

Summary HSI report: The connection between animal agriculture, viral zoonoses and global pandemics

The 2020 pandemic outbreak of COVID-19 turned the world's attention to the growing global threat of new viral diseases. The number of newly emerging infectious disease events is rising and the way we interact with both wild and domestic animals has profound implications for emergence and spread of viruses with pandemic potential.

While it is difficult to predict the next zoonotic pandemic, there are many known risk factors including the global trade of live animals, live animal markets, the destruction and fragmentation of natural habitat, and anthropogenic activity aimed at meeting the increasing demand for animal protein, including the growth and intensification of animal production.

Pandemic risks associated with animal agriculture include:

1. **Agricultural expansion:** Food production is a major factor leading to widespread land-use change. As human activity encroaches into natural habitat, wild species are in greater contact with domestic animals and people, increasing the potential for disease transfer or “spillover.”
2. **Viral amplification:** The industrialization of animal agriculture concentrates large numbers of animals indoors, often in barren cages or narrow crates. Larger farms have a greater potential virus load, creating the ideal mixing vessel for viruses to pass serially through many hosts, potentially generating novel viral strains with the ability to infect people. In particular, the transition from low pathogenic avian influenza (LPAI) to highly pathogenic avian influenza (HPAI) is more likely in a site with thousands of confined, susceptible animals.
3. **Farm concentration:** The geographic proximity of neighboring operations in regions of the world where animal production is highly concentrated facilitates disease transmission among farms. A site with just 10,000 broiler chickens uses approximately 42 tons of feed while generating 20 tons of waste. Each input and output is a potential pathway for disease. Pathogens can spread through ventilation systems, insect vectors, disposed animal waste (an infection risk to wildlife) and the trucking of infected poultry on public roadways. To prevent infection from spreading, government interventions involve “stamping out” the disease, a euphemism for the mass killing of many thousands of animals at once, commonly with inhumane methods such as carbon dioxide gassing or smothering with firefighting foam.
4. **Trade in live animals:** The unprecedented global trade in live animals can lead to the rapid transmission of pathogens across long distances, some intercontinental, despite international safeguards. The 2009 outbreak of H1N1 swine influenza that originated in Mexico and the United States spread to 30 countries. Imports of live swine in the 1990s likely introduced new swine flu strains into Mexico from the United States and Europe. During the first year of the pandemic, the Centers for Disease Control and Prevention estimated that deaths worldwide may have ranged from approximately 150,000 to 575,000 people.
5. **Live animal markets and agricultural fairs:** Semi-outdoor live animal markets and fairs are hubs in which animals from different sources are gathered tightly together, under high stress. Comingling can occur for several days, amplifying the viral load. In Asia, multiple human cases of avian influenza have been associated with poultry from live animal markets. In the United States, human cases of influenza A infection have been traced to contact with pigs at agricultural fairs, which likely played a role in the 2009 H1N1 pandemic.

Specific examples of zoonotic viruses with pandemic potential include not only avian and swine influenza, but also Nipah virus, Ebola, Menangle virus, picobirna viruses, coronaviruses and “disease X”, the World Health Organization recognized potential for “a serious international epidemic” that could be caused by a currently unknown pathogen.

Conclusions

The way society interacts with animals has serious implications for global human health. Zoonotic diseases are emerging in situations where the welfare of animals is poor, either through their confinement in intensive production facilities or live animal markets, as they are transported locally or internationally, or where farming encroaches on the habitat of wild animals. The virus that will cause the next global pandemic might already be circulating among farmed animals.

The growing demand for animal-based protein is often asserted without question. However, the emerging disease risks associated with the unprecedented growth of animal agriculture, along with environmental and animal welfare concerns, call into question the wisdom of continuing along the current path. A much more effective and sweeping option is to reduce our reliance on animal-sourced foods altogether. Such a shift would reduce animal population density and the transportation networks that move animals, and diseases, into new regions. It would also reduce the stocking density and number of animals confined in intensive systems, permitting a higher level of welfare and cage- and crate-free alternative housing. A viable alternative to meeting the growing protein demand is to curb expanding meat production with a shift toward more plant-based options.

Industrialized farming is just one of many risk factors for the emergence and spread of disease; however, intensively farmed animals play a critical role as intermediate hosts by bringing animal viruses, which would normally have little contact with alternative hosts, into close contact with people. While COVID-19 emerged from a wildlife market, the next global outbreak could just as easily be associated with intensive farming.

To prevent another global pandemic, Humane Society International recommends:

- A substantial reduction in our global reliance on animal-based protein.
- The enactment of public policies favoring the production of plant-based options in place of expanding animal agriculture.
- A reduction in the number of animals raised for human food, to reduce animal population density both within farms and geographically.
- A phase-out of the use of cages and crates used to overcrowd animals in intensive systems.
- A phase-out of the long-distance transport of live animals.
- Policies to protect natural ecosystems from agricultural expansion and other sources of degradation and fragmentation.
- A ban on the sale of poultry at all live bird markets and restrictions on live animal exhibitions.



Chickens at live animal markets in Vietnam, July 2020



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