HPAI RISK, BIO-SECURITY AND SMALLHOLDER ADVERSITY

Highly pathogenic avian influenza (HPAI) was first reported in Southeast Asia in late 2003, although the H5N1 virus is now considered to have emerged as early as 1996 when it was first identified in geese in Guangdong Province in southern China. Since then it has spread rapidly and over large distances, with outbreaks occurring in domesticated poultry and some wild bird populations in Mongolia, southern Russia, the Middle East and, in 2005, in Europe and Africa.

Several epidemic waves have occurred in Indonesia, Thailand, and Vietnam. The widespread practice of smallholder backyard poultry keeping in these countries is frequently cited as one of the primary risk factors for these outbreaks and the persistence of the virus in domestic poultry populations. Based on this assumption, some governments are considering the prohibition of unconfined poultry flocks in order to increase 'bio-security' in smallholder backyard production.

HPAI thus constitutes a serious threat to poor rural smallholder poultry producers, both directly, through mortality, but probably even more so indirectly, through measures applied to control the disease. These measures may be prohibitively expensive for resource-poor smallholder producers and thus could force them to abandon poultry keeping alltogether, depriving them of small but valuable amounts of protein in their diets, much needed petty cash income, and, most importantly, an investment opportunity for escaping poverty.

Given these likely adverse impacts of restrictive policies on smallholder poultry growers, it is important to examine the evidence base for such measures in terms of their effect on risks of HPAI.

• The Risk of HPAI in Backyard Flocks

There is an assumption that because the majority of HPAI outbreaks have been reported in smallholder backyard flocks, these operations are inherently more risky than other types of poultry operations. This assumption was tested using published data from the 2004 HPAI epidemic and concurrent active surveillance programme in Thailand.

The Thai poultry sector is very heterogenous with commercial broiler enterprises, consisting on average of 3,500 birds per 'flock', constituting only two percent of all 'flocks' but accounting for nearly sixty percent of the standing poultry population. On the other hand, backyard flocks, with an average flock size of 30 birds, constitute approximately three quarters of flocks but account for only around one fifth of the standing poultry population.

Estimation of the crude risk of HPAI infection in 2004 by flock type as defined by the Thai animal health authorities, showed that, for example, although layer flocks only constituted one percent of all flocks, they accounted for five percent of all registered infected flocks. Quail flocks showed the highest risk of detected HPAI infection, nearly reaching 1.6 percent. Against widely held expectations, backyard flocks showed the lowest risk of detected HPAI infection, 0.05 percent, only one quarter that of layer and broiler flocks.

These results may reflect differences in ascertainment, HPAI being more readily detectable by in large commercial operations and more likely to be brought to the attention of animal health authorities by these operators. However, since the active surveillance programmes in place in Thailand were focused on backyard operations, this potential ascertainment bias is unlikely to be the main explanation for the higher risk of HPAI detection in commercial layer and broiler flocks than in backyard operations, and it appears warranted to review the 'bio-security' of commercial operations.

• Bio-Security of Commercial Poultry Operations

The confinement of large numbers of birds (as many as 50,000 in modern broiler houses in the US and Thailand), at very high densities, poses significant challenges to ensuring bio-security. (Bio-security being broadly defined as any system that prevents the spread of infectious agents from infected to susceptible animals.)

Birds need to be supplied feed, water and air, and, because confinement of thousands of animals requires controls to reduce heat and regulate humidity, poultry houses require

A Living from Livestock

high volume ventilation. This results in considerable movement of materials from and into the external environment.

Campylobacter spp, for example, similar to HPAI virus, move among avian host species, both domesticated and wild and in both directions. The inability of conventional bio-security measures to prevent the movement of Campylobacter in and out of modern broiler facilities was clearly demonstrated in a recent study of Campylobacter-free broiler flocks in the USA, housed in sanitized facilities, using standard bio-security measures, and fed Campylobacter-free feed and water.

Once a poultry flock is colonized with Campylobacter, the food, water and air within the house quickly become contaminated and the air exiting the house via ventilation systems becomes a source of Campylobacter to the external environment. Campylobacter strains with identical DNA fingerprints to those colonizing broilers have been measured in air up to 30 m downwind of broiler facilities housing colonized flocks.

There are additional mechanisms by which pathogens enter and leave 'bio-secure' poultry houses. For example, insects may carry microbes in and out of facilities through ventilation systems and small openings as demonstrated in a study in Denmark, which found that as many as 30,000 flies may enter a broiler facility during a single flock rotation in the summer months.

Another major challenge to bio-security arises through the need to dispose of large amounts of animal waste from these large poultry populations – each broiler chicken is estimated to produce about 1.7 kg waste over its 6-7 week lifespan, ie a 50,000 broiler unit produces nearly 2 tonnes of waste per day. Land-disposed poultry house wastes are attractive to wild birds due to the presence of spilled feed in these wastes. These wild birds then may become infected and contaminate water supplies of other poultry operations, thereby contributing to large distance transmission.

The above provides ample evidence for the potential of pathogens to move in and out of standard, reputedly bio-secure, commercial poultry facilities, even in developed settings.

• Individual versus Collective HPAI Risk

The risk of HPAI introduction into an individual flock is determined by its 'contact' pattern and the risk mitigation measures in place. Thus, although backyard poultry keepers do not have bio-security measures in place, their 'risky' contacts, at least in Thailand, seem to be rather limited, resulting in the counter-intuitive finding that backyard poultry production is less risky, in terms of HPAI infection, than production in larger and confined commercial poultry operations.

Collectively, however, simply as a result of their large numbers, backyard poultry keepers will account for the majority of infected flocks, thereby jeopardizing the sanitary status of the poultry sector as a whole. Given the much stronger political influence of commercial interests vis-à-vis smallholder producers there is a clear danger that regulators will opt for 'easy' solutions, such as imposing measures to make subsistence poultry production 'safer', eg forced housing or confinement of poultry. This will impose very high costs, particularly upon a marginal group of entrepreneurs and household producers and may lead to an overall reduction of HPAI outbreaks, but more as a result of the loss of household production flocks than as a result of enhanced bio-security.

The imposition of measures which do not significantly reduce the risk of pathogen introduction and spread but place severe economic burdens on society or groups thereof may be politically opportune but is socially unjustifiable. Appropriate social investments to reduce health risk locally and nationally, which draw on the current global momentum for rapid and intensive measures to control HPAI, can have the very significant dividend of improving smallholder commercial viability, a pro-poor benefit that stands in sharp contrast to the displacement effects many of the proposed control strategies threaten to cause.

Policy Brief based on:

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