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An HSI Fact Sheet: Avian Influenza in India

Humane Society International

HUMANE SOCIETY INTERNATIONAL

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Avian influenza (AI), commonly known as bird flu, typically causes little or no harm to its wild waterfowl hosts.[1] In 2003-2004, however, nine Asian countries reported unprecedented outbreaks of high-mortality AI in domestic poultry.[2] This viral lineage, subtype H5N1, has spread to over 60 countries, and is considered endemic in at least four.[3]

In India, H5N1 outbreaks were first recorded in 2006, and have continued each year since, reaching a total of 86 by 2012.[4] Millions of India's chickens and ducks have been culled in efforts to contain and eliminate the virus.[5] India has declared itself free of AI a number of times since 2006—but the virus has continued to resurface.

From 2003 to 2011, 576 cases of *human* H5N1 infection were reported, with two-thirds in east and southeast Asia. Of those infected, only 41% survived.[6] Though there have yet been no direct bird-to-human cases reported in India, the greatest concern is that a virus such as H5N1 could mutate to acquire easy human transmissibility (perhaps by combining with swine-origin H1N1). In 2009 H1N1 spread rapidly throughout India in 2-3 months infecting an estimated excess of 10 million people.[7] Imagine if the mortality rate was 60%, like H5N1, instead of 0.02%?

The emergence of such high-pathogenicity avian influenza (HPAI) viruses is likely facilitated by aspects of industrial poultry and egg production. Industry trade journal *World Poultry* listed some factors that make intensive poultry facilities such "ideal"[8] "breeding grounds for disease"[9]: "inadequate ventilation, high stocking density, poor litter conditions, poor hygiene, high ammonia level, concurrent diseases and secondary infections."[10] These conditions not only diminish animal welfare, but may help produce a pathogen with pandemic potential.

Low to High Pathogenicity

In nature, animals are not overcrowded or confined, and a pathogen's virulence tends to be constrained, since its spread depends on the host remaining mobile enough to infect others.[11] Only when "they pass from wild birds to poultry" do AI viruses "heat up."[12] The World Organisation for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO) agree that it has been "prove[n]"[13] that once certain low-pathogenicity viruses gain access to poultry facilities, they can "progressively gain pathogenicity in domestic birds through a series of infection cycles until they become HPAI."[14] Indeed, an avian virology textbook states: "Viral infections can move fastest through groups of birds maintained in closed, crowded, unsanitary conditions."[15] There has never been a recorded transformation of a mild strain to a highly pathogenic flu virus in any backyard or free-ranging chicken flock.[16]

Stocking Density

Industrial practices crowd birds from the start; producers may deposit 20,000 to 30,000 day-old broiler chicks[17] atop litter material in a shed, and as the chicks grow, the crowding intensifies. According to the standard reference manual for intensive production, birds "weighing 4.5 to 6 lbs have little more than a half a square foot of living space per bird in the last two weeks of their 42-47 days of life."[18] Egg-laying hens, too, suffer severe crowding; in battery cages they are stocked at such densities that each hen has less floor space than a standard letter-sized piece of paper.[19] With up to ten hens per cage and thousands of cages stacked vertically in multiple tiers, facilities stocking 10,000 to 50,000 birds are now common in India.[20]

Anthropologist Wendy Orent explains, "H5N1 has evolved great virulence among chickens only because of the conditions under which the animals are kept—crammed together in cages, packed into giant warehouses. H5N1 was originally a mild virus found in migrating ducks; if it killed its host immediately, it too would die. But when its next host's beak is just an inch away, the virus can evolve to kill quickly and still survive." [21] According to microbiologist Dorothy H. Crawford, "overcrowded farms are a hotbed of genetic mixing for flu viruses." [22]

Stressors

The physiological stress created by crowded confinement can have a profound impact on immunity,[23] predisposing animals to infection.[24] Studies exposing birds to stressful housing conditions provide "solid evidence in support of the concept that stress impairs adaptive immunity in chicken." [25] One industry specialist wrote in *World Poultry* that it is "proven that high stress levels, like the ones modern management practices provoke," lead to a reduced immune response.[26]

In addition to overcrowding, other sources of stress for birds raised for meat are the mutilations performed on them without pain relief. In many cases, birds' beaks, spurs, and claws are cut off to limit damage from stress-induced aggression, or for identification purposes.[27] In the egg industry, too, birds may undergo mutilations without pain relief, and caged hens are prevented from most of their natural behaviors.

Unhygienic Conditions

Rearing so many animals in one building produces an extraordinary amount of manure, and a single gram of manure from an infected chicken can contain "enough virus to infect 1 million birds"[28]—virus which may survive in wet manure for weeks.[29] Commercially-raised birds are bred for such size that their legs tend to collapse under their own bodyweight,[30] causing them to spend more than three-quarters of their time lying in their own waste.[31] By the time the birds are slaughtered, all of their carcasses may show evidence of gross fecal contamination.[32]

Contaminated Air and Lack of Sunlight

Feces generate irritating chemicals, including hydrogen sulfide, methane, and ammonia,[33] which "in a poultry house is nauseating to the caretaker, irritates the eyes, and affects the chickens," states one poultry science textbook.[34] High levels of ammonia can damage the respiratory tract, predisposing birds to infection.[35] A large-scale study of millions of birds from nearly 100 commercial farms across multiple countries found that ammonia increased levels of the stress hormone corticosteroid,[36] a potent immune depressant. And although aerosol spread of H5N1 AI virus remains relatively inefficient, even among birds,[37] the ammonia damage associated with intensive poultry production may facilitate the virus' acquisition of pneumotropic, or "lung-seeking," behavior.[38] Exposure to open air and sunlight has been shown effective in eliminated micro-organisms in poultry feces.[39] For flocks raised outdoors, according to the FAO, the ultraviolet rays of the sun may "destroy any residual virus."[40]

Genetic Selection for Production Traits

Breeding for traits such as greater breast muscle or increased rates of egg-laying has contributed to impaired immune function among modern poultry. Given the intensive genetic selection for productivity over immune functionality, almost all modern commercial chickens may be compromised in a way that would facilitate wild waterfowl viruses taking hold. "[D]omestic poultry have been bred to be plump and succulent rather than disease-resistant," virologist Bryan Eaton reportedly points out. "[T]hey're sitting ducks, so to speak, for their wild cousins' viruses."[41]

Lack of Genetic Diversity

As of 2000, more than 95% of birds raised globally were provided by five broiler breeder companies, five egg-laying chicken breeder companies, and four turkey breeder companies.[42] While a significant downside to a diminished breeding pool is the increasing genetic uniformity of poultry, which may increase the susceptibility of the global flock to disease,[43] mass consolidation has some positive potential as well: selection decisions can be propagated across the entire world in a matter of years. So, for example, if the industry elected to prioritize selection for stronger immunity, virtually the entire global flock could be replaced with the improved disease-resistant variety in three or four years.

Conclusion

Genetic selection for productivity combined with the stressful, overcrowded, and unhygienic confinement of intensive poultry and egg production may facilitate immune suppression in birds already bred with weakened immunity, providing a ripe breeding ground for diseases with serious human public health implications. To date, no highly pathogenic avian influenza virus has emerged that is easily transmissible among people. But pandemic threat should not be underestimated, as long as these welfare-depriving production methods provide ample opportunity for the spread, amplification, and mutation of viruses with pandemic potential.

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