Royal Society/ Academy of Medical Sciences study on pandemic influenza: Response by the RSPB

- The events in Europe in February/March 2006 clearly show that wild birds can carry the disease across international boundaries (and probably transmit the disease to other wild birds). However, subsequent events suggest that the disease is self-limiting in wild birds - outbreaks have, by and large, burnt out in Europe. This is what you would expect if the disease remained highly pathogenic to wild birds. The most parsimonious theory for the spread of the disease in Europe remains a cold-weather exodus of prior-infected birds from the Black Sea region (probably Ukraine). Understanding of migratory patterns alone would not have predicted this event.
- Nevertheless, an understanding of the migratory patterns of individual species can help in form risk assessments on a coarse scale of the disease being brought to any country from an affected area, by wild birds. RSPB have, along with the Wildfowl and Wetlands Trust and British Trust for Ornithology, been advising the Government on the risk of introduction to the UK from affected areas as the disease has spread. The BTO are currently undertaking an analysis of ring-recoveries under contract to Defra to better inform such assessments, which hitherto have been conducted on a reactive basis at short notice.
- The understanding of the role of wild birds in disease spread would be markedly improved if there was a multi-disciplinary approach, involving both virologists and ornithologists. Understanding has been further hampered by a lack of standardised data collection from outbreak areas, including identification of the species involved. A virologist stating that H5N1 has been found in a ‘wild duck’ is about as much use in understanding the spread of the disease as an ornithologist stating that a ‘virus’ has been isolated from a male pochard!
- The main threat of the disease in wild birds in its current form is to the poultry industry, and associated human suffering due to loss of livelihoods. The threat to human health from wild birds is very small. In Europe, following the spread by wild birds, there have been three or four instances in domestic poultry - all of which have been contained.
- A huge amount of effort and resource is being expended in sampling programmes of live birds. This is important in terms of understanding the background levels of avian influenza generally and in the search for asymptomatic carriage of H5N1 by wild birds. However, such programmes are frequently labelled 'surveillance' rather than 'R&D'. Live bird sampling is <u>not</u> a good method of detecting the disease in wild bird populations. This is because the virus appears to remain highly pathogenic to most wild bird species; hence there is only a short period between infection and death in which the virus could be detected in wild birds. Even if wild birds were regularly carrying the virus asymptomatically, the sample sizes needed to reliably detect a virus circulating at relatively low rates would be enormous. If you want an 'early warning system' to trigger implementation of control measures, you need to sample dead birds (concentrating on unusual die-offs of target species). BirdLife partners and other NGOs could play a huge role here but are under resourced. Funding in the EU and America appears to be directed towards live bird surveillance. This imbalance should be corrected. (A short paper prepared by RSPB / BirdLife International on this subject for circulation to the Ornis Committee of the European Commission is attached).
- Globally, poultry movements remain the most important route of disease transmission and persistence. Genetic studies have demonstrated that poultry movements were responsible for 'multiple reintroductions' in SE Asia and both the Nigerian and Indian governments are publicly blaming poultry imports for the arrival of the disease in their countries. SE Asia and Africa are the two theatres where the WHO fear evolution of

pandemic influenza. Much less attention has been paid to movements of poultry, whether legal or illegal, than to movements of wild birds. This needs to be addressed.

- Every human case increases the risk of the evolution of the virus to a human - transmissible form. Almost all human cases have been associated with contact with sick or dead poultry - only one possibly associated with a wild bird (a dead swan plucked in Azerbaijan). Therefore, in terms of preventing a pandemic authorities need to concentrate on measures to control movements of poultry, cull infected flocks swiftly and effectively, prevent contact between wild birds and poultry and on improving public education. This last point was graphically illustrated by the deaths of four people in Turkey in Dec 2005 to Jan 2006 - in one case, children were allowed to play with the severed head of a chicken three months after the disease was confirmed in the country. The facts are that it remains difficult for humans to contract the virus – and this risk could be reduced further by following some basic precautions.
- There is little that can be done to prevent wild birds carrying the disease across international boundaries. Culls won't work – it is simply not possible to kill sufficient birds quickly enough to prevent disease spread. Further, attempts at culling could exacerbate the situation by disturbing potentially infected individuals and dispersing them to other sites.
- The risk of the evolution of the virus to a form capable of initiating a pandemic is related to the number of human cases and thus to the disease in poultry. This is where attention needs to be focussed.

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Annex 1. Issues to be considered when designing surveillance programmes for H5N1 avian influenza

H5N1 Avian Influenza in wild birds: surveillance protocols and Issues

Typically, surveillance programmes take one of three approaches:

a) Sampling of carcasses of recently dead or sick birds.
b) Sampling of apparently healthy birds trapped for the purposes of ringing
c) Sampling of apparently healthy birds shot by hunters or wildfowlers

These approaches are likely to yield different results. Given the resources limitations on surveillance, the balance given to each of these approaches should be carefully considered *in relation to the desired objectives of the scheme*. The strengths of each approach are discussed briefly here in relation to potential objectives of surveillance.

a) Sampling of sick or dead birds. Given that H5N1 appears to be generally (but not exclusively) highly pathogenic to wild bird species, you are more likely to detect the virus if you sample sick or dead individuals. H5N1 has been identified in excess of 300 wild birds in the EU since February 2006. All have been from sick or dead individuals. In contrast, in excess of 10,000 apparently healthy wild birds have been tested; all with negative results. If the objective of surveillance is early warning of the arrival of the virus in a Member State in order to trigger contingency plans for control of the disease, sampling sick or dead birds is the obvious approach to use. The weakness of this approach is that by definition, it won't help identify asymptomatic carriage of the disease. Results need to be interpreted with caution as virus isolation does not necessarily equate to cause of death.

b) Sampling of healthy live birds, trapped for ringing. This approach is vital in providing information on background levels of all AI viruses in wild birds, and also in the identification of possible asymptomatic carriage of the virus. It cannot serve as an effective 'early warning system', because of the sample sizes required to be confident of a negative result (i.e. a negative result was due to absence of the virus, rather than inadequate level of sampling leading to non-detection -see discussion below). Results need to be interpreted with caution because trapping methods can be biased towards weak or inexperienced individuals, i.e. should the virus be identified via this approach it does not necessarily follow that the individual was entirely healthy. Trapping methods need to be carefully selected to minimise bias. This approach has a major strength in that as individuals are marked there is a possibility of re-sampling at a later date, whether the bird lives

or dies. Colour-making techniques could allow the health of individuals to be monitored in the field. Some of the problems of sample sizes could be dealt with by concentrating live bird surveillance around known outbreaks, where the background rate of infection is likely to be higher. This would help assess how easily the disease can be transmitted between hosts and also how far (local movements) infected birds may be able to transmit the disease. The benefits of concentrating sampling around known outbreaks need to be offset against the possibility of disturbance and dispersal of potentially infected individuals.

c) Sampling of apparently healthy birds shot by hunters or wildfowlers. This approach is subject to the same restrictions as (b) above. Clearly there is no possibility for following the fate of sampled birds, and disturbance / dispersal is a potential problem. Whilst making wise use of quarry species killed in the course of normal hunting activities is sensible, the conservation lobby would not support an increase in hunting activity as an element of AI surveillance because of the limitations of this approach.

Issues

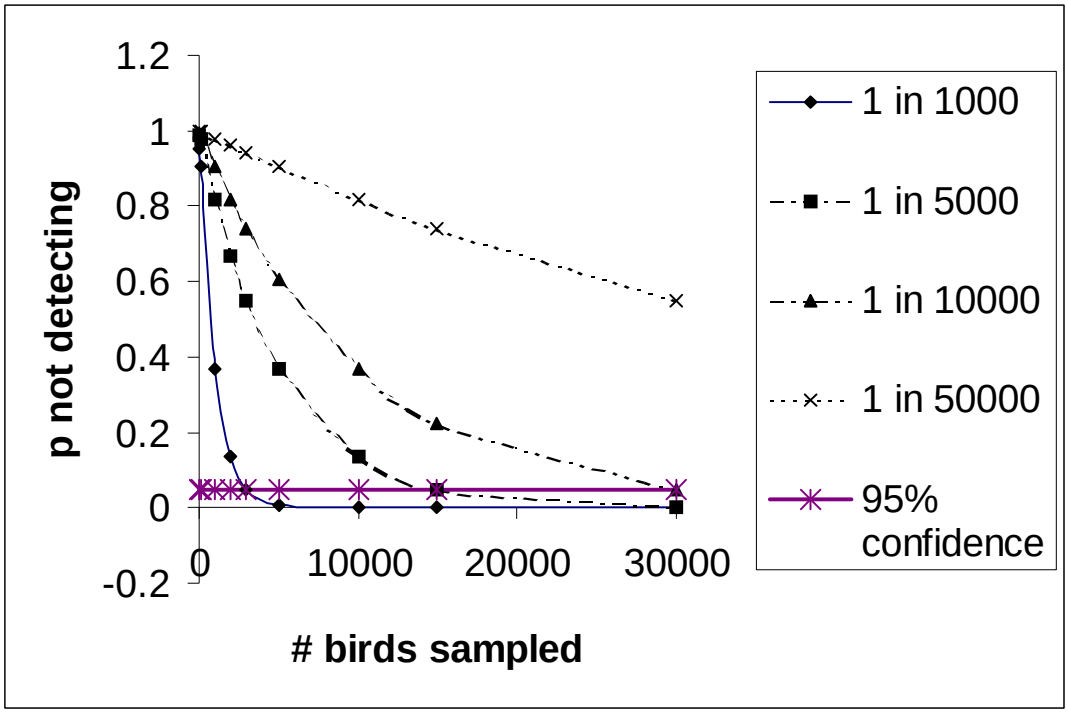
a) EU matched funding is made available for laboratory testing of samples. No funding is available for collection of samples, or for structured surveillance for sick or dead birds. The ornithological NGOs across Europe could help play a vital role here, given adequate resource.
b) Many sampling programmes to date have been hampered by frequent lack of identification to species level. A digital photograph of each individual bird sampled should be included in a standard protocol. BirdLife are prepared to field a panel of named experts to undertake identification from photographs.
c) Supporting data from sampling programmes are very variable. It would be useful to have a standard protocol including a defined list of variables to collect when samples are taken. BirdLife are happy to submit some suggestions.
d) Member States need to consider Health and Safety requirements if the voluntary sector is to be involved in surveillance either of die-offs or live birds.
e) The objectives of any surveillance strategy need to be tightly defined before the methods are decided upon.
f) It is suggested that sampling of sick or dead birds is by far the most cost-effective way of providing an 'early-warning mechanism'
g) If die-off monitoring was properly structured and included counts of live birds, negative data would be more useful
h) Sampling of apparently healthy wild birds is vital in furthering our understanding of the epidemiology of the disease. However, this approach might be better labelled as 'Research and Development' rather than 'Surveillance'
i) Sampling of healthy birds requires several decisions:
    a. Whether to target particular species or whether to extend range of species sampled;

b. Whether to continue with faecal swabs only or whether to extend sampling to take tracheal swabs too.
c. Determination of target sample size (see below).

Figure showing probability of failing to detect a H5N1 infection from live bird surveillance, as a function of sample size. Curves given for different background asymptomatic infection rates.

Based on the function: P of failing to detect = $(1\text{-infection rate})^{\text{sample size}}$

Example: if asymptomatic infection rate in infected areas = 1 in 1000, then you would need to sample 3000 birds to be 95% confident that the virus wasn't present in a given population ($0.999^{3000} = 0.0497$).



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