

Embargoed:
Monday, February 19, 2007,
9:15 AM PST / 12:15 PM EST / 17:15 GMT
Media Only—Not for Commercial Distribution

Preliminary findings from *Vital Signs 2007–2008*:

“Avian Flu Spreads” and
“Meat Output and Consumption Grow”

Presented by
Danielle Nierenberg, Research Associate
Worldwatch Institute, Washington DC

American Association for the Advancement of Science
Annual Conference
San Francisco, CA
February 19, 2007



Vital Signs 2007–2008 tracks and analyzes over 40 trends that are shaping our future. Categories of trends include Food and Agricultural Resources, Energy and Environment, the Economy, Transport and Communications, Health and Society, and Conflict and Peace. The full report will be released in September 2007.

For more information, contact Worldwatch Institute Communications Manager:
Darcey Rakestraw, 202-452-1992 x 517, drakestraw@worldwatch.org

Avian flu is a disease that affects not only birds but also other animals, including pigs, cats, and humans. Since the latest major outbreak began in late 2003, at least 250 people have contracted the virus and more than 150 of them have died.¹ It is highly likely that other cases of infection and death have gone unreported, making it impossible to know the true scope of the disease.

Hundreds of millions of chickens, ducks, and other birds in areas where outbreaks occurred have been killed in an effort to control avian flu.² The virus, labeled H5N1, first jumped the species barrier in 1997 and spread to humans in Hong Kong, killing 6 of the 18 people infected.³ The latest outbreak has now spread to more than 50 countries—nearly 40 of which were affected just in 2006—including China, India, Indonesia, Nigeria, and the United Kingdom.⁴ (See Table 1.) Most of the human and avian deaths have occurred in Asia.⁵

In places with high concentrations of domestic pigs and chickens, pigs may serve as a “mixing vessel” for the virus because of their genetic similarity to humans.⁶ In China, for example, where half of the world’s pork is produced and consumed, pigs and chickens often live close to one another and to people in backyards or on factory farms.⁷ The avian influenza virus could combine with pig influenza to create an entirely different strain of the disease, which could then be spread from coughing pigs to pig handlers and processors.⁸

Avian flu can also be spread directly from birds to humans through direct handling of chickens and the slaughtering and processing of meat—although not, experts say, from eating cooked meat from infected birds.⁹ According to the World Health Organization (WHO), the current outbreak of H5N1 has been the most deadly of all the influenza viruses that have spread from birds to humans, killing more than half of the people infected—most of them previously healthy children and young adults.¹⁰ Scientists are even more concerned that H5N1 will mutate into a virus that can easily spread from person-to-person, sparking a pandemic.¹¹

If the disease does become a pandemic, loss

of human life could be staggering. Thanks to globalized air travel and trade, a highly pathogenic flu virus could spread to every corner of the globe in just a matter of months. A December 2006 study in *The Lancet* estimated that as many as 62 million people could die in such a flu pandemic.¹² WHO gives a much more conservative number—estimating anywhere from 2 million to 7.4 million deaths from a pandemic.¹³ But millions more would be forced to stay home from work, causing widespread economic disruption.¹⁴ The World Bank estimates that current losses to the global poultry sector from avian flu are in excess of \$10 billion.¹⁵ If the virus becomes a pandemic, it could cost from \$800 billion a year to \$2 trillion overall.¹⁶

Developing nations will likely experience the greatest numbers of deaths because they lack access to vaccines or antivirals.¹⁷ Governments are being encouraged to stock medications, such as the antiviral Tamiflu, to help combat an outbreak should it occur. But pharmaceutical companies lack the capacity—and often the financial incentive—to produce large numbers of these drugs quickly.¹⁸ Currently, the World Bank estimates that \$1.2–1.5 billion is needed over the next two to three years to address the financing gap for programs on avian and human influenza.¹⁹

In an attempt to deal with avian flu on the ground, at least 15 nations have restricted or even banned free-range and backyard production of birds, although this endangers the livelihoods of countless small farmers and jeopardizes the availability of affordable food for poor consumers.²⁰ Yet although migratory birds and small backyard farmers have been blamed for the spread of the disease, recent studies in Asia and Africa indicate that the real culprits may be factory farming and the globalized poultry trade and transport of livestock.²¹

Rising demand has helped drive livestock production from rural mixed farming systems, where farmers raise a few different species of animals on grass, to intensive periurban and urban production of pigs and chickens.²² These confined animal feeding operations (CAFOs), or factory farms, create the perfect environment

for the rapid spread of disease between animals and to people.²³ Because of unregulated zoning and subsidies that encourage livestock production, chicken and pig CAFOs are moving closer to major urban areas in China, Bangladesh, India, and many countries in Africa.²⁴ In Asia alone more than 6 billion birds are raised for food, many of them near the region's rapidly growing cities.²⁵

In Laos, according to the Barcelona-based agriculture organization GRAIN, 42 of the 45 outbreaks of avian flu in spring 2004 occurred on factory farms and 38 of them were in the capital, Vientiane.²⁶ The few small farms where outbreaks occurred were located close to commercial operations. In Nigeria, the first cases of avian flu were found in one of the nation's industrial broiler operations.²⁷ The virus spread from that 46,000-bird farm to 30 other factory farms in the country—and then quickly to neighboring farms, forcing farmers to kill their chickens.²⁸ In India, the world's fifth largest producer of eggs and a leading producer of broiler chickens, the first outbreak occurred on a large factory farm.²⁹

Avian flu has been found on backyard farms for centuries but has never been found to evolve there to the highly pathogenic form, such as the H5N1 virus.³⁰ Backyard poultry tend to be more genetically diverse and there are far fewer birds than in factory farms. These chickens receive more exposure to sunlight and have better ventilation, hygiene, and less stress than factory-farmed chickens—making them more resistant to disease.³¹ Even genetically diverse native chickens cannot remain immune to the virus for long, however; it circulates from factory farms to backyard flocks and then back to factory farms, becoming more virulent.³² Although having birds concentrated together in large factory farms may make it easier to monitor chickens and eradicate flocks, free-range birds are less likely to encourage an outbreak in the first place.³³

And the avian flu virus continues to change. In 2004 some studies showed that the disease was becoming more lethal with every outbreak, but a 2005 study maintained that some strains

Table 1. Human Cases of Bird Flu and Deaths, by Country, January 2007

Country	Cases	Deaths
Azerbaijan	8	5
Cambodia	6	6
China	22	14
Djibouti	1	0
Egypt	18	10
Indonesia	76	58
Iraq	3	2
Thailand	25	17
Turkey	12	4
Viet Nam	93	42
Total	264	158

Source: WHO, BBC World News.

of the virus could be becoming “less virulent and more infectious,” meaning that while it is not as lethal it could affect many more people.³⁴

Despite bans on raising chickens outdoors, farmers will continue to do this in order to survive. Experts suggest that the Food and Agriculture Organization, WHO, and other international agencies should focus most of their avian flu prevention efforts on big poultry producers and on stopping disease outbreaks before they occur.³⁵ The industrial food system not only threatens the livelihoods of small farmers, it potentially puts the world at risk for a pandemic. Reversing this trend, according to GRAIN and other public interest groups, will mean standing up for farmers and demanding food production that is safe for animals and humans alike.³⁶

AVIAN FLU SPREADS

1. World Health Organization (WHO), "Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO" (Geneva: 27 December 2006); Juan Lubroth, Head, Infectious Disease Group/EMPRES, and Senior Officer, Animal Health Service, Food and Agriculture Organization (FAO), e-mail to author, 4 January 2007.
2. WHO, op. cit. note 1; Lubroth, op. cit. note 1.
3. WHO, "Ten Things You Need to Know About Pandemic Influenza" (Geneva: 14 October 2005).
4. Declan Butler and Jaqueline Ruttiman, "Avian Flu and the New World," *News@Nature.com*, 10 May 2006; "Global Impact of Bird Flu," *BBC World News*, updated January 2007.
5. Butler and Ruttiman, op. cit. note 4.
6. FAO, Animal Production and Health Division, "Avian Influenza," at www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html.
7. FAO, *FAOSTAT Statistical Database*, at faostat.fao.org, viewed January 2007.
8. FAO, op. cit. note 6.
9. WHO, "Avian Influenza Frequently Asked Questions," at www.who.int/csr/disease/avian_influenza/avian_faqs/en/index.html#whatis.
10. *Ibid.*
11. *Ibid.*
12. C. J. Murray et al., "Estimation of Potential Global Pandemic Influenza Mortality on the Basis of Vital Registry Data from the 1918–20 Pandemic: A Quantitative Analysis," *The Lancet*, 23 December 2006, pp. 2211–18.
13. WHO, op. cit. note 3.
14. *Ibid.*
15. World Bank, East Asia and Pacific Region, "Economic Impact of Avian Flu," at web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIA/PACIFICEXT/EXTEAPREGTOPHEANUT/0,,contentMDK:20713527~pagePK:34004173~piPK:34003707~theSitePK:503048,00.html.
16. World Bank, East Asia and Pacific Region, "Avian Flu: Economic Losses Could Top US\$800 Billion" (Washington, DC: 8 November 2005); Jason Gale and Kristen Hallam, "Severe Flu Pandemic May Cost Up to \$2 Trillion, World Bank Says," *Bloomberg.com*, 29 June 2006.
17. WHO, op. cit. note 9.
18. *Ibid.*
19. World Bank, *Avian and Human Influenza: Update on Financing Needs and Framework*, Draft (Washington, DC: 30 November 2006), p. 5.
20. GRAIN, *Fowl Play: The Poultry Industry's Central Role in the Bird Flu Crisis*, GRAIN Briefing (Barcelona, Spain: February 2006), p. 4.
21. *Ibid.*
22. See Christopher L. Delgado and Claire A. Narrod, *Impact of Changing Market Forces and Policies on Structural Change in the Livestock Industries of Selected Fast-Growing Developing Countries, Final Research Report on Phase I—Project on Livestock Industrialization, Trade, and Social-Health-Environmental Impacts in Developing Countries* (Rome: International Food Policy Research Institute and FAO, 2002), and Henning Steinfeld et al., *Livestock's Long Shadow, Environmental Issues and Options* (Rome: FAO, 2006) for more information on the growth of factory farming.
23. Michael Greger, *Avian Flu: A Virus of Our Own Hatching* (New York: Lantern Books, 2006), p. 109; Council for Agricultural Science and Technology, *Global Risks of Infectious Animal Diseases*, Issue Paper No. 28 (Ames, IA: February 2005).
24. Greger, op. cit. note 23.
25. FAO, Animal Production and Health Division, "Avian Influenza—Questions and Answers," *Animal Health Special Report*, at www.fao.org/ag/AGInfo/subjects/en/health/diseases-cards/avian_qa.html#1.
26. GRAIN, op. cit. note 20, p. 9.
27. "Deadly Bird Flu Found in Africa," *BBC News*, 8 February 2006.
28. GRAIN, op. cit. note 20, p. 17.
29. Christopher L. Delgado, Claire A. Narrod, and Marites M. Tiongco, *Project on Livestock, Trade and Social-Health-Environmental Impacts in Developing Countries, Policy, Technical, and Environmental Determinants and Implications of the Scaling-Up of Livestock Production in Four Fast-Growing Developing Countries: A Synthesis, Final Research Report of Phase II* (Rome: FAO, 2003); GRAIN, op. cit. note 20, p. 16.
30. Greger, op. cit. note 23, p. 33.
31. Michael Greger, e-mail to author, January 2007; Greger, op. cit. note 23, pp. 194–96.
32. GRAIN, op. cit. note 20.
33. *Ibid.*
34. Dr. Isabella Donatelli, "Serological Analysis of Serum Samples of Humans Exposed to Avian H7 Influenza Viruses in Italy Between 1999 and 2003," *Journal of Infectious Diseases*, 15 October 2005, p. 5; "Less Virulent Strains of Avian Influenza Can Infect Humans," press release (Alexandria, VA: Infectious Diseases Society of America, 13 September 2005).
35. GRAIN, op. cit. note 20.
36. *Ibid.*

In 2006, meat production increased 2.5 percent to an estimated 276 million tons; output is expected to rise another 3 percent in 2007 to 285 million tons.¹ (See Figure 1.) Developing countries produced more meat and dairy products than industrial countries for the first time in 1995.² At least 60 percent of meat in 2006 was produced in developing nations.³

Consumption of meat and other animal products also continues to grow. While 43 kilograms of meat are produced annually per person at the moment, however, meat consumption still varies widely by region and socioeconomic status.⁴ In the developing world, people eat about 32 kilograms of meat per year, compared with almost 85 kilograms per person in the industrial world.⁵ (See Figure 2.)

Due mainly to the spread of avian flu and the culling of birds and burning of meat, global poultry output rose only slightly in 2006 to approximately 83 million tons, roughly a 1-percent decrease from the preceding year.⁶ Beef output rose by 2.5 percent, with nearly 66 million tons produced in 2006.⁷ The United States is the largest beef producer, although developing nations account for 55 percent of the total.⁸

Pork production grew by 3 percent to 108 million tons, more than any other meat.⁹ (See Figure 3.) This increase is likely due to shifting meat consumption patterns in Asia as people switch from chicken to pork due to concerns about avian flu.¹⁰ China continues to be the world's largest producer of pig meat, but several South American nations, including Brazil—which accounts for nearly 70 percent of pork output in the region—as well as Chile and Mexico, are increasing their production facilities.¹¹

Much of the growing demand for animal products is being met by large-scale intensive industrial systems (factory farms).¹² These facilities rely on commercial breeds of livestock, usually pigs and chickens, that have been bred to gain weight quickly on soybeans and corn. Factory farms are very crowded and confine animals in close quarters. Many of the world's 17 billion hens and meat chickens are given an area less than the size of a sheet of paper to live

in, while cattle in feedlots often stand knee-high in manure and arrive at slaughterhouses covered in feces.¹³

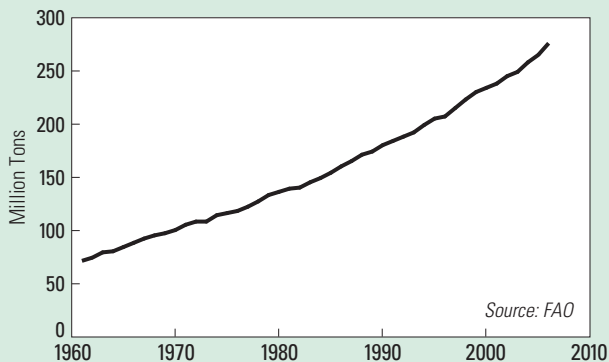
These operations are increasingly located in or near urban markets in developing countries, making cities the center of industrial meat production. Although city dwellers have kept livestock for centuries to help deal with urban waste as well as to provide income and food, industrial operations can create a host of environmental and public health problems, including the spread of diseases such as avian flu.¹⁴

Livestock are also the “single largest anthropogenic user of land,” according to the Food and Agriculture Organization.¹⁵ Meat production accounts for 70 percent of all agricultural land and 30 percent of the land surface of the planet.¹⁶ In the Amazon, 70 percent of previously forested land is occupied by pastures for cattle and much of the remaining 30 percent is used to grow soybeans and other feed crops.¹⁷

In addition, livestock are responsible for 18 percent of greenhouse gas (GHG) emissions (as measured in carbon dioxide equivalent), which is higher than the share contributed by cars and sport utility vehicles.¹⁸ And livestock account for 37 percent of emissions of methane, which has more than 20 times the global warming potential of carbon dioxide, and for 65 percent of nitrous oxide, another powerful GHG, most of which comes from manure.¹⁹

Livestock are major water users and polluters as well. The irrigation of feed crops for cattle accounts for nearly 8 percent of global human water use.²⁰ Compounding the contamination of rivers and streams from the runoff of manure from feedlots, livestock waste can contaminate soil and groundwater with a cocktail of hormones, pesticides, and antibiotics used in factory farms.²¹ One way to prevent some of these problems is by raising livestock in areas with enough land to handle the waste from large operations. Thailand, for example, has levied high taxes on poultry production within a 100-kilometer radius of Bangkok while exempting farmers outside that zone.²² Over the last decade, poultry production near Bangkok dropped significantly.²³

Figure 1. World Meat Production, 1961–2006



World Meat Production, 1961–2006

Year	Total (million tons)	Per Person (kilograms)
1961	71	23.1
1965	84	25.2
1966	88	25.7
1967	92	26.4
1968	95	26.7
1969	97	26.7
1970	100	27.1
1971	105	27.6
1972	108	27.9
1973	108	27.5
1974	114	28.4
1975	116	28.3
1976	118	28.5
1977	122	28.9
1978	127	29.6
1979	133	30.3
1980	136	30.7
1981	139	30.7
1982	140	30.4
1983	145	30.9
1984	149	31.3
1985	154	31.8
1986	160	32.4
1987	165	32.8
1988	171	33.5
1989	174	33.5
1990	180	34.1
1991	184	34.3
1992	188	34.5
1993	192	34.8
1994	199	35.4
1995	205	36.0
1996	207	35.9
1997	215	36.9
1998	223	37.7
1999	230	38.3
2000	234	38.4
2001	238	38.6
2002	245	39.3
2003	249	39.5
2004	258	40.6
2005	269	41.9
2006 (prel)	276	43.0

Figure 2. World Meat Production Per Person and Consumption Per Person in Industrial and Developing Countries, 1961–2006

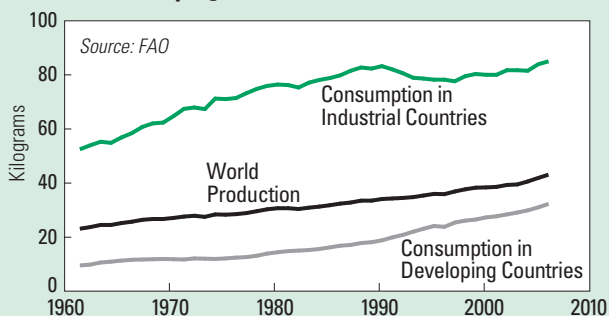
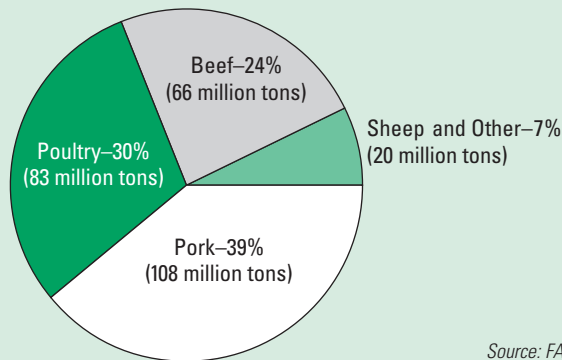


Figure 3. World Meat Production by Source, 2006



MEAT OUTPUT AND CONSUMPTION GROW

1. Food and Agriculture Organization (FAO), "Meat and Meat Products," *Food Outlook*, No. 2, December 2006; Figure 1 from *ibid.* and from FAO, "Meat and Meat Products," *Food Outlook*, No. 1, June 2006.
2. Henning Steinfeld and Pius Chilonda, "Old Players, New Players," *Livestock Report 2006* (Rome: FAO, 2006), p. 3.
3. FAO, June 2006, *op. cit.* note 1.
4. FAO, December 2006, *op. cit.* note 1.
5. *Ibid.*
6. FAO, June 2006, *op. cit.* note 1; FAO, December 2006, *op. cit.* note 1.
7. *Ibid.*
8. *Ibid.*
9. FAO, December 2006, *op. cit.* note 1.
10. *Ibid.*
11. *Ibid.*
12. FAO, *Livestock Report 2006* (Rome: 2006); Henning Steinfeld et al., *Livestock's Long Shadow, Environmental Issues and Options* (Rome: FAO, 2006).
13. FAO, *FAOSTAT Statistical Database*, at apps.fao.org, updated 24 January 2006; Compassion in World Farming, *Laying Hens Fact Sheet*, revised January 2004, at www.ciwf.org.uk/publications/Factsheets/Factsheet%20-%20Laying%20Hens%20.pdf.
14. Michael Greger, *Bird Flu: A Virus of Our Own Hatching* (New York: Lantern Books, 2006), p. 111–12, 113.
15. Henning Steinfeld et al., *Livestock's Long Shadow*, *op. cit.* note 12, pp. xx–xxi.
16. *Ibid.*, p. 4.
17. *Ibid.*, p. xxi.
18. *Ibid.*
19. *Ibid.*
20. *Ibid.*, p. xxii.
21. *Ibid.*, p. xx.
22. FAO, *Pollution from Industrialized Livestock Production*, Policy Brief 2 (Rome: Livestock Information, Sector Analysis, and Policy Branch, Animal Production and Health Division, undated).
23. *Ibid.*