

Studies on the effectiveness of avian influenza control measures in the Asian partnership countries (control measures project)

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Policy brief on issues related to avian influenza control measures obtained from APEIR studies

- Stronger justifications than those provided in the past for use of wide area culling need to be provided if it is to be used as a control method given the level of disruption and hardship it cause producers and the absence of evidence from studies on application of control measures to suggest it is likely to be more effective than local culling.
- Many areas currently considered free from H5N1 HPAI remain at high risk of widespread disease transmission if the virus returns to these areas because of deficiencies in biosecurity measures, especially in small scale to medium scale farms. Any new disease control measures recommended for application at farm level for smallholders to overcome these deficiencies must be seen by farmers to be feasible and inexpensive, and must recognise the realities of existing production systems.
- Existing health certification systems need to be re-examined to see if there are better ways of identifying and certifying the disease and vaccination status of individual consignments of poultry, perhaps using mobile technology.
- Systems for identifying and controlling movement of fighting cocks in Thailand have not achieved their intended goal and should be re-examined
- Far too much disinfectant is used in a manner that is unlikely to have any effect in controlling disease – and disinfectants are expensive. Improved training on the correct and rational use of disinfectants is required.
- Use of vaccination of chickens against H5N1 influenza virus appears to produce an appropriate immune response. However, vaccinated ducks had poor immune responses based on results of serological tests. Further studies are needed to assess whether vaccinated ducks with low antibody titres are still protected and, if so, to find better tests for assessing immunity in vaccinated duck populations. If not, better vaccines for ducks are required.
- H5N1 HPAI will not be eliminated from the region in the medium term. This means that infected poultry remain a low level threat to public health.
- Behavioural change campaigns must take into account the motivations for existing behaviour. Producers and traders must see a valid reason to change their approach and/or to modify production practices. An Ecohealth approach to the control and prevention of H5N1 HPAI in which all stakeholders are involved is likely to achieve better results in this area than traditional top down approaches

Brief summary of what was known prior to the project about control measures for avian influenza

Highly pathogenic avian influenza caused by viruses of the H5N1 subtype (H5N1 HPAI) was first detected in Asia in 1996 in China but no specific national program was developed to control the disease. Outbreaks in Hong Kong in 1997 causing severe disease in poultry and humans were controlled using mass culling of commercial poultry in local farms and markets followed by a raft of measures to reduce the risk of reinfection, including changes to the way poultry were reared, transported and marketed. The strain of the virus found in Hong Kong was eradicated but other related viruses continued to circulate in China and caused outbreaks of disease in 9 countries in 2003-04 and in subsequent years spread widely to affect over 60 countries. A range of control measures was adopted. In places

with well-developed veterinary services and relatively recent infection the disease was eradicated quickly (Japan, South Korea and Malaysia), on multiple occasions, but for other countries including China, Indonesia and Vietnam virus had been present for some time before formal control programs were implemented and the virus was already well entrenched (FAO 2007) resulting in endemic infection. In Vietnam over 45 million poultry were destroyed or died from the disease in 2003-04 yet the disease remained endemic. Virus also persisted in Thailand for several years although the number of new reports diminished markedly over time.

Each of the measures recommended for use against avian influenza is known to be effective in reducing the risk of infection and can help to eliminate the virus locally if applied properly. In addition, in some places specific measures may not

be required to control an outbreak, especially for farms in areas with very low concentrations of poultry and limited movement of birds or items associated with poultry (in other words some outbreaks will be self-limiting regardless of the measures used) (Sims and Brown 2007). This can complicate assessment of the effectiveness of control measures (were the measures responsible for disease control or would the disease have died out regardless of the measures used).

In all places where H5N1 HPAI occurred a number of control and preventive measures were implemented in line with advice from international agencies (FAO 2004). Stamping out remained the mainstay of the programs but other measures were introduced including changes to the way poultry were sold such as closure of live poultry markets in large urban centres, and vaccination. Not all measures were used in all countries (e.g. no vaccination in Thailand) and it was not always possible to determine the precise effect of individual measures because the interventions were usually applied in parallel, and in most cases an untreated control population was not available. For example vaccination was introduced in Vietnam in 2005 along with a range of other measures and was followed by a reduction in avian and human cases. All that could be concluded was that, at best, vaccination had contributed to this reduction but it was not possible to prove this or to quantify the extent to which vaccination was responsible for the fall in human cases (which was the main objective of the vaccination program). The need to determine the effectiveness of individual control measures was identified in an international technical meeting held in Rome in June 2007, demonstrating the relevance of this APEIR study (FAO 2007).

Some of the measures used (especially vaccination) differed from those used routinely in the past for control of HPAI. Indirect evidence for the effectiveness of vaccination was collected in Hong Kong when the inclusion of universal vaccination for poultry destined for live poultry markets in late 2003 was followed by a cessation of cases (virus detection through intensive active surveillance) in these markets for a number of years whereas the introduction of other measures prior to this had failed to do so (Sims 2007)

Prior to the start of the study it was also already apparent from field observations that any measures badly applied were unlikely to prove effective – be it vaccination, stamping out or changes to the way poultry were reared and sold. Therefore this study focused not only on the measures that were used but also on the manner in which control and preventive measures were applied.

Main findings from APEIR activities

The control measures project involved teams from China, Thailand and Vietnam. A novel approach was adopted to assess the effectiveness of control measures in which the manner in which the measures were implemented was recorded through interviews with farmers, government officials and traders as well as direct observation of existing practices. The project did not rely on case-control studies because most of the areas examined were not experiencing outbreaks of disease at the time the study was performed, in some places insufficient cases had occurred, and some cases would have gone unreported making it difficult to identify true controls. In Vietnam some post-vaccination seromonitoring was also performed on duck and chicken flocks.

A range of measures has been used in efforts to control and prevent H5N1 HPAI in Vietnam, Thailand and China. In conducting this study the goal was not to find fault in implementation but to assess how well the measures were

working and the extent to which they were reducing the risk of infection for poultry in the areas under study.

The study found that there is room for improvement in implementation of all of the measures and they will not prevent virus incursion onto farms if H5N1 HPAI viruses continue to circulate or return to the provinces studied.

The study found that stamping out was performed effectively when cases were reported but disease reporting systems and active surveillance programs in place would not have detected all cases of disease or all infected premises. This was compounded by sub-clinical infection which can occur in infected waterfowl and potentially in vaccinated flocks of birds that are subsequently infected.

For stamping out to be effective it requires early detection of all cases but the project found (as did the backyard poultry project) that disease reporting was far from perfect which means that many cases go unrecognised, reducing the value of stamping out as a control measure.

In all three countries a change occurred between the initial approach of wide area culling to local culling (affected flock only or perhaps including other flocks in contact). This was done in part because of the high cost of the wide area approach and also the adverse effects this method had on producers. There was no evidence to suggest that wide area culling was superior to local culling but the disruption caused by the former was far greater (and compensation in Vietnam and China did not cover the cost of all poultry as discussed in the backyard poultry project).

Disinfectants are used widely by farmers and government during and after outbreaks but are often used inappropriately, often without preliminary cleaning of surfaces and objects, resulting in considerable waste and potential environmental pollution, for limited gain.

Vaccination of poultry in Vietnam in the areas included in the study appeared to be increasing the resistance of the vaccinated chicken population to infection and disease based on antibody levels detected in chickens after vaccination. Questions remain about the overall level of population immunity and protection in the vaccinated duck population with many duck flocks appearing to have little or no immune response to vaccination.

The extent of risk reduction afforded by vaccination depends on many complex factors, among which is the probability of any individual vaccinated flocks being exposed to H5N1 virus. This could not be measured in this study and remains a major limiting step in developing targeted vaccination programs. Unsanctioned use of vaccines was recorded in Thailand despite the ban on importation and use of the product. Over time the number of farms using vaccines illegally fell dramatically.

It was evident from this study that farm biosecurity measures remain weak in most of the farms/households studied in the three countries. This means that they remain vulnerable to virus incursion if virus is circulating in the area, in which case vaccination and/or additional improvements to farm biosecurity both could play a role in protecting poultry. The low incidence of this disease on a household basis provides little incentive for small scale farmers to invest more in biosecurity measures.

The simple scoring system developed by the team was used for assessing biosecurity measures by examining each of the main risk pathways for virus incursion onto farms. Exposure to wild birds was one of the main vulnerabilities detected. Fortunately, it appears that this route of transmission is rare (wild bird

studies in Thailand in another related APEIR project found that when infection is not present in poultry it is not detected in wild birds, suggesting wild birds represent a low level hazard except in areas where the virus is circulating). Controls on visitors and vehicles, the limited quarantine applied to newly introduced poultry, and absence of all in all out management in some places also create vulnerabilities not only to avian influenza but for other diseases as well. Only very large farms in the areas studied in China had formal biosecurity plans. Hygiene has been improved in registered cock fighting rings in Thailand but a significant amount of cock fighting still occurs at unregulated arenas diluting the overall value of the improvements in the well run establishments .

Some movement controls appear to have been relatively effective, especially those applied to grazing ducks in Thailand, but other movement control measures, including fighting cock passports, have had minimal impact because of their limited uptake, the presence of many non-sanctioned cock fighting pits and the difficulty in identifying individual birds without use of some form of permanent identification. Movement controls are not applied to very small consignments of poultry in Vietnam (and elsewhere) and as most backyard farms only rear small numbers of birds a very high proportion of consignments of poultry do not require and do not have certification. The project found that fighting cock owners had moved cocks past road blocks in Thailand without inspection although fighting cock owners also self-regulate movement as they would not knowingly introduce a sick cock to a fighting ring.

The study found that existing health certificates provide limited assurance that poultry are not infected when transported, even in places where testing is conducted, given that the tests are performed a number of days prior to movement (infection can occur after testing) and the number of samples collected would not detect all infected consignments anyway, especially any consignment with a low prevalence of infection. In countries where vaccines are used, certification provides some indication of whether the birds were vaccinated but the absence of systems for individual identification of poultry means that certificates do not guarantee that the poultry being transported are the ones for which certificates have been produced or that the birds are necessarily immune to H5N1 virus as a result of vaccination.

Behavioural change communication programs appear to have raised awareness but did not necessarily change behaviour. Much attention in communication programs was focused on improving biosecurity measures but the evidence collected in this study (and confirmed by the backyard poultry study) suggests that few changes were made, especially at the smallholder level or, if they have been implemented, they have not significantly reduced the risk of viral incursion.

Despite the evidence to suggest that the control and preventive measures were not implemented in a way that would have provided complete protection, H5N1 HPAI virus has not returned to some of the areas under study (one province in both China and Thailand), indicating that the measures implemented locally were not the sole reason for the prolonged freedom from infection in these places. Measures taken in other parts of the country to address potential reservoirs of infection, in particular free ranging ducks, and changes to markets and larger commercial farms may have had some effect in reducing the overall threat of infection to some of the areas studied.

Capacity building

The project provided opportunities for graduate students in each country to undertake additional training, in some cases leading to post graduate qualifications. The project provided exposure of veterinary researchers to social research methods and novel ways to assess effectiveness. It also provided greater awareness of field conditions for veterinarians who were not always familiar with the situation on the ground. It provided teams with access to experts on avian influenza both from within and outside the home countries. It also highlighted differences between the countries that increased understanding of the constraints faced in individual countries.

Policy advocacy

Teams in Thailand and Vietnam included staff from the provinces in which the studies were conducted so the findings were readily transferred to these staff. Staff members from central policy level were also involved in these projects providing a direct link to policymakers.

Many of the issues identified in the study were fed in to international recommendations on control and prevention of avian influenza including the FAO global strategy for avian influenza control (FAO 2008) and a paper on countries with endemic infection (FAO 2011) and, for Vietnam, into the second 5 year plan (the Blue Book) covering the period from 2011 to 2016. Major policy recommendations from this study are provided below.

References

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