004).

Habitat Description
Waterbirds, especially Anatidae are natural reservoirs for AI which needs a host to reproduce (Horimoto and Kawaoka, 2001).

Reproduction
AI needs a host to reproduce. Once inside, the virus uses the hosts DNA to replicate itself (Horimoto and Kawaoka, 2001).

Nutrition
AI, like most viruses, has no metabolism. Therefore, the virus does not require any nutrition (Horimoto and Kawaoka, 2001).

General Impacts
The effects of AI are felt worldwide. The virus has had a significant impact on the economy, trade industry, chicken and animal health, and human health (APHIS, 2004). For instance, in 1983 and 1984 the the United States government destroyed more than 17 million birds at a cost of 65 million dollars due to an outbreak of AI (APHIS, 2004). In 1997, 6 out of 18 people in Hong Kong infected with H5N1 (a subtype, see Avian Influenza Virus for more details on different types) died (CDC, 2004).

Management Info
Control measures include trade restrictions, and biocontrol security measures on farms and at live markets (APHIS , 2004), quarantine (Butcher, G. *et al.* 2004), surveillance and vaccines. Swift action following an outbreak of HPAI involves depopulation.

Pathway
The virus is spread from one continent to another by migratory birds that are natural hosts for the disease. The virus has the potential to spread through agriculture industry, such as the poultry industry and live poultry markets. The virus has the potential to be spread through the food trade.

Principal source: Horimoto, T. and Kawaoka, Y. 2001. Pandemic Threat Posed by Avian Influenza A Viruses. Clinical Microbiology Reviews. 14: 129-149.
\n NIAID, 2004. Background: What we know about the flu.
APHIS, 2004. Highly pathogenic avian influenza.
\n CDC, 2004. Basic Information about avian influenza (bird flu).

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ALIEN RANGE

[1] AUSTRALIA
[1] CANADA
[1] HONG KONG
[1] KOREA, REPUBLIC OF
[1] MALAYSIA
[1] SOUTH AFRICA
[1] THAILAND
[1] VIET NAM
[1] CAMBODIA
[1] CHINA
[1] INDONESIA
[1] LAO PEOPLE'S DEMOCRATIC REPUBLIC
[1] NETHERLANDS
[1] TAIWAN
[15] UNITED STATES

Red List assessed species 22: EN = 2; VU = 3; NT = 1; LC = 16;

Anas penelope **LC**
Anas querquedula **LC**
Ardea cinerea **LC**
Aythya ferina **LC**
Calidris alpina **LC**
Calidris ferruginea **LC**
Calidris temminckii **LC**
Fulica atra **LC**
Gavia arctica **LC**
Gavia stellata **LC**
Grus monacha **VU**
Grus vipio **VU**
Larus genei **LC**
Larus ichthyaetus **LC**

Mimus melanotis **EN**
Numenius arquata **NT**
Progne modesta **VU**
Tadorna ferruginea **LC**
Necrosyrtes monachus **EN**
Porphyrio porphyrio **LC**
Sarkidiornis melanotos **LC**
Tringa ochropus **LC**

BIBLIOGRAPHY

18 references found for **Avian Influenza Virus**

Managment information

Animal and Plant Health Inspection Service (APHIS), 2002. Avian influenza. June 2002.
Summary: The website provides information regarding the threat of the virus, clinical signs, introduction and spread of AI virus, and biosecurity measures.

Butcher, J., Mather, F., Miles, R. Avian influenza in poultry. University of Forida IFAS Extension.
Summary: The website provides useful information about avian influenza which includes the history, clinical signs, posstmortem lesions, serotypes, transmission, treatment and prevention.

Clauer, P. Avian Disease Fact Sheet. 2004. Virginia Cooperative Extension.
Summary: The website provides information on avian diseases and diagnosis, clinical signs, prevention, and treatment of such diseases.

Department of Primary Industries and Fisheries. Avian influenza.
Summary: The website provides useful information about avian influenza which includes differential diagnosis, distribution, and control measures.

Horimoto, T. and Kawaoka, Y. 2001. Pandemic Threat Posed by Avian Influenza A Viruses. Clinical Microbiology Reviews. 14: 129-149.
Summary: The article reviews the classification, history, biological properties, pathogenesis, transmission, host range, and influenza pandemics and outbreaks.

Office International des Epizooties World Organization for Animal Health, 2004.FAO/OIE/WHO Technical consultation on the control of avian influenza.
Summary: The website provides informaton on controlling the virus and prevention measures.

Tracey, P.J.,Woods, R., Roshier, D., West, P., Saunders, G. The role of wild birds in the transmission of avian influenza for Australia: an ecological perspective. *Emu*, 2004, 104, 109-124
Summary: A review of the movements of birds in Australasia, the occurrence of AI in wild birds and the implications for managing AI outbreaks in Oceania

UN Food and Agriculture Organization (FAO). Animal health special report avian influenza.
Summary: The report presents information on what is being done to control and prevent the spread of avian influenza in Southeast Asia. A veterinary network is already in the works, which goal is to provide better diagnosis of the disease and examine epidemiological data. Being able to Exchange information is critical for managing outbreaks.

General information

All the Virology on the WWW-Frequently asked questions.
Summary: The website provides general information about viruses in a question and answer typw of format.

Bosman, A., Broekman, J., Fouchier, R., Kemink, S., Koch, G., Koopmans, M., Kuiken, T., Munster, V., Osterhaus, A., Rimmelzwaan, G., Rozendaal, F., Schneeberger, P., VanDoornum, P., 2004. Avian influenza A virus (H7N7) associated with human conjunctivitis and a fatal case of acute respiratory distress syndrome. Proceedings of the National Academy of Sciences of the United States of America (PNAS). 101: 1356-1361.
Summary: The article presents information on H7N7 as well as other strains of avian influenza viruses. The characteristics of the viruses and how the viruses are spread from poultry to humans is discussed and remains unclear.

CDC. 2004, July 2. Basic Information about avian influenza (bird flu).
Summary: The fact sheet provides basic information about the avian influenza including recent outbreaks in humans, symptoms, and an historical overview of the influenza virus.

Chan, K. Cheung, C.L., Cheung, C.Y., Ellis, T., Guan, Y., Leung, Y., Lim, w., Lipatov, A., Peiris, J., Poon, L., Sturm-Ramirez, K., Webster, R., Yuen, K., 2004. H5N1 influenza: a protean pandemic threat. PNAS. 101:8156-8161.
Summary: The article presents information on H5N1 including natural hosts of the disease, impacts, threats to humans, and genetic analysis of the virus.

Guan, Y., Poon, L. L. M., Cheung, C. Y., Ellis, T. M., Lim, W., Lipatov, A. S., Chan, K. H., Sturm-Ramirez, K. M., Cheung, C. L., Leung, Y. H. C., Yuen, K. Y., Webster, R. G., and Peiris, J. S. M. (2004). H5N1 influenza: A protean pandemic threat. *Proceedings of the National Academy of Sciences of the United States of America* 101, 8156-8161.

Intenational Committee on Taxonomy of Viruses (ICTVdB). 2002.
Summary: The website provides taxonomy information on different species and has links to other useful sources.

NIAID. 2004. background: what we know about the flu.
Summary: The report provides latest updates on the avian influenza virus and includes information on ecology, life cycle, and reproduction.

Perdue, M., Crawford, J., Garcia, M., Latimer, J., and Swayne, D. (1998). Occurrence and possible mechanisms of cleavage site insertions in the avian influenza hemagglutinin gene. In Proceedings of the Fourth International Symposium on Avian Influenza . (D. E. Swayne and R. D. SlemonsEds.) pp. 182-193. (US Animal Health Association: Athens, Georgia.)

Virology AI.
Summary: The website provides useful information on viruses, such as ecology, life cycle, reproduction, and different types of viruses.

WHO Expert Committee (1980). A revision of the system of nomenclature for influenza viruses. *Bulletin of the World Health Organization.* 58, 585-591.