

CRS Report for Congress

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Avian Influenza: Agricultural Issues

Jim Monke
Analyst in Agricultural Policy
Resources, Science, and Industry Division

Summary

Since the fall of 2003, a strain of highly pathogenic avian influenza (H5N1) has spread throughout Asia, infecting mostly poultry but also a limited number of humans. The virus reached Europe in 2005, and the Middle East and Africa in 2006. Avian flu is highly contagious in domestic poultry. Strict biosecurity measures are practiced by commercial poultry farms and encouraged by governments. The economic effects of avian flu outbreaks can be significant, especially given international trade restrictions.

Controlling avian flu in poultry is seen as the best way to prevent a human pandemic from developing, by reducing the number of animal hosts in which the virus may evolve. This report mainly covers avian flu in poultry, and will be updated.

Two Forms with Many Strains

Avian influenza (AI) viruses exist throughout the world in many different strains. Avian flu is an Influenza A virus that infects birds, and certain strains have been known to infect both animals and humans. Avian flu is characterized by two forms in birds:¹

- a low pathogenicity (LPAI) form that causes mild illness, and
- a highly pathogenic (HPAI) form that is extremely contagious, causes severe illness, and frequently has high rates of mortality.

Both forms are possible in several strains. Strains are identified by two surface proteins designated by the letters H and N.² Some low pathogenicity strains (H5 and H7) are capable of mutating into highly pathogenic strains, and thus are treated aggressively. For example, in Italy in 1999, an H7 LPAI virus mutated into HPAI within nine months.

¹ Tests for pathogenicity are conducted in two ways: through genetic (DNA) sequencing, and by inoculating healthy chickens and monitoring their immune response and mortality over a 10-day period. HPAI strains can result in greater or lesser rates of mortality, perhaps ranging from 30-100%. LPAI strains typically do not exceed 10-20 percent mortality.

² The surface proteins are called hemagglutinin and neuraminidase, abbreviated H and N. Sixteen H subtypes and nine N subtypes have been identified, and they can occur in any combination.

Because LPAI is endemic in wild birds, low pathogenicity outbreaks are not unusual. The most recent domestic cases were in 2004 with low pathogenicity strains of H7N2 in Delaware, Maryland, and New Jersey, and H2N2 in Pennsylvania. A strain classified as HPAIH5N2 was found in Texas, although it did not manifest as highly pathogenic. Other cases include low pathogenicity H7N2 in the Northeast in 2003, and in the mid-Atlantic in 2002. Only three HPAI outbreaks have occurred domestically (1924, 1983, and 2004).

Status of Avian Influenza Outbreaks

In the United States.³ The highly pathogenic H5N1 strain of current global concern has not reached the United States, neither in poultry nor humans. To reduce the possibility that H5N1 enters U.S. borders, the U.S. Department of Agriculture (USDA) has blocked imports of poultry and poultry products from affected countries, and increased smuggling interdiction efforts. The Department of Homeland Security helps with enforcement through Customs and Border Protection.

Since wild birds can carry the disease, migratory birds routes are being monitored. North American flyways are not believed to be as susceptible as Eastern Hemisphere flyways that currently are spreading the virus. However, the United States has increased surveillance where flyways overlap because officials suspect migrating birds in Asia could carry the virus to Alaska this spring, and down the Pacific flyway in the fall of 2006.

Congressional Hearings. The House and Senate agriculture committees held hearings on avian influenza on November 16 and 17, 2005, respectively. Witnesses from the Administration, academia, and industry reviewed prevention and control efforts.⁴

In the Rest of the World.⁵ Since December 2003, at least 10 Asian countries have had confirmed outbreaks of H5N1 in poultry, including Vietnam, Thailand, Indonesia, Cambodia, China and Hong Kong, South Korea, Malaysia, Laos, and Japan. In 2005, H5N1 spread westward, being confirmed in six new countries: Russia, Ukraine, Kazakhstan, Turkey, Romania, and Croatia. In 2006, H5N1 spread further into Europe, and entered the Middle East and Africa, being confirmed in at least 17 new countries: six in domestic poultry (Iraq, Egypt, Nigeria, Niger, India, and France), and 11 in wild birds (Azerbaijan, Bulgaria, Greece, Slovenia, Hungary, Slovakia, Austria, Italy, Germany, Switzerland, and Poland). Iran, Serbia-Montenegro, Bosnia-Herzegovina, Pakistan, and Georgia have confirmed outbreaks of an H5 virus, but are awaiting results on the subtype.

³ For more on domestic poultry, see the U.S. Department of Agriculture (USDA) at [http://www.aphis.usda.gov/lpa/issues/avian_influenza]. For more on human issues, see the Centers for Disease Control (CDC) at [<http://www.cdc.gov/flu/avian>].

⁴ House Agriculture Committee, “*Review Issues Related to the Prevention, Detection, and Eradication of Avian Influenza*,” Serial No. 109-21, November 16, 2005 [<http://agriculture.house.gov/hearings/109/10921.pdf>]. Senate Agriculture Committee, “Avian Influenza: Role of U.S. agriculture to control and eradicate,” November 17, 2005 [<http://agriculture.senate.gov/Hearings/hearings.cfm?hearingId=1691>].

⁵ For international issues, see the World Health Organization (WHO) [http://www.who.int/csr/disease/avian_influenza/en], U.N. Food and Agriculture Organization (FAO) [http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html], and the World Organization for Animal Health (OIE) [http://www.oie.int/eng/avian_influenza].

The H5N1 outbreak is historically unprecedented and extremely challenging. The U.N. Food and Agriculture Organization (FAO) estimates that over 200 million birds have died or been culled. Some countries were reluctant to acknowledge the disease for fear of economic consequences. In other countries, lack of compensation for farmers whose flocks are destroyed has been a disincentive to report outbreaks early. In some parts of Asia and Africa, about 80% of the poultry are produced in small backyard farms.

International Control Efforts.⁶ As H5N1 spreads, it may become endemic in countries with low levels of veterinary services or animal husbandry practices that harbor the virus. Chances increase that the virus will evolve through mutation or reassortment into a strain that could be transmitted easily between humans. Thus, FAO and the World Health Organization (WHO) developed a strategy calling for the swift and coordinated control of avian flu in poultry as the best way to prevent or delay a human pandemic from developing, by reducing the number of animal hosts in which the virus may evolve.⁷

Transmission

Wild birds are the primary natural reservoir for Influenza A viruses and are often the vector that introduces new outbreaks into domestic flocks. Wild birds often are resistant to the virus and do not show clinical symptoms. The role of migratory birds is of increasing concern, especially given the spread of the disease in 2006.

Avian flu is highly contagious in domestic poultry. The virus is spread by contact with infected feces, nasal, or eye excretions. Human activity poses further risks when people, clothing, vehicles, and supplies move between farms. Thus, strict biosecurity measures are practiced among commercial poultry farms and are encouraged by USDA and international organizations.⁸ Confined poultry sheds prevent contact with wild birds.

In the United States, avian flu viruses have been common in live bird markets concentrated in ethnic or urban areas. Biosecurity practices are insufficient if birds and equipment intermingle in the market or move back to farms. Thus sanitation of crates, periodic disinfection of the market, and restrictions on moving birds back into general farm populations are needed. USDA has focused on these markets as one of the first places to control the disease. Live bird markets are a small portion of the U.S. poultry industry (about 0.25%), but the frequency of outbreaks is of concern to the majority of commercial growers practicing tighter biosecurity protocols. In Asia, a larger network of live bird markets and the much larger number of small backyard farms have posed significant problems for eradicating the disease.

⁶ For more on the international response, see CRS Report RL33219, *U.S. and International Responses to the Global Spread of Avian Flu: Issues for Congress*, coordinated by Tiaji Salaam-Blyther and Emma Chanlett-Avery.

⁷ “A Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza (HPAI),” FAO and OIE, in cooperation with WHO, November 2005 [<http://www.fao.org/ag/againfo/subjects/documents/ai/HPAIGlobalStrategy31Oct05.pdf>], and “Avian Influenza Control and Eradication: FAO’s Proposal for a Global Programme,” FAO, Jan. 2006 [http://www.fao.org/ag/againfo/subjects/documents/ai/Global_Programme_Jan06.pdf].

⁸ For biosecurity recommendations, see the USDA “Biosecurity for the Birds” website at [<http://www.aphis.usda.gov/vs/birdbiosecurity/hpai.html>].

Human Infection.⁹ Certain strains of avian flu can infect humans through close poultry-to-human transmission, usually through contact with fecal matter or other live bird excretions. The World Health Organization (WHO) and the World Organization for Animal Health (OIE) conclude that avian flu is not a food-borne disease since the virus is killed by the temperature reached in normal cooking. The Centers for Disease Control and Prevention (CDC) recommends standard food safety practices.

The human disease caused by H5N1 differs from typical human flu. H5N1 can replicate in a wide range of cells, more so than the usual flu virus. This can result in a severe disseminated disease affecting multiple organs, which has caused high rates of mortality. Public health professionals are concerned that the virus could mutate or combine with human flu viruses to allow efficient human-to-human transmission.

WHO has confirmed 176 human cases of H5N1 from December 2003 to March 10, 2006, with 97 deaths (a 55% mortality rate). Seven countries have had human cases. Vietnam (93 cases, 42 deaths) and Indonesia (28 cases, 21 deaths) have the most, with Thailand, China, Turkey, Cambodia, and Iraq having fewer.

The first human cases of H5N1 were in Hong Kong in 1997. Two other strains have caused human illness: H7N7 in the Netherlands, and H9N2 in Hong Kong.

Control

Avian flu in poultry is controlled domestically through prevention and eradication by individual farmers in cooperation with state and federal governments, and with industry associations. The USDA Animal and Plant Health Inspection Service (APHIS) is the lead federal agency. Internationally, FAO has a joint response plan with WHO for the current outbreak (see footnote 6).

Preventing Infection. Biosecurity practices are the most important means of preventing outbreaks in poultry. This includes preventing access of wild birds to domestic flocks and limiting access to farm buildings by outside conveyances. For example, delivery trucks and personnel are cleaned and disinfected before entering a farm's biosecure area. In Asia and other parts of the world, the large number of small farms or backyard flocks without biosecurity practices has posed greater problems for control. Such animal husbandry practices are slow to change.

Vaccines. While vaccination of poultry is possible and has been used on a small scale with some success, it generally is not considered a sufficient control method.¹⁰ Vaccination poses problems for international trade as many countries will not import poultry products from other countries that use vaccination, since animals will test positive

⁹ For more on human issues, see CRS Report RL33145, *Pandemic Influenza: Domestic Preparedness Efforts*, by Sarah A. Lister.

¹⁰ Iliaria Capua and Stephano Marangon, "Vaccination for avian influenza in Asia," *Vaccine*, 22 (2004), 4137-7138 [http://www.oie.int/eng/avian_influenza/vaccination%20in%20Asia.pdf], and Iliaria Capua & Stephano Marangon, "The use of vaccination as an option for the control of avian influenza," May 2003, [http://www.oie.int/eng/avian_influenza/A_71%20SG_12_CS3E.pdf].

for antibodies. If vaccination is not administered and monitored correctly, it can allow the virus to become endemic and continue to spread or mutate.

In November 2005, USDA had a stockpile of 40 million doses of vaccine (for two types of H5 and two types of H7 viruses). USDA plans to double this stockpile with supplemental funds appropriated for avian flu in December 2005 (discussed below).

Eradicating Outbreaks. Because the virus is highly contagious and easily spread in poultry, the most common method of control after there is an outbreak is culling (also called “stamping out,” depopulating) the infected flocks, and certain flocks in close proximity to the infected flock. Following depopulation, buildings and equipment are rigorously disinfected before new birds are allowed, a process that takes at least several weeks. The virus is killed by common disinfectants or heat (about 160 degrees F).

Domestic outbreaks usually are managed through joint federal, state, and industry cooperation. States usually lead the response in terms of depopulation and quarantines of surrounding areas which are imposed until the disease is eradicated. APHIS provides personnel and equipment to advise and supplement state resources. In highly pathogenic outbreaks, APHIS may take a larger role. Federal statute allows the destruction of affected animals (9 CFR 53.4). The USDA National Veterinary Services Lab (NVSL) conducts confirmatory tests on the pathogenicity and type of virus. USDA also works to limit export restrictions (such as to states or counties) and reopen export markets.

Indemnities to Farmers. Compensation programs are desired to encourage farmers to report outbreaks and cooperate with control programs when culling is needed. States generally manage indemnification programs for low pathogenicity outbreaks. Some industry associations, such as those on the Delmarva peninsula (Delaware, Maryland, and Virginia), have compensation funds. In the past, USDA has not had a compensation program for LPAI.¹¹ However, a new low pathogenicity indemnification program was developed in FY2005. USDA’s standard indemnification rate for low pathogenicity programs is 50% of fair market value. For highly pathogenic outbreaks, statute allows USDA to offer 100% indemnification (9 CFR 53.2).

Federal Appropriations to Control Avian Flu in Poultry

For FY2007, USDA requests \$82 million for avian flu: \$77 million for APHIS and \$5.4 million for agricultural research. Of the amount for APHIS, \$56.7 million would be for monitoring and surveillance of HPAI, and \$16.7 million for management of LPAI.

For FY2006, the regular appropriation to APHIS for its LPAI program is \$13.8 million (but with carryover, \$28.3 million is available, with about \$12 million for indemnities; P.L. 109-97, H.Rept. 109-255). In addition, Congress appropriated USDA \$91.4 million in emergency supplemental funds as part of \$3.8 billion for pandemic influenza (Division B, Title II, of P.L. 109-148). From the supplemental, APHIS received \$71.5 million for domestic surveillance, diagnosis, and vaccine stockpiles; and international technical assistance for surveillance, biosecurity, and control. The Agricultural Research Service received \$7 million in the supplemental.

¹¹ A limited indemnification program was created for an LPAI outbreak in 2002 (9 CFR 53.11).

In other international, agricultural aid, the Emergency Supplemental Appropriations Act of 2005 (P.L. 109-13) provided \$25 million to the U.S. Agency for International Development (USAID) and CDC to combat avian flu. Conferees encourage cooperation with FAO and WHO on a joint international plan (footnote 6). The \$140 million, three-year FAO/WHO plan is being implemented but is not fully funded by donor countries.

Economic Impacts

Avian flu can affect the agricultural economy significantly. Usually, direct costs include culling birds and quarantining farms. Larger economic effects arise from international trade bans which affect farms outside the quarantine area. However, in the current H5N1 outbreak, global consumer confidence is increasingly at stake despite official statements that normal cooking would kill any virus if it was present.

If consumer confidence remains high, demand for healthy poultry may rise. If consumer confidence declines, poultry prices may drop and demand for substitute meats may increase. As poultry production falls, demand for feed such as corn and soy meal may decrease. Poultry account for about one-third of total world feed use.

Through most of 2005, the global impact on feed and poultry consumption was limited due to relatively quick recovery of production where outbreaks were contained, since poultry production cycles are quite short at about eight weeks. However, the rapid geographic spread of the virus in 2006 is reducing consumer demand for poultry in Europe and Africa. FAO reports poultry consumption dropped 70% in Italy during February 2006, 20% in France, and 10% in northern Europe. In the United States, export prices dropped 13% from declining shipments to Eastern Europe and Central Asia in November and December of 2005.¹²

The United States is the world's largest producer and exporter of poultry meat and the second-largest egg producer. USDA estimates that about 8.5 billion broilers were produced in 2003, and farm sales of poultry were worth \$23.3 billion (out of \$105 billion for all livestock, and \$200 billion including crops). Broiler production was \$15.2 billion, followed by eggs at \$5.3 billion, and turkeys at \$2.7 billion. Five states account for 60% of U.S. production: Georgia (15%), Arkansas (14%), Alabama (13%), Mississippi (9%), and North Carolina (9%). The U.S. exports about 16% of its poultry production.

No economic estimates of an H5N1 outbreak in the United States are provided because of the highly uncertain nature of any possible, hypothetical outbreak. The 1983-84 outbreak of highly pathogenic avian flu in the United States caused the destruction of 17 million birds and cost \$65 million.

¹² FAO, "Escalating bird flu crisis jeopardizes global poultry trade prospects," Feb. 28, 2006 [<http://www.fao.org/newsroom/en/news/2006/1000240/index.html>], and USDA Economic Research Service, "Livestock, Dairy, and Poultry Outlook," February 15, 2006 (monthly), [<http://www.ers.usda.gov/publications/ldp>].