

# **Avian influenza**

## **A few facts**

### **Introduction**

Avian Influenza (AI) is a contagious viral infection which can affect all species of birds. In intensive poultry rearing systems young fattening turkeys and laying hens are usually the most affected species.

Free-living birds may carry influenza viruses without becoming ill due to a natural resistance. It is known that wild waterfowl present a natural reservoir for these viruses and can be responsible for the primary introduction of infection into domestic poultry.

### **Causative agent**

The virus causing avian influenza is an *Influenzavirus A* virus of the family Orthomyxoviridae. Several virus subtypes exist, which are divided on the bases of the antigenic relationships in the virus glycoproteins haemoagglutinin (H) and neuraminidase (N). At present 15 H subtypes have been recognised (H1-H15) and nine neuraminidase subtypes (N1-N9).

Influenza A viruses infecting poultry can also be divided on the basis of their pathogenicity (ability to cause disease).

The very virulent viruses cause highly pathogenic avian influenza (HPAI) with mortality in poultry as high as 100%. In the whole world there have been only 19 reported primary isolates of such viruses from domestic poultry since 1959. A severe epidemic occurred in Italy in 1999/2000 causing 413 outbreaks with 16 Million birds affected.

Other AI viruses cause a much milder disease (low pathogenic avian influenza, LPAI). Clinical signs are much less evident or even absent and mortality is much lower.

Sometimes secondary infections or environmental conditions may cause exacerbation of LPAI infections leading to more serious disease.

Evidence suggests that certain avian influenza virus subtypes of low pathogenicity may, after circulation for some time in a poultry population, mutate into highly pathogenic virus strains.

To date only viruses of H5 and H7 subtype have been shown to cause HPAI in susceptible species, but not all H5 and H7 viruses are highly pathogenic.

### **Clinical symptoms**

The main symptoms of HPAI in poultry are depression, loss of appetite, cessation of egg laying, nervous signs, swelling and blue discoloration of combs and wattles due to disturbance of blood circulation, coughing, sneezing and diarrhoea. Sudden death can occur without any previous signs. The mortality rate may reach up to 100% depending on the species, their age, the virus type involved and environmental factors like concurrent bacterial infections.

Clinical signs of LPAI consist primarily of mild respiratory disease, depression and drop in egg production in laying birds.

The incubation periods for these viruses range from as short as a few hours to 3 days in individual birds and up to 14 days to spread throughout a flock.

### **Transmission and spread**

All the available evidence suggests that the most common primary introduction of AI viruses into an area is by wild birds, usually waterfowl, but gulls and shorebirds have also been implicated. Direct contact between wild bird and poultry is not always necessary for introduction of virus into poultry farms, as infected waterfowl may spread AI viruses by infective faeces into an area and these may then be introduced to poultry farms by a variety of mechanisms that may transfer the virus mechanically. If contaminated with influenza viruses, surface water used as drinking water may also be a source of infection. Poultry kept in free range or poultry which have access to surface water are at specific risk.

AI is transmitted within a farm by direct contact of infected animals with healthy animals, or indirect contacts with contaminated equipment or farm staff.

Spread of AI viruses from farm to farm is mainly by mechanical transfer of infective faeces, in which virus may be present at high concentrations and may survive for considerable periods. Shared water or food may also become contaminated.

However, man is a very important cause of secondary spread of AI for domestic poultry. Caretakers, farmers, workers, trucks and drivers visiting farms, moving birds or delivering food have caused the spread of AI virus both on to and within farms.

### **Legislation and basic disease control measures**

The O.I.E (Office International des Epizooties, the World Organisation for Animal Health) has classified HPAI as a "list A" disease, signifying a rapidly spreading animal disease of major economic importance, such as Foot and mouth disease or classical swine fever .

EU legislation to control avian influenza is laid down in Council Directive 92/40/EEC. All suspected cases of AI must be investigated and appropriate measures taken in case of confirmation of HPAI. To limit the spread, infected poultry must be killed in a humane way and disposed off safely. Feedingstuffs, contaminated equipment and manure must be destroyed or treated to inactivate the virus.

To prevent further spread of disease the veterinary authorities are required to immediately put in place movement restrictions on the affected holdings and on all farms in a radius of at least 10-km around these holdings, the so called surveillance zone. If necessary, stamping-out measures can also be extended to poultry farms in the vicinity of or which have had dangerous contacts with infected farms

In accordance with Community legislation, all Member States have AI contingency plans in place to ensure that the most appropriate measures are immediately implemented.

At farm level preventive hygienic measures such as cleaning and disinfection are crucial. Disease awareness amongst farmers and co-operation by all people in the poultry sector must ensure that the strictest biosecurity measures are applied to prevent disease spread.

## Vaccination

The existence of a large number of virus subtypes together with the known variation of different strains within a subtype pose serious problems when selecting strains to produce influenza vaccines and to use vaccination as a routine tool for disease prevention.

In accordance with Directive 92/40/EEC, vaccination against AI may be used to supplement the control measures carried out after confirmation of disease. Birds vaccinated against the HA subtype corresponding to the one which is circulating are protected against the worst effects of AI.

The decision to introduce vaccination may be taken by the Member State concerned, with or without prior approval by the Commission. Such steps must be accompanied by further disease control measures, including trade restrictions, in accordance with the Standing Committee procedures<sup>1</sup>.

Following confirmation of LPAI, vaccination against AI is currently being applied in some regions of Italy, pursuant to Commission Decision 2002/975/EC<sup>2</sup>. This vaccination strategy developed and applied in Italy makes use of a heterologous vaccine, allowing discrimination between vaccinated and infected poultry<sup>3</sup>. This strategy was adopted for the first time in the world in 2001 by Commission Decision 2001/847/EC<sup>4</sup> and allowed certain trade restrictions on the meat of vaccinated poultry to be lifted.

However, the immunity induced by vaccination may not be sufficiently rapid to stop farm-to-farm spread of HPAI. Furthermore, emergency vaccination is also hindered by practical difficulties related to the administration of the vaccine (each single bird must be injected).

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<sup>1</sup> Certain specific disease control measures may be taken by the Commission, following a debate in the Standing Committee for the Food Chain and Animal Health, which includes representatives of all Member States

<sup>2</sup> Commission Decision 2002/975/EC of 12 December 2002 on introducing vaccination to supplement the measures to control infections with low pathogenic avian influenza in Italy and on specific movement control measures, Official Journal L 337, 13.12.2002, p 87.

<sup>3</sup> The vaccine is prepared with a virus strain which has the same H type of the field virus circulating in the area, but with a different N type. The vaccinated birds are protected against the field virus but they produce antibodies against a different neuraminidase. A serological test may then allow discrimination.

<sup>4</sup> Commission Decision 2001/847/EC amending for the third time Decision 2000/721/EC to modify the Italian avian influenza vaccination programme and current trade restrictions for fresh meat originating from vaccinated turkeys Official Journal L 315, 1.12.2001, p 61.

## **Potential threat to human health**

The human population all over the world is continuously affected by epidemic waves of Influenza due to virus strains of human origin, causing mainly respiratory infections which may be particularly serious in the young and elderly people and in the immuno-depressed individuals. Vaccines are available and their use is recommended for at-risk groups.

However, influenza viruses of avian origin may also be occasionally responsible for disease in humans. In recent years three different subtypes of avian influenza virus have been detected on five occasions in humans, causing disease of varying degrees of seriousness. In all cases the avian influenza viruses have shown a very limited tendency to spread in the human population (the spread was self-limiting).

In 1996, a H7N7 virus of avian origin was isolated in England from the eye of a woman with conjunctivitis who kept ducks. In March 1999 two independent isolations of influenza virus subtype H9N2 were made from girls aged one and four who recovered from flu-like illnesses in Hong Kong. Subsequently, five isolations of H9N2 virus from humans on mainland China in August 1998 were reported.

The most serious case occurred in May 1997 in Hong Kong. A virus of H5N1 subtype was isolated from a young child who died in Hong Kong and by December 1997 the same virus was confirmed by isolation to have infected 18 people, six of whom died. There was evidence of very limited human to human spread of this virus, but the efficiency of transmission amongst humans was extremely low. In February, 2003 a new transmission of avian influenza virus subtype H5N1 to humans was reported in Hong Kong, infecting 4 people of one family, two of whom died. In Europe several cases of avian influenza have been identified, but they have never had any human consequences.

The exact mode of transmission of these viruses to humans is not known.

In this context, surveillance for influenza viruses in humans and animals is relevant for both human and animal health. The disease requires a high level of preparedness, both at national and at Community level. The Commission has identified influenza as a priority area within the Community Network for Communicable Diseases. A disease surveillance network is in place under the decision 2119/98/EC (EISS: European Influenza Surveillance Scheme) to monitor virological and clinical data concerning influenza in 18 European countries. These activities are

carried out in collaboration with the other existing surveillance networks, including those co-ordinated by WHO.