

Highly pathogenic avian influenza H5N1 – a global animal health crisis:

Profound challenges to science and society

The H5N1 highly pathogenic avian influenza epizootic is a serious multi-dimensional challenge to agriculture, rural development and public health and requires high multi-sectoral attention for its solution. Many drivers of the crisis are insufficiently known which renders its technically and socially successful containment rather difficult. In this article some of these elements are highlighted as are the main actions undertaken by the UN's Food and Agriculture Organization (FAO) in support of its member countries.

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The first Asian H5N1 highly pathogenic avian influenza (HPAI) strain emerged in 1996 when it was identified in geese in Guangdong Province in southern China. Since then the disease spread widely, initially through East and South East Asia, in 2003/4, and then into Mongolia, southern Russia, the Middle East and to Europe, Africa and South Asia in 2005/6. Migratory birds appear to have played a role in some of these movements.

During this time avian influenza has attracted very considerable public and media attention because the viruses involved produced fatal zoonotic disease in a small number of humans exposed to the viruses and because of the potential to acquire the capacity to be transmitted from humans to humans, a prerequisite for a human pandemic strain. Although the possibility exists that avian influenza caused by H5N1 viruses leads to a global influenza pandemic, H5N1 has not yet been found to be easily transmissible from birds to humans and even less, if at all, among humans.

The impact of the disease and of its control

With the fear of the spread of avian influenza many decision makers are asking how to best prevent the introduction of HPAI to their country or if it is already in their country how to prevent further spread and having it become endemic. Emergency control measures to eliminate new outbreaks of HPAI and to stop the spread of the disease have centred on stamping out which may entail the large scale culling of infected flocks and contact flocks. The high concentration of poultry in certain areas has led to the culling of millions of animals at great expense (Brahmbhatt, *Avian and human pandemic influenza – economic and social impacts*. World Bank, 2005). For low income countries in which poultry is raised primarily by smallholders who can generate important income from raising birds, such measures may seriously threaten smallholder poultry operations.

For those countries with a large number of backyard producers, poultry production is an important contributor to the livelihood of many poor households. Further, poultry meat and eggs are important sources of essential micronutrients for the poor, children and women, and it is known that in general small animal husbandry is positively associated with intake of animal source foods. The economic and nutritional losses faced by poor producers in these countries, depending on the strategy chosen to control HPAI, could be devastating, as would be the accelerated loss of animal genetic diversity.

Though the viruses have had a significant impact on producers, and in particular on backyard producers, the direct cost of the disease has been dwarfed by the devastating impact on poultry producers globally caused by market shocks driven largely by misplaced public fears regarding safety of poultry products. These concerns, fuelled in part by the media, have led to a marked fall in sales and prices for poultry products.

Controversy about origin and spread of the disease

There are a range of unresolved questions regarding the emergence and spread of H5N1 HPAI since 1996. One school of thought suggests that rapidly expanding intensive or industrial farming has played a pivotal role whereas others see this largely as a disease of smallholder poultry, brought about by failure or inability to implement appropriate biosecurity / quality management systems as smallholder flocks expanded. FAO argues that both have played a role and any attempt to blame a particular practice or sector for emergence of this disease fails to recognize the complexity of the poultry industry and the pitfalls and benefits of the various management systems employed from a veterinary, social and economic perspective.

The crucial role of ducks in open farming systems and of live bird markets as reservoirs of infection also needs to be recognized as well as ways by which these risks are managed or have failed to be managed.

A worldwide growing and changing poultry sector

Rearing of poultry has long played and continues to play a crucial role in rural development due to the relatively low entry cost and the potentially high returns for smallholders who expand their flocks. Many smallholders have responded to increased market demands created by large urban centres by rearing additional poultry but are now finding that rapid expansion of their flocks without concurrent investments in measures to prevent disease, such as enhancement of biosecurity, has left them vulnerable to disease. Even smallholders with uninfected flocks have been affected as a result of market shocks when avian influenza occurred, as the public and authorities demanded infection free produce grown under «safe» certifiable conditions.

FAO argues that the very dynamic growth of the poultry industry world-wide, but particularly in regions which are lacking the scale of veterinary infrastructure needed to monitor and protect animal health has created a 'time bomb' that 'exploded' when H5N1 HPAI, a highly transmissible disease of public health significance, emerged. All poultry producers were affected by market crashes but those with sub-standard disease prevention programmes paid a particularly high price for their failure or inability to implement such measures. Some of these producers will never return to poultry production and those that remain may no longer have access to markets they relied upon before the outbreaks occurred.

Insufficient veterinary support systems

FAO has long noted with concern the rapid expansion of the poultry industry without the required veterinary support systems; this concern also relates to the growth of practices such as free grazing duck production in association with paddy rice systems and to the rearing of domestic birds over ponds in fast expanding aquaculture systems. FAO considers that such practices may be ecologically and economically sound but some of these production systems, in particular free grazing ducks, have now proven to be reservoirs of H5N1 virus (Gilbert et al., *Free-grazing ducks and highly pathogenic avian influenza*, Thailand, 2006). Therefore additional measures, such as effective duck vaccines and easy-to-apply vaccination technologies, need to be implemented for these important production systems to be safe and sustainable.



Photo: FAO/G. Bizzarri

Smallholder backyard poultry systems – under long-term pressure by HPAI?

It is perhaps too easy to blame veterinary authorities for failing to impose tighter standards on producers when viewing events in retrospect, as the political will to implement necessary actions usually only materializes after major shocks have occurred that convert potential problems to real ones. Similarly it is rather easy to blame governments and donors for sponsoring programmes in many developing countries to encourage poultry raising as a viable income earning activity for rural populations; it is certain, though, that such programmes with their direct benefits particularly for women and children in terms of livelihoods and access to micro-nutrients (*The World Hunger Project*, 2005) need to be associated with the strengthening of disease prevention capabilities.

Although it is recognized that intensively reared poultry can play a role in the emergence of highly pathogenic avian influenza viruses, these farms can also remain largely uninfected in the face of infection in other production sectors through rigorous implementation of biosecurity and other disease prevention measures. This has been demonstrated in Thailand and Hong Kong SAR where poultry have been reared successfully in intensive farms despite the presence of virus outside these farms.

Live bird markets, existing in most poultry farming communities, have been blamed for maintaining and spreading infection and there is little doubt that they pose major challenges to veterinary authorities, as seen in experiences from the US

and Hong Kong. It has proven difficult to keep avian influenza viruses out of such markets, reason for which their continued operation is questioned by some experts and policy makers.

Strengthening advice on safe and equitable sector development

Achieving an appropriate balance between the benefits of enhanced biosecurity, the risks associated with creating large susceptible populations of poultry in industrial scale farms, providing consumers with affordable food and protecting the livelihood of poor smallholders and villagers and conserving valuable poultry genetic diversity is perhaps the greatest challenge facing authorities when making decisions relating to control of H5N1 HPAI. FAO's animal health programme continues to work in order to better understand the global epidemiology of the disease and to define the best strategies for prevention and control. To ensure that these strategies are socially and economically sound, FAO has set up a dedicated group of professionals to carefully analyse socio-economic impacts of the disease and of disease control measures and to advise countries and donors on the management of the challenges associated with control of this disease vis-à-vis the current and future structure of the poultry industry (McLeod et al., *Economic and social impacts of avian influenza*, FAO, 2005).

The current HPAI H5N1 crisis poses a possibly unprecedented challenge to the scientific community, both biological and social, to work together to bring the understanding of the socio-economic

Photo: FAO/Tarik Tinazay



A worker collects eggs at a well protected chicken farm. How can smallholders keep pace?

impacts of efforts to control HPAI to the forefront of the public and private debate. The question is how best to do this so that the risks and pathways of spread, the socio-economic impacts of control measures, and cost-effective control measures can be identified to minimize the negative impact on the poor while successfully containing the HPAI threat. More research has to be done to explain all the determinants of the epidemiology of the disease and to develop better tools, such as vaccines, and strategies to prevent and control avian influenza. Nevertheless, it needs to be recognized that decision makers will have to cope with making decisions under uncertainty for some time to come in that they will not have all the information they need about the disease when implementing control strategies and may need to modify these as new information becomes available.

FAO's response to avian influenza

FAO is committed to continue supporting such complex decision making; the Organization is, at the request of its member countries, endeavouring to assemble all available and relevant scientific and technical resources so as to contribute to the strengthening of the role of the livestock sector to ensure global food security while enhancing poverty alleviation, public health and the sustainability of the natural resource base, including animal genetic diversity, used in such production. Since early 2004, when several Asian countries almost simultaneously reported outbreaks of highly pathogenic avian influenza H5N1, FAO has worked with affected and at risk countries in Asia, Eastern Europe, Middle East, Caucasus, Africa, Latin America and the Caribbean to facilitate information sharing, networking and

capacity building, using FAO's own funds and increasingly supported by extra-budgetary financial contributions from multi- and bilateral donors. The primary objective of these operations was and continues to be the strengthening of disease intelligence and emergency preparedness, the examination of the role of migratory birds in the disease spread, the support of broad awareness creation and of risk communication, the analysis of and advice on social and economic consequences of both the disease and its control, the strengthening of field surveillance and laboratory capabilities, and of global avian influenza surveillance and early warning capabilities. FAO fielded, often together with OIE (Office International des Epizooties / World Organisation for Animal Health), WHO (World Health Organization), WB (World Bank) and EC (European Commission), more than 200 missions in 2004 and 2005 in support of affected and at-risk countries. In the first six months of 2006, a further 159 missions were carried out to help set up and sustain local, national, regional and global action. By mid 2007, FAO has raised US Dollar 185 million in support of national, regional and global action against this dangerous disease. FAO has so far provided HPAI control and preparedness support in terms of services and/or supplies to 135 countries.

FAO established, in 2004, the Emergency Centre for Transboundary Animal Disease Operations (ECTAD), a corporate platform for the integrated delivery of FAO's livestock programme related to animal health crises such as avian influenza; this mechanism combines the technical animal health programme design responsibilities of FAO's Animal Production and Health Division under the leadership of FAO's Chief Veterinary Officer with the programme delivery capabilities of FAO's Emergency and Rehabilitation Division

with its broad operational experience and expertise (see also box on page 19).

FAO has supported countries in designing and implementing emergency and mid- to long-term national control strategies, reviewing human capacity, infrastructure and policies for avian influenza surveillance, detection and control, assessing the socio-economic consequences of the crises as well as costs and consequences of control measures and various attempts of rehabilitation and long-term restructuring of the poultry sector. FAO also maintains an information service on the evolution of the crisis and of actions undertaken world-wide.

FAO and OIE have prepared jointly a Global Plan for the progressive control of HPAI; they have established the OIE-FAO Avian Influenza network (OFFLU) designed to coordinate research, provide confirmatory diagnosis, support countries through provision of experts and interface with WHO in the analysis of virus strains.

The avian influenza early warning activities at the global level are the joint concern of FAO, OIE and WHO, working together in a Global Early Warning (and Response) System (GLEWS), based at FAO in Rome, for transboundary animal diseases and emerging zoonoses.

FAO has assumed, in the UN-wide Avian and Pandemic Influenza Coordination set up by Secretary-General Kofi Annan in September 2005, the leading role as the specialized UN organization in charge of assisting member states in controlling the disease at source in the animal.

This contribution was prepared using a major review on *The relationship between avian influenza, different mechanisms of viral spread and persistence, and the structure of the poultry industry* by C. Narrod, L. Sims, A. J. Slingenbergh, McLeod (forthcoming).