

# AVIAN INFLUENZA:

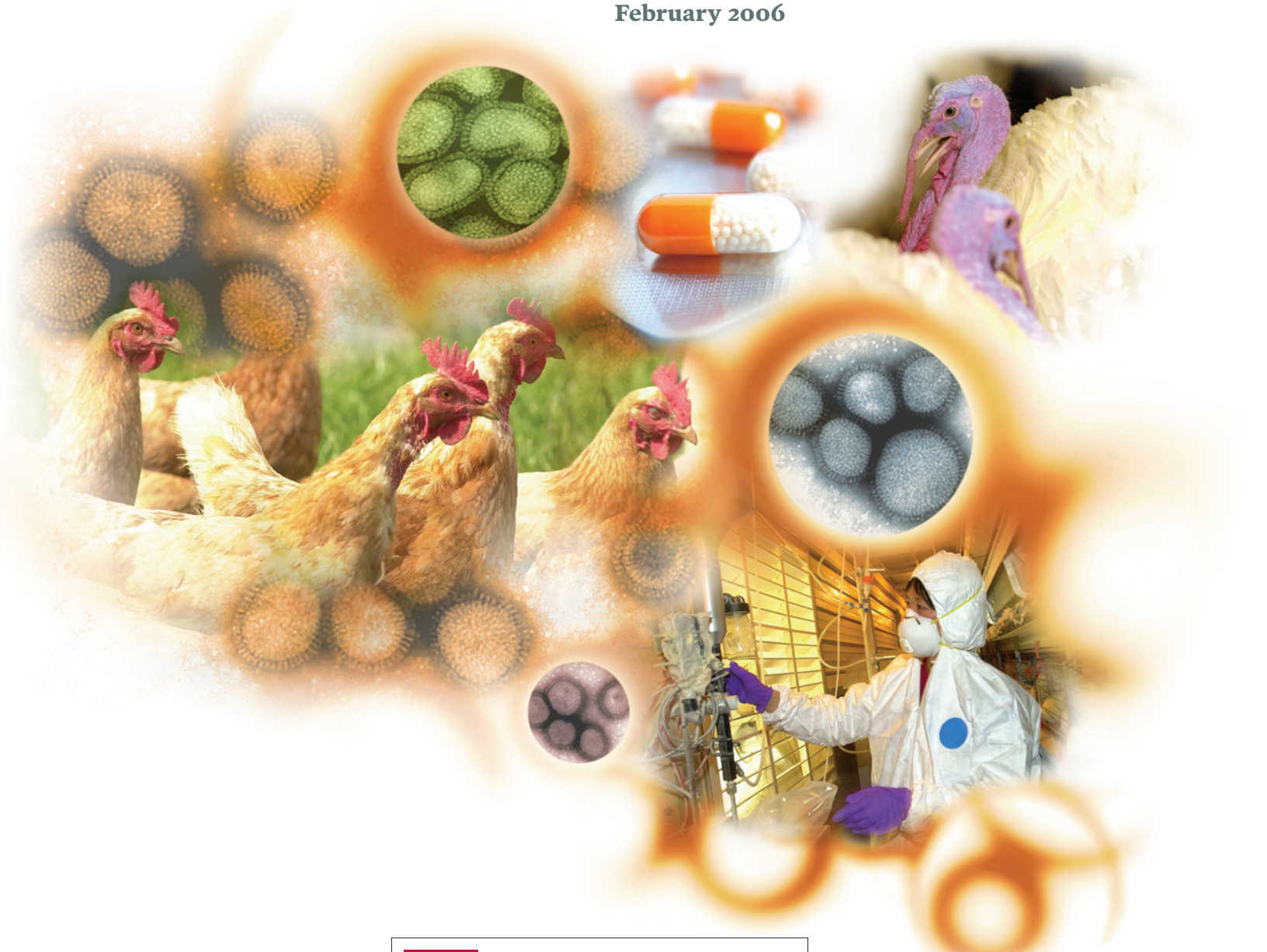
AN INTERNAL REPORT FOR THE COLLEGE OF FOOD,  
AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

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## I. What is avian influenza?

Avian influenza is an infectious disease of birds caused by type A strains of the influenza virus. The disease, which was first identified in Italy more than 100 years ago, occurs worldwide.

The risk from avian influenza is generally low to most people, because the viruses do not usually infect humans. However, confirmed cases of human infection from several subtypes of avian influenza infection have been reported since 1997.

Influenza type A viruses are divided into subtypes and are named on the basis of two proteins on the surface of the virus: hemagglutinin (HA) and neuraminidase (NA). For example, an “H7N2 virus” designates an influenza A subtype that has an HA 7 protein and an NA 2 protein. Similarly, an “H5N1” virus has an HA 5 protein and an NA 1 protein. There are 16 known HA subtypes and nine known NA subtypes.

### The avian influenza H5N1 virus

Influenza A (H5N1) virus, also called “H5N1 virus,” is an influenza A virus subtype that occurs mainly in birds, is highly contagious among birds, and can be deadly to them. This is the virus that has infected and/or killed dozens of humans in Asia since 1997.

Unlike seasonal influenza, in which infection usually causes only mild respiratory symptoms in most people, H5N1 infection may follow an unusually aggressive clinical course, with rapid deterioration and high fatality. Primary viral pneumonia and multi-organ failure have been common among people who have become ill with H5N1 influenza.

*Sources: Centers for Disease Control and Prevention; World Health Organization.*

## 2. How is avian influenza spread?

Avian influenza viruses circulate among birds worldwide. Certain birds, particularly waterfowl, act as hosts for influenza viruses by carrying the virus in their intestines and shedding it. Infected birds shed virus in saliva, nasal secretions, and feces. Susceptible birds, such as poultry, can become infected with avian influenza virus when they have contact with contaminated nasal, respiratory, or fecal material from infected birds. Fecal-to-oral transmission is the most common mode of spread between birds. Most cases of avian influenza infection in humans have resulted from contact with infected poultry (e.g., domesticated chicken, ducks, and turkeys) or surfaces contaminated with secretion/excretions from infected birds.

Thus far, there is no evidence of human-to-human spread of avian influenza. However, if the H5N1 virus were to gain the capacity to spread easily from person to person, an influenza pandemic (worldwide outbreak of disease) could begin. No one can predict when a pandemic might occur. However, experts from around the world

are watching the H<sub>5</sub>N<sub>1</sub> situation in Asia and Europe very closely and are preparing for the possibility that the virus may begin to spread more easily from person to person.

*Source: Centers for Disease Control and Prevention.*

### **3. What is the difference between low pathogenic and highly pathogenic influenza viruses?**

Avian influenza A virus strains are further classified as low pathogenic (LPAI) or highly pathogenic (HPAI) on the basis of specific molecular genetic and pathogenesis criteria that require specific testing.

Most avian influenza A viruses are LPAI viruses that are usually associated with mild disease in poultry. In contrast, HPAI viruses can cause severe illness and high mortality in poultry. More recently, some HPAI viruses (e.g., H<sub>5</sub>N<sub>1</sub>) have been found to cause no illness in some poultry, such as ducks. LPAI viruses have the potential to evolve into HPAI viruses, and this has been documented in some poultry outbreaks.

Only avian influenza A viruses of the subtypes H<sub>5</sub> and H<sub>7</sub>—such as H<sub>5</sub>N<sub>1</sub>, H<sub>7</sub>N<sub>7</sub> and H<sub>7</sub>N<sub>3</sub> viruses—have been associated with HPAI. Human infection with these viruses has ranged from mild (H<sub>7</sub>N<sub>3</sub>, H<sub>7</sub>N<sub>7</sub>) to severe and fatal disease (H<sub>7</sub>N<sub>7</sub>, H<sub>5</sub>N<sub>1</sub>). Human illness due to infection with LPAI viruses has been documented, including very mild symptoms (e.g., conjunctivitis) to influenza-like illness. Examples of LPAI viruses that have infected humans include H<sub>7</sub>N<sub>7</sub>, H<sub>9</sub>N<sub>2</sub>, and H<sub>7</sub>N<sub>2</sub>.

*Source: Centers for Disease Control and Prevention.*

### **4. What is the current situation of avian influenza?**

Thus far, outbreaks of avian influenza H<sub>5</sub>N<sub>1</sub> among poultry have occurred in several Asian countries: Cambodia, China, Indonesia, Japan, Kazakhstan, Laos, Malaysia, Mongolia, Russia (Siberia), South Korea, Thailand, and Vietnam.

Influenza H<sub>5</sub>N<sub>1</sub> infection also has been reported among poultry in Turkey, Romania, and Ukraine. Outbreaks of influenza H<sub>5</sub>N<sub>1</sub> have been reported among wild migratory birds in China, Croatia, Hong Kong, Mongolia, and Romania.

Since 1997, human cases of influenza A (H<sub>5</sub>N<sub>1</sub>) infection have been reported in Cambodia, China, Indonesia, Thailand, Vietnam, and, most recently, Turkey and Iraq. For the most current information about avian influenza and cumulative case numbers, see the World Health Organization (WHO) Web site at [http://www.who.int/csr/disease/avian\\_influenza/en/](http://www.who.int/csr/disease/avian_influenza/en/).

No cases of H<sub>5</sub>N<sub>1</sub> virus have been reported in the United States or the Americas.

During the past three years, there have been two instances in which other avian influenza viruses have sickened humans in North America. In November 2003, a patient with serious respiratory symptoms was admitted to a New York hospital; tests showed this individual had been infected with an H<sub>7</sub>N<sub>2</sub> virus. In 2004, British

Columbia experienced an outbreak of avian influenza H7N3 in poultry; the virus also infected a person involved in culling operations and a poultry worker who had close contact with sick animals, both of whom developed conjunctivitis and other flu-like symptoms.

In 2004, avian influenza outbreaks in poultry occurred in Texas (highly pathogenic H5N2) and in Delaware, New Jersey, and Maryland (low-pathogenic H5N2). No humans were infected in either outbreak.

Experts at the World Health Organization (WHO) and elsewhere believe the world is now closer to another influenza pandemic than at any time since 1968, when the last of the previous century's three pandemics occurred. WHO uses a series of six phases of pandemic alert as a system for informing the world of the seriousness of the threat and of the need to launch progressively more intense preparedness activities. The world is presently in phase 3: a new influenza virus subtype is causing disease in humans, but is not yet spreading efficiently and sustainably among humans.

For updates on pandemic alerts, go to [http://www.who.int/csr/disease/avian\\_influenza/phase/en/index.html](http://www.who.int/csr/disease/avian_influenza/phase/en/index.html).

*Sources: Centers for Disease Control and Prevention; World Health Organization.*

## 5. Avian influenza: A timeline

### 1890

First recorded recent influenza pandemic.

### 1918

The "Spanish flu" pandemic, caused by the H1N1 influenza virus, kills more than 40 million people. The origin of H1N1 remains a mystery, but may have involved incubation in an intermediate host, such as the pig, or another as-yet-unidentified animal host.

### 1957

Asian flu pandemic kills 100,000 people, due to the H2N2 influenza virus.

### 1968

Hong Kong flu pandemic kills 700,000 people, due to the H3N2 virus. Both H2N2 (1957 pandemic) and H3N2 are likely to have arisen by exchange of genes between avian and human flu viruses, possibly following dual infection in humans.

### May 1997

Bird flu virus H5N1 is isolated for the first time from a human patient in Hong Kong. The virus infects 18 patients after close contact with poultry, with six deaths. Fortu

nately the virus does not spread from person to person. Within three days, Hong Kong's entire chicken population is slaughtered to prevent further outbreak.

### **September 1998**

Trial results are announced at the Interscience Conference on Antimicrobial Agents and Chemotherapy for two new influenza drugs, Relenza and Tamiflu, that target the virus's neuraminidase enzyme.

### **1999**

Two new flu drugs, Relenza and Tamiflu, are licensed in the United States and Europe.

### **2001**

The World Health Organization (WHO) outlines its new global laboratory proposal, aimed at improving the range, speed, and quality of influenza virus surveillance.

### **February 2003**

Alarm bells are again raised when the avian virus H<sub>5</sub>N<sub>1</sub> infects two people in Hong Kong, one fatal.

Outbreaks of chicken flu occur in The Netherlands due to the H<sub>7</sub>N<sub>7</sub> avian flu virus. By April the virus spreads to nearly 800 poultry farms and results in the culling of almost 11 million chickens. The virus infects 83 people, causing conjunctivitis and flu-like symptoms, and kills one man.

### **December 2003**

South Korea has its first outbreak of avian flu in chickens, caused by H<sub>5</sub>N<sub>1</sub>.

### **January 2004**

Japan has the first outbreak of avian influenza (H<sub>5</sub>N<sub>1</sub>) since 1925.

WHO confirms H<sub>5</sub>N<sub>1</sub> infection in 11 people, eight fatal, in Thailand and Vietnam, but no cases of person-to-person transmission. The virus has wreaked havoc among poultry in Thailand, Vietnam, Japan and South Korea and has also appeared on a duck farm in China.

### **February 2004**

The United Nations Food and Agriculture Organization advises governments in affected areas that mass culling of birds is failing to halt the disease and that vaccination of targeted poultry flocks is required as well.

**March 2004**

Avian H<sub>5</sub>N<sub>1</sub> flu virus becomes more widespread among bird flocks in Asia, and has caused 34 human cases, with 23 deaths.

**April 2004**

Avian influenza virus H<sub>7</sub>N<sub>3</sub> confirmed in two poultry workers in British Columbia who developed flu-like symptoms.

**June 2004**

Tests on chickens and mice show that avian flu H<sub>5</sub>N<sub>1</sub> virus isolated from ducks in 2004 is more virulent and harmful to mammals than in recent years.

**July 2004**

Several countries, including Thailand, Vietnam, China, and Indonesia, report new infections in poultry with H<sub>5</sub>N<sub>1</sub>.

**August 2004**

H<sub>5</sub>N<sub>1</sub> is reported to have killed three more people in Vietnam.

Chinese scientists report H<sub>5</sub>N<sub>1</sub> avian flu infection in pigs, raising concerns that the virus could exchange genes with human flu strains in this “mixing vessel.”

H<sub>5</sub>N<sub>1</sub> virus has spread throughout most of SE Asia, resulting in the culling of over 100 million chickens. In Vietnam and Thailand, the virus has infected at least 37 people, with 26 deaths.

**October 2004**

UK authorities suspend manufacturing of this year’s routine influenza vaccine at the Liverpool factory of Chiron, owing to sterility concerns. The move leads to vaccine shortages, particularly in the United States, where Chiron supplies 50 percent of the market, and highlights the need for alternative manufacturing sources.

**November 2004**

WHO warns that the H<sub>5</sub>N<sub>1</sub> bird flu virus might spark a flu pandemic that could kill millions of people, and is concerned that “much of the world is unprepared for a pandemic” and needs to enhance preparedness to reduce its potential impact. WHO officials meet with vaccine makers, public-health experts, and government representatives in a bid to speed up the production of flu vaccines to avert a global pandemic.

**December 2004**

WHO reports the first human case of H<sub>5</sub>N<sub>1</sub> in Vietnam since early September.

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Sequencing of the chicken-genome (published in *Nature* on Dec. 9, 2004) may help provide insight into which genes prevent the spread of bird flu from person to person.

Since the beginning of 2004, bird flu has caused the deaths of 32 people in Vietnam and Thailand and of millions of chickens across Asia.

### **January 2005**

Chinese authorities announce they have developed a new rapid test for bird flu that produces results in hours rather than days.

### **January/February 2005**

Thirteen additional cases of bird flu have occurred in Vietnam since December 2004, 12 fatal.

### **February 2005**

First report of a bird flu case from Cambodia.

WHO has made prototype H5N1 vaccine strains available to a number of institutions and companies, and several vaccines have been developed for clinical testing.

### **March 2005**

Fifteen additional cases of H5N1 infection in Vietnam, and one additional case in Cambodia, are reported.

An H7 strain of avian influenza is found in North Korea among poultry.

### **April 2005**

Vietnam has reported a total of 60 laboratory-confirmed human cases of H5N1 avian influenza since the outbreaks began, with 35 deaths; Thailand has confirmed a total of 17 infections, of which 12 have been fatal; while Cambodia has confirmed two fatal cases.

### **May 2005**

Rumors of human deaths in China from H5N1 remain unconfirmed, while the virus has killed more than 1,000 migratory birds. Indonesia's government confirms reports of H5N1 infection in pigs.

WHO reports 97 cases of, and 53 deaths from, bird flu in Vietnam, Cambodia, and Thailand since January 2004.

### **June 2005**

Indonesia confirms a man exposed to sick chickens has been infected with a deadly

strain of avian flu virus. The farm worker shows no symptoms, but his blood carries antibodies to the H<sub>5</sub>N<sub>1</sub> strain.

Bird flu becomes resistant to the low-cost amantadine family of antiviral drugs. Chinese farmers' use of the compound in chickens is blamed, a claim formally denied by Chinese authorities, who pledge to investigate the claim.

### **July 2005**

At the end of a three-day conference in Malaysia, WHO officials announce that \$150 million is needed to fight the spread of the disease in people and another \$100 million to stop its spread in animals in Asia.

The Philippines, so far the only Asian country unaffected by bird flu, report their first case in a town north of the capital, Manila, but do not confirm whether it is the H<sub>5</sub>N<sub>1</sub> strain.

On July 29, WHO confirms that samples from an 8-year-old girl who died on July 14, two days after the death of her father (who was Indonesia's first confirmed human infection of influenza A H<sub>5</sub>N<sub>1</sub>), revealed she was also infected by H<sub>5</sub>N<sub>1</sub>.

### **August 2005**

WHO confirms three new cases of H<sub>5</sub>N<sub>1</sub> in Vietnam. Of the three individuals infected, two die. Since mid-December 2004, 20 of the 63 cases of H<sub>5</sub>N<sub>1</sub> in Vietnam have been fatal.

Both Russia and Kazakhstan report outbreaks of avian influenza in poultry in late July that are confirmed as H<sub>5</sub>N<sub>1</sub> in early August. Outbreaks in both countries are attributed to contact between domestic birds and wild waterfowl via shared water sources.

In early August, an outbreak of H<sub>5</sub>N<sub>1</sub> in poultry is detected in Tibet. Mongolia then issues an emergency report following the death of 89 migratory birds at two lakes in the northern part of the country.

### **September 2005**

Three more laboratory-confirmed cases of H<sub>5</sub>N<sub>1</sub> strike Indonesia. A 37-year-old woman dies on Sept. 10 and is the fourth fatality associated with H<sub>5</sub>N<sub>1</sub> to hit the country. Indonesia's third laboratory-confirmed case of H<sub>5</sub>N<sub>1</sub> since July 2005 involves an 8-year-old boy who survives. Later, a 27-year-old woman from Jakarta, who developed symptoms after direct contact with diseased and dying chickens in her household, dies on Sept. 26.

Vietnam officials retrospectively confirm an additional fatal case of H<sub>5</sub>N<sub>1</sub> infection, bringing the total in Vietnam since mid-December 2004 to 64 cases, a third of which—21—were fatalities.

Two independent studies, each reaching different conclusions, suggest it would be possible to contain an emerging pandemic if the virus was detected quickly, if it did not spread too fast, if sufficient antiviral drugs were deployed around the outbreak's epicenter, and if strict quarantine and other measures were employed.

U.S. President George W. Bush calls for an international partnership that would require countries facing an influenza outbreak to share information and samples with the WHO. But experts say research would speed up if the U.S. Centers for Disease Control and Prevention's (CDC) influenza branch threw open its databases of virus sequences and immunological and epidemiological data; they complain that too few of the flu data collected by the CDC are made generally available.

### **October 2005**

Greece becomes the first EU country with a bird flu infection, as the country's Centre for Veterinary Institutes detects bird flu in one turkey on the eastern Aegean island of Chios. Officials confirm the virus is a member of the H5 strain but is not yet identified as H5N1.

On Oct. 13, WHO states that tests conducted by the World Organization for Animal Health (OIE) confirm the presence of H5N1 avian influenza in samples taken from domestic birds in Turkey. Days later, the presence of the virus is confirmed in Romania.

A fifth laboratory-confirmed case of H5N1 is reported from Indonesia on Oct. 10, 2005. The 21-year-old Sumatran man had contact with diseased chickens shortly before he became ill. The case brings the total number of human infections with influenza A (H5N1) since December 2003 to 117.

WHO confirms the presence of the H5N1 virus in Romania on Oct. 13 and reiterates that the WHO level of pandemic alert remains unchanged at phase 3: a virus new to humans is causing infections but does not spread easily from one person to another.

The Ministry of Public Health in Thailand confirms its first case of human infection with H5N1 avian influenza since Oct. 8, 2004. A 48-year-old man developed symptoms on Oct. 13, was hospitalized, but died less than a week later. Authorities linked his infection to close contact with diseased poultry.

The Ministry of Health in Indonesia confirms two additional cases of human infection with H5N1 avian influenza.

### **November 2005**

Officials in Thailand confirm two non-fatal cases of the disease: an 18-month-old boy and a 50-year-old woman from Bangkok.

The Ministry of Health in Indonesia confirms another non-fatal human infection with the case of a 16-year-old boy who developed symptoms of fever followed by

breathing difficulties. Two more fatal cases in Indonesia, a 16-year-old girl and 20-year-old woman from Jakarta, bring the total of newly confirmed cases to 12, seven of which were fatal.

Surveillance for human cases in China intensifies following a recurrence of H5N1 in poultry, with officials reporting 25 fresh outbreaks in poultry in nine provinces.

China confirms the country's first two human cases of bird flu and investigates the possibility of human-to-human transmission. A 24-year-old female from Anhui Province becomes the country's first fatality, and a 9-year-old boy is hospitalized with respiratory symptoms but recovers.

A newly confirmed fatal case in Vietnam coincides with a recurrence of outbreaks in poultry. The Ministry of Health later confirms a further non-fatal case: a 15-year-old boy from Hai Phong Province who recovered after treatment in hospital. Vietnam has reported 66 cases (22 fatal) since December 2004.

### **December 2005**

A 41-year-old woman from the southeastern province of Fujian dies Dec. 21, China's seventh laboratory-confirmed case and third fatality. To date, China has reported human cases in six provinces and regions: Hunan, Anhui, Guangxi, Liaoning, Jiangxi, and Fujian.

Two newly confirmed cases bring the total number in Indonesia to 16. Of these cases, 11 were fatal.

### **January 2006**

Bird flu spreads west. Turkey reports its first cases of avian flu in humans. Three children in one family die from the illness in the eastern part of the country. They are the first reported human cases—and the first deaths—from bird flu outside southeast Asia and China. They had been exposed to dying poultry.

By the middle of the month, avian flu claimed a fourth life in Turkey and health officials had reported confirmed or suspected cases of the H5N1 strain in the virus in 26 of the country's 81 provinces. Agriculture Minister Mehdi Eker accused several neighboring countries of concealing bird flu outbreaks—hampering Turkey's efforts to control the disease. He did not name the countries.

In Indonesia, a toddler and his 13-year-old sister were listed as that country's latest bird flu deaths. The toddler's death was reported a day after wealthy nations meeting at a conference in Beijing pledged almost \$2 billion to fight bird flu.

As that conference unfolded, China reported its sixth bird flu death, bringing to 80 the total number of deaths since 2003.

An Iraqi official confirms that a girl who died Jan. 17 in Raniya, less than 60 miles south of Iraq's border with Turkey, was killed by the H5N1 strain of bird flu. It is the

first confirmed bird-flu death in the country. The girl's uncle also died with similar symptoms. Officials begin culling birds in Raniya and two neighboring communities.

*Sources: Nature; World Health Organization. For updates, go to [http://www.who.int/topics/avian\\_influenza/en](http://www.who.int/topics/avian_influenza/en)*

## I. Influenza viruses and commercial poultry

Avian influenza outbreaks among poultry occur worldwide from time to time. Since 1997, for example, more than 16 outbreaks of H5 and H7 influenza have occurred among poultry in the United States. The U.S. Department of Agriculture monitors these outbreaks.

Low pathogenic forms of avian influenza viruses are responsible for most avian influenza outbreaks in poultry. Such outbreaks usually result in either no illness or mild illness (e.g., chickens producing fewer or no eggs), or low levels of mortality.

When highly pathogenic influenza H5 or H7 viruses cause outbreaks, between 90 percent and 100 percent of poultry can die from infection. Animal health officials carefully monitor avian influenza outbreaks in domestic birds for several reasons:

- The potential for low pathogenic H5 and H7 viruses to evolve into highly pathogenic forms.
- The potential for rapid spread and significant illness and death among poultry during outbreaks of highly pathogenic avian influenza.
- The economic impact and trade restrictions from a highly pathogenic avian influenza outbreak.
- The possibility that avian influenza could be transmitted to humans.

*Source: U.S. Department of Agriculture.*

## 2. How does avian influenza spread among birds?

Infected birds shed influenza virus in their saliva, nasal secretions, and feces. Susceptible birds become infected when they have contact with contaminated excretions or with surfaces that are contaminated with excretions or secretions.

Domesticated birds may become infected with avian influenza virus through direct contact with infected waterfowl or other infected poultry, or through contact with surfaces (such as dirt or cages) or materials (such as water or feed) that have been contaminated with the virus. People, vehicles, and other inanimate objects such as cages can be vectors for the spread of influenza virus from one farm to another. When this happens, avian influenza outbreaks can occur among poultry.

*Source: Centers for Disease Control and Prevention.*

## 3. What are the symptoms and health effects of avian influenza among poultry?

Low pathogenic avian influenza symptoms are typically mild. Decreased food consumption, respiratory signs (coughing and sneezing), and a decrease in egg production might demonstrate the presence of the disease. Complete secession of egg production has been reported in turkeys infected with low pathogenic influenza virus.

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Birds that are affected with highly pathogenic avian influenza have a greater level of sickness and could exhibit one or more of the following clinical signs:

- Sudden death.
- Lack of energy and appetite.
- Decreased egg production.
- Soft-shelled or misshapen eggs.
- Swelling of the head.
- Purple discoloration of the skin.
- Nasal discharge.
- Coughing, sneezing.
- Lack of coordination and diarrhea.

*Source: U.S. Department of Agriculture.*

#### **4. What is the relationship between avian influenza viruses and wild birds?**

Wild birds, especially waterfowl, are the reservoirs of avian influenza viruses.

During 2005, an additional and significant source of international spread of the virus in birds became apparent for the first time, but remains poorly understood. Scientists are increasingly convinced that at least some migratory waterfowl are now carrying the H5N1 virus in its highly pathogenic form, sometimes over long distances, and possibly introducing the virus to poultry flocks in areas that lie along the wild birds' migratory routes. Should this role of migratory birds be scientifically confirmed, it would mark a change in a long-standing stable relationship between the H5N1 virus and its natural wild-bird reservoir.

Evidence supporting this altered role began to emerge in mid-2005 and has since been strengthened. The die-off of more than 6,000 migratory birds infected with the highly pathogenic H5N1 virus, which began at the Qinghai Lake nature reserve in central China in late April 2005, was highly unusual and probably unprecedented. Prior to that event, wild-bird deaths from highly pathogenic avian influenza viruses were rare, usually occurring as isolated cases found within the flight distance of a poultry outbreak. Scientific studies comparing viruses from different outbreaks in birds have found that viruses from the most recently affected countries, all of which lie along migratory routes, are almost identical to viruses recovered from dead migratory birds at Qinghai Lake. Viruses from Turkey's first two human cases, which were fatal, were also virtually identical to viruses from Qinghai Lake.

*Source: World Health Organization.*

## 5. What is the economic impact of avian influenza?

The economic losses associated with highly pathogenic avian influenza (HPAI) have been of varying importance depending on the magnitude of the outbreak and the measures taken to eradicate the virus.

Epizootics of HPAI that have expanded into commercial farms or into large live-bird market systems have resulted in the greatest economic losses. For instance, during the 1983-1984 H5N2 outbreak in Pennsylvania, it cost the U.S. government more than \$60 million to eradicate the disease, including \$40 million in indemnities. Producers had to absorb an additional \$15 million in non-indemnified losses. Consumers, on the other hand, had to overcome approximately \$350 million in increased food costs.

More recently, the eradication of the H7N1 virus responsible for the HPAI outbreak in Italy in 1999-2000 carried approximately \$100 million in compensations, and total indirect losses have been calculated in excess of \$500 million.

The Columbus, Ohio-based Battelle Memorial Institute calculated that an avian influenza outbreak like the one in Virginia in 2002 would result in a 75 percent loss of Ohio's turkeys, with direct sustained economic losses of \$53.8 million.

Without a doubt, the massive HPAI epidemic of H5N1 in Asia dwarfs previous figures: more than 100 million birds have either died or been killed to contain the outbreak. For southeast Asian countries, the economic implications of the 2004 H5N1 virus are tremendous. Besides the time it can take to eradicate the virus, it will take several years until some of these countries can restore export of their poultry products. China and Thailand, which are the two most important poultry exporters in Asia, have been particularly hit by the outbreak.

*Sources: OARDC; University of Maryland; Battelle Memorial Institute.*

## 6. What can be done to prevent and control avian influenza among poultry?

Apart from being highly contagious among poultry, avian influenza viruses are readily transmitted from farm to farm by the movement of live birds; people (especially when shoes and other clothing are contaminated); and contaminated vehicles, equipment, feed, and cages. Highly pathogenic viruses can survive for long periods in the environment, especially when temperatures are low. For example, the highly pathogenic H5N1 virus can survive in bird feces for at least 35 days at low temperature (39F). At a much higher temperature (98F), H5N1 viruses have been shown to survive in fecal samples for six days.

### **Biosecurity**

Here are some basic rules for practicing backyard biosecurity. Doing these things will greatly decrease the risk of carrying disease to your birds:

- **Keep your distance.** Restrict access to your property and to your birds. Consider

fencing off the area where you keep your birds and make a barrier area if possible. Allow only people who take care of your birds to come into contact with them. If visitors have birds of their own, do not let them near your birds. Game birds and migratory waterfowl should not have contact with your flock because they can carry germs and diseases.

- **Keep it clean.** Wear clean clothes, scrub your shoes with disinfectant, and wash your hands thoroughly before entering your bird area. Clean cages and change food and water daily. Clean and disinfect equipment that comes in contact with your birds or their droppings, including cages and tools. Remove manure before disinfecting. Properly dispose of dead birds.
- **Don't haul disease home.** If you have been near other birds or bird owners, such as at a feed store, clean and disinfect car and truck tires, poultry cages, and equipment before going home. Have your birds been to a fair or exhibition? Keep them separated from the rest of your flock for two weeks after the event. New birds should be kept separate from your flock for at least 30 days.
- **Don't borrow disease from your neighbor.** Do not share birds, lawn and garden equipment, tools, or poultry supplies with your neighbors or with other bird owners. If you do, bring these items home clean and disinfect them before they reach your property.
- **Know the warning signs of infectious bird diseases.** Early detection is important to prevent the spread of disease. These signs include sudden death; diarrhea; decreased or complete loss of egg production; soft-shelled, misshapen eggs; sneezing and gasping for air; nasal discharge; coughing; lack of energy and appetite; swelling of tissues around eyes and in neck; purple discoloration of the wattles, combs, and legs; depression; muscular tremors; drooping wings; twisting of head and neck; lack of coordination; complete paralysis.
- **Report Sick Birds.** Don't wait. Early detection can make a difference. If your birds are sick or dying, call OARDC's Food Animal Health Research Program (FAHRP), an OSU Extension county office, the state veterinarian, or the U.S. Department of Agriculture Veterinary Services (866-536-7593).

## Vaccines

Vaccinated birds are less likely to become infected and are less likely to excrete the virus. Therefore, vaccination can be used either as a tool to support eradication or as a tool to control the disease and reduce the viral load in the environment.

Two different types of vaccines are currently available, both of which are administered by injection:

- **Conventional vaccines:** These include inactivated homologous vaccines and inactivated heterologous vaccines. These vaccines involve an inactivated whole avian influenza virus antigen in oil-based emulsion adjuvant. They use a homologous H

determinant (such as H5 for the strain currently circulating in Asia). They possess either a homologous (such as N1 for the strain currently circulating in Asia) or heterologous N determinant. The use of a heterologous N determinant allows use of serologic surveillance to detect the circulation of field virus through the detection of antibodies to the N subtype of the field virus. This is known as the DIVA approach. The DIVA approach was used successfully during an LPAI outbreak in Italy.

■ **Recombinant vaccines:** Several recombinant fowlpox virus-vector vaccines that express the H5 antigen have been developed. One vaccine has been licensed and is in use in Mexico. A number of additional novel vaccines either have been developed or are under development. Examples include subunit vaccines, DNA vaccines, vaccines based on reverse genetics, adenovirus-vectored vaccine delivered via drinking water, and Newcastle disease-vectored vaccine delivered via aerosol.

*Sources: U.S. Department of Agriculture; Center for Infectious Disease Research and Policy; World Health Organization.*

## 7. What can be done to ensure the safety of poultry workers?

A number of strict biosecurity guidelines are employed on Ohio's farms, including the use of protective gear (such as biosecurity suits and shoe covers) by workers at all times.

Below are important measures to protect those who work with poultry:

### **Follow biosecurity practices**

Poultry workers should know and follow biosecurity practices to prevent the introduction of avian influenza and other diseases into a poultry flock. An understanding of how infection can be spread is important for both effective biosecurity and worker safety and health practices. Poultry processing companies should provide a written copy of biosecurity practices to each of their contract growers.

Depending on temperature and moisture conditions, avian influenza A viruses can survive in the environment for weeks. However, they are generally sensitive to most detergents and disinfectants and are inactivated by heating and drying. Contact with organic material such as dust, dirt, litter, and manure can decrease the effectiveness of some disinfectants, and thus the possibility persists that viruses will survive. U.S. Environmental Protection Agency (EPA)-registered products that have a claim of being effective against influenza viruses should provide some measure of activity against avian influenza A viruses.

The label of an EPA-registered disinfectant describes how to use the product safely and effectively and includes measures that applicators should take to protect themselves. The personal protective equipment listed on a disinfectant label is based on the chemical's toxicity and may not be appropriate for all exposure conditions and handling activities. Thus, an exposure assessment should also be done when selecting personal protective equipment for applicators.

**Know the signs indicating birds are infected with avian influenza viruses**

The signs of illness seen in domestic poultry infected with avian influenza viruses are variable and affected by the virus strain, age and species of infected birds, concurrent bacterial disease, and the environment (see symptoms on page 13).

Some birds might be otherwise healthy-looking but still infected with avian influenza virus. The severity of disease in poultry can also vary during an outbreak. Poultry workers should be aware of signs of disease in poultry so when necessary they can take immediate steps to protect themselves and other workers, quarantine the farm to prevent spread of disease, and report the disease to the responsible animal health authorities.

**Take antiviral medication, and get the current season's influenza vaccine if appropriate**

In the event of an avian influenza outbreak, workers who will be involved in disease control and eradication activities should consult their healthcare provider about the advisability of taking antiviral medications for influenza. The Centers for Disease Control and Prevention (CDC) has recommended that workers receive an influenza antiviral drug daily for the entire time they are in direct contact with infected poultry or contaminated surfaces. In the absence of sensitivity testing, oseltamavir is the antiviral drug currently of choice because the likelihood that the virus will be resistant to it is less than with amantadine or rimantadine.

The CDC recommends that workers involved in avian influenza disease control and eradication activities should get the current season's human influenza vaccine. Human influenza vaccine will not prevent infection with low pathogenic or highly pathogenic avian influenza A viruses, but this precautionary measure could reduce the possibility of dual infection with avian and human influenza viruses.

**Know the signs and symptoms of human infection with avian influenza viruses**

All poultry workers should know the signs and symptoms of avian influenza virus infection in humans so that measures can be taken for immediate treatment. The signs and symptoms may include fever, cough, sore throat, conjunctivitis (eye infections), and muscle aches. Infection with avian influenza viruses can also lead to pneumonia, acute respiratory distress, and other severe and life-threatening complications. A worker who experiences any of these symptoms or illnesses or who might have been exposed to avian influenza virus should seek medical care and tell the healthcare provider before arrival that exposure to avian influenza virus may have occurred.

**Wear personal protective equipment**

People working daily in poultry confinement units are at risk of exposure to a variety

of contaminants, including organic dusts, gases such as ammonia, and microorganisms (viruses, bacteria, and fungi) that can cause illness. Thus, for many poultry workers, wearing personal protective equipment is a routine practice. For example, wearing a respirator can reduce exposures to airborne organic dusts that might pose a risk of respiratory disease and decreased breathing capacity. These exposures in the poultry industry can lead to chronic lung disease and premature death.

Most cases of avian influenza virus infection in humans are thought to have resulted from contact with infected poultry or contacting contaminated surfaces followed by self-inoculation of the virus into the eyes, nose or mouth. Other means of transmission are possible, such as airborne material containing the virus entering a person's mouth, nose, or eyes, or being inhaled into the lungs.

#### ■ Respiratory protection

Because infectious diseases such as avian influenza may be transmitted by breathing contaminated dust, poultry workers should wear respirators. Respirators that have filters or cartridges are called air-purifying respirators. These types are the most practical and appropriate choices for poultry workers to wear when they might be exposed to infected birds or during day-to-day activities in poultry barns.

#### ■ Eye protection

Eye protection will reduce direct exposure of the eyes to contaminated dust and aerosols and will help keep workers from touching their eyes with contaminated fingers. To prevent the mucous membranes of the eyes from being exposed to the avian influenza virus, poultry workers should wear safety goggles or a respirator that has a full facepiece, hood, helmet, or loose-fitting facepiece. If safety goggles are worn, they should be nonvented (eyecup goggles, for example) or, at a minimum, indirectly vented.

Caution should also be used when removing eye protection to ensure that contaminated equipment does not come in contact with the eyes or other mucous membranes. Eye protection that is properly selected and used will help prevent conjunctivitis (redness, swelling, and pain in the eyes and eyelids). Poultry workers exposed to birds infected with avian influenza should see a physician at the first signs of conjunctivitis.

#### ■ Protective clothing and hand-hygiene practices

Protective clothing (which includes gloves, aprons, outer garments or coveralls, and boots or boot covers) should be used to prevent direct skin contact with contaminated materials and surfaces and to reduce the likelihood of transferring contaminated material outside a poultry barn or work site. Disposable protective clothing is preferred.

It is important to take measures for preventing the avian influenza virus from being

spread to other areas. To do this, disposable items of personal protective equipment should be discarded properly, and nondisposable items should be cleaned and disinfected according to outbreak-response guidelines.

*Sources: Ohio Poultry Association; U.S. Department of Labor-OSHA*

## **I. How does avian influenza infect humans?**

Most cases of avian influenza infection in humans have resulted from direct or close contact with infected poultry (e.g., domesticated chicken, ducks, and turkeys) or surfaces contaminated with secretions and excretions from infected birds.

The spread of avian influenza viruses from an ill person to another person has been reported very rarely, and transmission has not been observed to continue beyond one person. During an outbreak of avian influenza among poultry, there is a possible risk to people who have direct or close contact with infected birds or with surfaces that have been contaminated with secretions and excretions from infected birds.

There is no evidence that properly cooked poultry or eggs can be a source of infection for avian influenza viruses.

*Source: Centers for Disease Control and Prevention.*

## **2. What are the symptoms and health effects of avian influenza among humans?**

Symptoms of avian influenza in humans have ranged from typical human influenza-like symptoms (fever, cough, sore throat, and muscle aches) to eye infections, pneumonia, severe respiratory diseases (such as acute respiratory distress syndrome), and other severe and life-threatening complications. The symptoms of avian influenza may depend on which specific virus subtype and strain cause the infection.

Two main risks for human health from avian influenza are the risk of direct infection when the virus passes from the infected bird to humans, sometimes resulting in severe disease; and the risk that the virus, if given enough opportunities, will change into a form that is highly infectious for humans and spreads easily from person to person.

### **Clinical features**

In many patients, the disease caused by the H5N1 virus follows an unusually aggressive clinical course, with rapid deterioration and high fatality rates. Like most emerging diseases, H5N1 influenza in humans is poorly understood. Clinical data from cases in 1997 and from the current outbreak are beginning to provide a picture of the clinical features of the disease, but much remains to be learned. Moreover, the current picture could change given the propensity of this virus to mutate rapidly and unpredictably.

The incubation period for H5N1 avian influenza may be longer than that for normal seasonal influenza, which is around two to three days. Current data for H5N1 infection indicate an incubation period ranging from two to eight days and possibly as long as 17 days. However, the possibility of multiple exposures to the virus makes it difficult to define the incubation period precisely. The World Health Organization currently recommends that an incubation period of seven days be used for field investigations and the monitoring of patient contacts.

Initial symptoms include a high fever, usually with a temperature higher than 100°F, and influenza-like symptoms. Diarrhea, vomiting, abdominal pain, chest pain, and bleeding from the nose and gums have also been reported as early symptoms in some patients.

Watery diarrhea without blood appears to be more common in H5N1 avian influenza than in normal seasonal influenza. The spectrum of clinical symptoms may, however, be broader, and not all confirmed patients have presented with respiratory symptoms. In two patients from southern Vietnam, the clinical diagnosis was acute encephalitis; neither patient had respiratory symptoms at presentation. In another case, from Thailand, the patient presented with fever and diarrhea but no respiratory symptoms. All three patients had a recent history of direct exposure to infected poultry.

One feature seen in many patients is the development of manifestations in the lower respiratory tract early in the illness. Many patients have symptoms in the lower respiratory tract when they first seek treatment. On present evidence, difficulty in breathing develops around five days following the first symptoms. Respiratory distress, a hoarse voice, and a crackling sound when inhaling are commonly seen. Sputum production is variable and sometimes bloody. Most recently, blood-tinted respiratory secretions have been observed in Turkey. Almost all patients develop pneumonia. During the Hong Kong outbreak, all severely ill patients had primary viral pneumonia, which did not respond to antibiotics. Limited data on patients in the current outbreak indicate the presence of a primary viral pneumonia in H5N1, usually without microbiological evidence of bacterial supra-infection at presentation. Turkish clinicians have also reported pneumonia as a consistent feature in severe cases; as elsewhere, these patients did not respond to treatment with antibiotics.

In patients infected with the H5N1 virus, clinical deterioration is rapid. In Thailand, the time between onset of illness to the development of acute respiratory distress was around six days, with a range of four to thirteen days. In severe cases in Turkey, clinicians have observed respiratory failure three to five days after symptom onset. Another common feature is multi-organ dysfunction, notably involving the kidney and heart. Common laboratory abnormalities include lymphopenia, leukopenia, elevated aminotransferases, and mild-to-moderate thrombocytopenia with some instances of disseminated intravascular coagulation.

*Sources: Centers for Disease Control and Prevention; World Health Organization.*

### **3. What can be done to prevent and control avian influenza among humans?**

The U.S. government carefully controls domestic and imported food products, and in 2004 issued a ban on importation of poultry from countries affected by avian influenza viruses, including the H5N1 strain. This ban still is in place.

The Centers for Disease Control and Prevention (CDC) currently advises that travelers to countries with known outbreaks of H5N1 influenza avoid poultry farms,

contact with animals in live food markets, and any surfaces that appear to be contaminated with feces from poultry or other animals.

As a general rule, the public should observe wildlife, including wild birds, from a distance. This protects you from possible exposure to pathogens and minimizes disturbance to the animal. Avoid touching wildlife. If there is contact with wildlife do not rub eyes, eat, drink, or smoke before washing hands with soap and water. Do not pick up diseased or dead wildlife. Contact your state or federal natural resource agency if a sick or dead animal is found.

Hunters should follow routine precautions when handling game, including wild birds. The National Wildlife Health Center recommends that hunters:

- Do not handle or eat sick game.
- Wear rubber or disposable latex gloves while handling and cleaning game; wash hands with soap and water (or with alcohol-based hand products if the hands are not visibly soiled); and thoroughly clean knives, equipment, and surfaces that come in contact with game.
- Do not eat, drink, or smoke while handling animals.
- Cook all game thoroughly.

### **Vaccines and antivirals**

There currently is no commercially available vaccine to protect humans against the H5N1 virus that is being detected in Asia and Europe. However, vaccine development efforts are taking place. Research studies to test a vaccine that will protect humans against H5N1 virus began in April 2005, and a series of clinical trials is under way.

Four different influenza antiviral drugs (amantadine, rimantadine, oseltamivir, and zanamivir) are approved by the U.S. Food and Drug Administration for the treatment of influenza; three are approved for prophylaxis. All four have activity against influenza A viruses. However, sometimes influenza strains can become resistant to these drugs, and therefore the drugs may not always be effective. For example, analyses of some of the 2004 H5N1 viruses isolated from poultry and humans in Asia have shown that the viruses are resistant to two of the medications (amantadine and rimantadine).

*Source: Centers for Disease Control and Prevention.*

# NATIONAL AND STATE RESPONSES

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## I. The national plan

“Safeguarding the United States From Highly Pathogenic Avian Influenza (HPAI): USDA Actions, Plans, and Capabilities for Addressing the Bird Flu Threat”

*U.S. Department of Agriculture Veterinary Services, October 2005*

The U.S. Department of Agriculture (USDA) recognizes that HPAI (H<sub>5</sub>N<sub>1</sub>) poses a significant threat to agriculture and human health. Accordingly, USDA’s Animal and Plant Health Inspection Service (APHIS) is taking steps to safeguard against the introduction of HPAI (H<sub>5</sub>N<sub>1</sub>) into the United States. APHIS also continues to work closely with its federal, state, and tribal partners and industry stakeholders to have effective and coordinated emergency response plans ready should an outbreak of HPAI (H<sub>5</sub>N<sub>1</sub>) occur in the United States.

Any outbreak of HPAI, regardless of the strain, could have very serious economic and health impacts on the U.S. poultry industry as well as on public health. The United States is the world’s largest producer and exporter of poultry meat and the second-largest egg producer. Total U.S. poultry production was valued at \$23.3 billion in 2003. Broiler production was valued at \$15.2 billion, followed by eggs at \$5.3 billion and turkeys at \$2.7 billion. An outbreak of HPAI could result in significant poultry production losses in affected areas due to quarantine and bird depopulation activities.

The United States is the world’s largest exporter of broilers and turkeys. In 2003, U.S. broiler exports were valued at \$1.5 billion and turkey exports at \$265 million. In the event of an HPAI outbreak in the United States, our foreign trading partners would impose a ban on all U.S. exports of poultry and poultry products.

Without following proper food handling, hygiene, and normal cooking practices, HPAI (H<sub>5</sub>N<sub>1</sub>) virus can survive on contaminated raw poultry meat, on contaminated surfaces of eggs, and within the albumen and yolk of eggs. However, it is important to note that there is no evidence that people have been infected by HPAI (H<sub>5</sub>N<sub>1</sub>) through the consumption of eggs, egg products, or well-cooked poultry meat.

### **Preventing HPAI in the United States**

As a primary safeguard against the introduction of HPAI (H<sub>5</sub>N<sub>1</sub>) into the United States, APHIS maintains trade restrictions on the importation of poultry and poultry products from affected countries. In many of these countries, APHIS had prior poultry and poultry product import restrictions in place because the countries were also known to have exotic Newcastle disease (END). The import restrictions targeted against END also effectively mitigate HPAI risk. These restrictions include:

- Prohibiting the importation of live birds and hatching eggs from H<sub>5</sub>N<sub>1</sub> affected countries.
- Requiring all imported birds to be quarantined at a USDA bird-quarantine facility and tested for the avian influenza virus before entering the country. This requirement now covers returning U.S.-origin pet birds.

APHIS has developed a risk assessment that specifically considers the threat to the United States of HPAI introduction from southeast Asia. This assessment is helping APHIS to identify and closely monitor pathways that are vulnerable to potential HPAI (H<sub>5</sub>N<sub>1</sub>) introduction. APHIS has alerted the U.S. Department of Homeland Security to be especially vigilant in performing agricultural inspections for prohibited products at U.S. ports-of-entry handling passengers and cargo from Asia. Additionally, APHIS has increased its monitoring of domestic commercial markets for illegally smuggled poultry and poultry products.

APHIS is working closely with international organizations such as the World Organization for Animal Health (OIE) and the United Nations' Food and Agriculture Organization (FAO) and World Health Organization (WHO) to assist HPAI-affected countries and other neighboring Asian-Pacific countries with disease prevention, management, and eradication activities. By helping these countries prepare for, manage, or eradicate HPAI (H<sub>5</sub>N<sub>1</sub>) outbreaks, APHIS can reduce the risk of the disease spreading from overseas to the United States.

### **Preparedness in the event of an outbreak**

In the event that HPAI prevention efforts fail to stop the introduction of the disease into this country, APHIS is working diligently to prepare for a potential outbreak. Preparations include coordinating efforts and information, developing response strategies, monitoring for the presence of HPAI, heightening disease awareness, and having resources and personnel readily available.

APHIS established an interagency working group to address HPAI preparedness and response issues. The group includes representatives from several federal agencies and international animal- and public-health organizations. This group communicates regularly electronically and receives HPAI (H<sub>5</sub>N<sub>1</sub>) status updates. USDA agricultural attachés with APHIS' International Services program and USDA's Foreign Agricultural Service are closely monitoring the HPAI situation in Asia and routinely report new developments.

APHIS reviewed and provided input to the U.S. Department of Health and Human Services' Centers for Disease Control and Prevention (CDC) on their Pandemic Influenza Response and Preparedness Plan. APHIS provided guidance concerning its role in animal health and wildlife disease management. APHIS also collaborated with CDC to draft recommendations to help prevent the transmission of HPAI to animal-disease outbreak-response workers. APHIS' Veterinary Services (VS) program is developing a policy to ensure the protection of personnel involved in HPAI control and eradication activities.

APHIS officials at the VS Center for Veterinary Biologics are considering options for the use of HPAI vaccines on poultry in the event of an outbreak in the United States. APHIS administers an Avian Influenza Vaccine Bank. VS maintains a national network of personnel to monitor for and respond to outbreaks of HPAI and other foreign animal diseases (FADs). This network includes:

- An Area Veterinarian-in-Charge (AVIC) assigned to a state or, in some cases, two or more states, to administer VS operations and work with state veterinary officers.
- Fourteen Area Emergency Coordinator (AEC) positions to help support and improve state and tribal preparedness and response to FAD emergencies. The AECs are strategically placed throughout the United States.
- A cadre of more than 40,000 certified private veterinary practitioners to report any suspected FADs to federal or state officials.
- Four hundred and fifty specially trained animal disease diagnosticians from state, federal, and military ranks who are highly trained in diagnosing HPAI and other FADs.

APHIS maintains world-class diagnostic capabilities through the VS National Veterinary Services Laboratories (NVSL). NVSL are also supported by the VS National Animal Health Laboratory Network, which provides additional FAD diagnostic capabilities at USDA approved State and private animal health diagnostic labs. APHIS has been conducting a multilevel outreach and education campaign called “Biosecurity for the Birds” that provides disease and biosecurity information to backyard poultry producers. The campaign also encourages producers to report sick birds, thereby increasing APHIS’s FAD surveillance opportunities in poultry.

### **Response to a potential outbreak**

If an HPAI (H<sub>5</sub>N<sub>1</sub>) outbreak should occur in the United States, APHIS has the FAD management infrastructure required to conduct an emergency response program. The response would take place at the local level in accordance with the National Animal Health Emergency Management System’s guidelines for highly contagious disease.

If the scope of the HPAI (H<sub>5</sub>N<sub>1</sub>) outbreak is beyond APHIS’s and the affected state’s immediate resource capabilities, additional resources can be obtained through the following mechanisms:

- Under the National Response Plan’s Emergency Support Function #11, APHIS can implement an integrated federal, state, tribal, and local response to an FAD or zoonotic disease outbreak. This mechanism ensures that animal-health emergencies are supported in coordination with the emergency support function that covers public health and medical services.
- APHIS can request additional animal health personnel through the National Animal Health Emergency Response Corps. The Corps is composed of private veterinarians and animal-health technicians who are able to assist on short notice.

APHIS would organize its response to an HPAI outbreak using the incident command system (ICS) prescribed by the National Incident Management System. Key APHIS leadership roles under ICS would include:

- The incident commander managing emergency response operations in the field, and
- The National Incident Coordinator, at the APHIS Emergency Operations Center in Riverdale, Md., providing national support to the incident commander.

This ICS organizational structure can be easily incorporated into a larger, federal multi-agency response if necessary. Upon detection of HPAI (H5N1) in poultry, APHIS would quickly notify the CDC to initiate their involvement, in coordination with state and local health departments, in efforts to minimize disease transmission from birds to humans. If necessary, CDC would activate the Pandemic Influenza Response Plan.

### **Recovery from an outbreak**

Following the eradication of an outbreak of HPAI in the United States, APHIS would play a key role in supporting the recovery of the poultry industry by working with foreign trading partners to reopen lost overseas markets to U.S. poultry and poultry products. APHIS is also authorized to offer producers indemnity for losses directly related to HPAI and HPAI eradication activities. Funding to support HPAI indemnity would be available through the USDA's Commodity Credit Corporation.

### **Conclusion**

APHIS is taking appropriate measures to safeguard against, plan for, and if necessary respond to an outbreak of HPAI (H5N1) in the United States. These efforts not only protect the health and value of the U.S. poultry industry from HPAI but also reduce the risk of a potential human health emergency in the United States.

*Source: U.S. Department of Agriculture.*

## **2. The Ohio plan**

### **Overview of the “Ohio Emergency Poultry Disease Plan”**

*Ohio Poultry Association, Updated November 2005*

The Ohio Emergency Poultry Disease Plan is a proactive program designed to prevent, control, and eradicate emergency poultry diseases (EPDs) in Ohio poultry populations. An EPD is any exotic or previously eradicated infectious disease or a common infectious disease for which no practical control measures are available and which, if present in Ohio, could result in serious economic loss to independent producers, integrated companies, or the entire Ohio poultry industry, and/or could affect public health. They include exotic Newcastle disease, pullorum, fowl typhoid, low pathogenic avian influenza H5/H7, and highly pathogenic avian influenza.

The plan has four levels of implementation:

**Level I: Prevention**

*A basic ongoing biosecurity program when no known EPD exists in Ohio, in regions adjacent to Ohio, or in regions operationally connected to Ohio.* We have to assume that EPDs can be present anywhere at any time. Therefore, a basic industry-wide written biosecurity effort is required to be in place at all times. Level I is the minimal accepted biosecurity effort required when there is no recognized EPD threat to Ohio poultry.

**Level II: Prevention**

*An increased level of biosecurity when an EPD outbreak occurs in an area adjacent to or operationally connected to Ohio.* At Level II, additional written biosecurity measures are recommended for implementation when an EPD outbreak occurring outside of Ohio is believed to present an increased threat to Ohio poultry. The assessment of the threat presented to Ohio poultry is used to determine which additional biosecurity measures are recommended for implementation. Therefore, the specific actions recommended for implementation will vary from situation to situation.

**Level III: Control**

*A plan of action if an EPD outbreak is suspected in Ohio.* The primary objective of Level III is early containment of any serious disease outbreak, especially a suspected EPD outbreak. This is an industry-initiated early response effort. Level III is maintained until a definitive diagnosis is made at the Ohio Department of Agriculture Animal Disease Diagnostic Laboratory and the National Veterinary Service Laboratory. In most cases the suspected outbreak will not be an EPD. The success of Level III depends on:

- Early reporting by producers, employees, flock supervisors, etc., when a disease outbreak is first suspected in their flock.
- Readiness of the Ohio Poultry Association, the Ohio poultry industry and advisory personnel to implement recommended Level III protocols; for example, availability of current phone numbers for key personnel, well publicized biosecurity and containment recommendations, and availability of required resources and supplies.
- Existence of a current and accurate demographics database for the Ohio poultry industry and other critical locations, e.g. truck washes and landfills, as developed for the Department of Homeland Security.
- Understanding the dynamics of the Ohio poultry industry, including hauling area, marketing area, travel patterns of service and allied industry representatives, etc.
- Reserve funds and a pre-existing indemnity plan to allow for rapid implementation of control and eradication protocols.

**Level IV: Control/Eradication**

*A plan of action if an EPD outbreak is confirmed in Ohio.* Level IV addresses implementation of industry-recommended and government-mandated (Chapter 941 of the Ohio Revised Code) control and eradication protocols when an EPD is diagnosed in Ohio. Out of necessity, the additional measures implemented at Level IV are more extensive, aggressive, and restrictive, including but not limited to:

- Flock is placed under quarantine.
- Additional exposed animals and/or farms are identified.
- The quarantine is expanded to appropriate areas including but not limited to utilization of law enforcement to shut down movement of animals.
- Governor may declare an emergency.
- Flock is appraised and ordered to be destroyed.
- Dead animals are disposed of in accordance with Chapter 941.14 of the Ohio Revised Code.

*Source: Ohio Poultry Association. For details about the Ohio Emergency Poultry Disease Plan and updates, contact Mo Saif, Food Animal Health Research Program, OARDC, (330) 263-3743, saif.1@osu.edu. For information about the State of Ohio's pandemic flu preparedness and response plan, go to <http://www.ohioagriculture.gov/news/news/anim-120605-govrelease.pdf>*

# NOTES



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