

Avian Flu: Impact And Consequences For The Chinese Market

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Avian Flu is not a new phenomenon in southern China. The rice belt of China, as well as Vietnam, Thailand, and Cambodia, have traditionally been the hotbeds of influenza pathogenesis. Due its strategic position in the migratory paths of asymptomatic wild fowl carriers and the large amount of contact between domesticated fowl and swine populations as a result of traditional farming practices, southern China has always been a breeding ground of most of the world's strains of influenza¹. Yet the pathogenic, potentially pandemic strain of avian flu known as H5N1 is a new phenomenon. The factors that contribute to its high lethality and contagiousness come as a result of China's industrialization and urbanization. In particular, it is a combination of increased population density of both humans, swine, and fowl that has enabled influenza to cross-contaminate all three populations.

Southern Chinese farmers in the 17th century perfected a farming technique where they allowed ducks to feed in rice paddies, acting as a method of pest control². The ducks fed on weeds and insect larvae, but did not damage the rice. When the rice bloomed, the ducks were moved to waterways and ponds. Then after harvest, the ducks were allowed to scavenge for grain left over in the dried rice fields and subsequently slaughtered. This method allowed the farmers both a pest free rice paddy and a swarm of fat ducks minus the cost of feed. However, the rice paddies were in the direct migratory path of many wild birds, who served as a reservoir system for influenza. The influenza virus replicates in these wild birds without any symptoms in the bird itself, thus it is a perfectly adapted host/parasite system³. Influenza infects fowl via an oral/fecal route, as opposed to via aerosol in humans and other mammals. The rapid mutation rate of the influenza virus in wild birds ensures that at least some viruses are able to infect domesticated fowl when the wild birds feed and excrete into rice paddies frequented by these domesticated

¹ Kolata, Gina. *Flu: The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus that Caused It*. New York: Farrar, Straus and Giroux, 1999, 224.

² Kolata, 224.

birds. Indeed, the first real outbreak of pathogenic H5N1 in chicken was in farms surround the Mai Po marshes of Hong Kong frequented by wild birds⁴.

As these ducks are kept in the rice fields, they are in constant contact with humans and pigs. It is believed that pigs serve as a mixing ground for human and avian influenzas, and that genetic recombination between the two strains inside a carrier such as a pig produces strains of influenza previously unseen in human populations⁵. When the virions infect human or swine hosts, it faces attacks by the mammalian immune system which is far more advance than that found in fowl. These immune system attacks exert selective pressure to make the virus evolve faster and increase in virulence. This inability on the part of human immune systems to identify the new strain is what leads to the new influenza strain's virulence, as our immune systems are not primed to fight off the infection.

This system of farming has been in place for hundreds of years, and influenza infection has become endemic within avian populations in Southern China. Why is avian influenza suddenly such a large threat, both to China's poultry export business and to world health? Several factors have acted in synergy to exponentially increase the threat posed to China's fowl and human populations. Urbanization and the subsequent increase in population density provides a habitat primed for infestation. The livestock revolution, headed by large companies such as CP, has increased the instances of cross contamination within livestock by housing chickens in increasingly huge groups. The rampant vaccination of chicken stock has upped the ante, so to speak, and selected for more virulent and resistant strains of flu. In addition, live "wet markets" in the cities of Southern China provide a large surface area of cross-species interaction primed for the spread of avian influenza⁶. All of these factors will be explored in detail, as well as their ramifications for China's poultry trade.

The key parameters in influenza emergence are human and animal population density, intense contact between different species to facilitate cross-species transmission, and a prevalence of respiratory diseases⁷. These three factors are all found in Hong Kong. Urbanization

³ Davis, Mike. *Monster at Our Door: The Global Threat of Bird Flu*. New York: The New Press, 2005, 10.

⁴ Davis, 47.

⁵ Davis, 10.

⁶ Davis, 57.

⁷ Davis, 59.

has led to an increase in the rural population of southern as well as northern China. In the Pearl River delta, the epicenter of the world's newest influenza strains, the urban population has increased from 32% to 70% in 2003, so that there is now a record 1273 people per square kilometer⁸. Of these, a large percentage consist of rural immigrants and floaters, people without permanent residency permits who migrate from boom town to boom town looking for factory jobs. These workers live in overcrowded dorms and the city slums, and are unlikely to have access to health care within the city. In addition, healthcare spending has also been cut in Guangdong from 34% in 1978 to 20% in 2003⁹, exacerbating an already dangerous situation. The first parameter is adequately fulfilled by China's urbanization.

Livestock population density also plays a role in increasing the pathogenic strains of influenza. The super-urbanization of human populations is paralleled by their meat supply. The livestock revolution is a revolution in the way of raising livestock. It is a response to the urbanizing third world's increased demand for animal protein. This revolution favors large corporate producers of animals such as Tyson in North America, and CP in Southern Asia versus small family owned farms¹⁰. As a result of the efficiency of these corporate producers, farmers are forced to integrate into a system of chicken processing that reduce them to mere caretakers of CP or Tyson's flocks. In making an industry out of growing chicken, livestock has become dis-integrated from agriculture. This may reduce the contact between different species of farm animal, but it also leads to extraordinarily dense populations of both chickens and pigs.

These vertically integrated corporations have landed in China through political maneuvering. Indeed CP, Thailand's biggest chicken grower, was issued business permit number 001 when Deng XiaoPing opened China up to international investments¹¹. CP has farms in Guangdong, from where many diseased chickens are imported. Five hundred distinctive strains of influenza were found in a survey of Guangdong's farms¹². These chicken factories provide the perfect environment for influenza mutation, firstly because of their huge population density which enables the easy spread of disease, and secondly because of the vaccination practices of

⁸ Davis, 58.

⁹ Davis, 83.

¹⁰ Davis, 59.

¹¹ Davis, 99.

¹² Davis, 62.

these large companies. Application of a vaccine against common strains of influenza has forced the evolution of uncommon and thus more deadly strains of influenza.

Purely an increase in the density of chicken populations or an increase in the density of human populations is not sufficient to ensure the development and spread of influenza. These two factors are brought together in China's wet markets, oftentimes located in central locations such as market places and in the middle of hotels¹³. There, birds are kept stacked in cages, and even sometimes directly above pigs. Bird excrement is allowed to fall into pig feeding troughs, and sanitation consists of a wash in cold water. It is estimated that Hong Kong itself may be home to up to 700 million chickens¹⁴. Garden plots next to the factories and dormitories house some of this chicken population, with a large amount living in the wet markets for up to a week before their purchase and slaughter, providing a perfect disease communication vector to other fowl populations. In addition to its wet markets and gardens, Hong Kong also boasts the Mai Po marshes as well as Deep Bay, both popular stops along the migratory paths of wild birds. Hong Kong is a city of avid bird watchers, further increasing incidences of human exposure to influenza.

The third factor, an increase in the incidences of respiratory diseases, facilitates the spread of influenza between humans. This factor is in existence because of the Pearl River delta's crash course industrialization in recent years. The pollution in this area is twenty-four times that of other areas in China in terms of smog and sulfur dioxide emissions¹⁵, which increases respiratory symptoms in the large urban populations. Thus the industrialization of southern China has changed the balance in a very delicate ecological system by increasing the amount of contact between avian and non-avian influenza, allowing them to mix and produce a virus as deadly as those in poultry populations, but capable of spreading between humans.

The economic price of the avian flu is crippling, especially for small family farms who raise free range poultry. Currently, the flu is contained by culling flocks of diseased birds, from which the small farms cannot recuperate. The larger factories are using avian flu as an excuse to close down smaller farms who do not integrate into their system. They call for the culling of all open range poultry who may have come into contact with migratory flocks, citing this as the

¹³ Kolota, 236.

¹⁴ Davis, 60.

¹⁵ Davis, 59.

primary source of new avian influenza strains. Though this may be the site of primary exposure, the massive factories of chicken certainly play their role in disease spread, and wet markets are still the primary inter-species contamination vector. Due to the political and economic pressure these larger corporations can exert, their infected chicken herds are often left alone while those of smaller growers are culled according to regulation. In response to this, many farms have taken to privately inoculating with vaccines, exacerbating the situation and selecting for deadlier strains of virus. Just during the initial epidemic scare in 1997, when the current strain H5N1 was first identified as pathogenic to humans and chickens, a total of 1.6 million birds were destroyed in Hong Kong and its environs¹⁶. This scare also involved an embargo on Guangdong's chicken imports, seriously distressing Guangdong's ill regulated poultry trade. Another major culling in February of 2004 killed 120 million birds¹⁷, a significant portion of the total avian population in the Pearl River delta, with no compensation for the less wealthy farms. Widespread testing in 2004 indicated that H5N1 avian influenza is now endemic in both wild and domesticated fowl populations^{18,19}, and thus cannot be stopped with culling. Ducks show no symptoms of the flu, and thus are a silent reservoir for the virus. To stop the avian flu now would mean the destruction of all poultry in the area, with a subsequent ban on poultry farming for several years, an economical investment no one is willing to make.

Thus avian flu poses a threat to south China's poultry as well as human populations because it is now hidden in the fowl population. Economically, it is not feasible to attempt to eliminate avian flu, as it involves the culling of all chicken flocks. However, it is also not feasible to allow such a public health hazard to exist unchecked. Selective culling is no longer an appropriate containment option. With the gradual takeover of the chicken market by industrial giants such as CP, conditions for disease spread worsen due to overcrowding. Dense human populations also serve to provide optimal conditions for an influenza epidemic. Combined with fact that the Pearl River delta is the manufacturing capital of China, the amount of human and commercial intercourse the area has with the rest of the world should serve to elicit concern over this eminent pandemic. In conclusion, south China's industrialization has allowed the old,

¹⁶ Davis, 53.

¹⁷ Davis, 113.

¹⁸ Davis, pg. 116.

¹⁹ Davis, 116.

balanced disease system of influenza new ground by providing a larger potential population, allowing increasing interaction between species, and by weakening the immune system of urban inhabitants via industrial pollution.