SUMMARY OF INITIAL EPIDEMIOLOGICAL AND VIROLOGICAL INVESTIGATIONS TO DETERMINE THE SOURCE AND MEANS OF INTRODUCTION OF HIGHLY PATHOGENIC H5N1 AVIAN INFLUENZA VIRUS INTO A TURKEY FINISHING UNIT IN SUFFOLK, AS AT 14 FEBRUARY 2007

1. Highly pathogenic (HP) H5N1 avian influenza (AI) virus was confirmed in a turkey finishing unit in Suffolk on Friday 2 February following a report of disease suspicion and increased mortality. As a result the necessary arrangements were made for a full epidemiological investigation. This started in earnest on 3 February when further virological examinations revealed the virus to be of Asian lineage and molecular genetic studies revealed that the nucleotide sequence of the HA gene, one of eight genes, was identical to that of the isolate of HP H5N1 AI virus from an outbreak in domestic geese in Hungary in January 2007 (see below).

STANDARD EPIDEMIOLOGICAL INVESTIGATION

2. The epidemiological investigation involved information and data collection common to all outbreaks of exotic disease to determine the source and means of introduction of infection during the period 22-25 January and the risk of transmission of infection to other domestic flocks. The specific investigations include the risk of introduction from a domestic poultry flock in Great Britain (GB) by the movement of live birds, personnel movements or vehicles; introduction via personnel who have recently visited countries with outbreaks of H5N1 and introduction via feedstuffs. The details of these investigations are not reported here, but will be included in the final epidemiological report. At the present time, there is no evidence for the introduction of the virus by the above means. Any further evidence on these means of introduction will be investigated. (A further hypothesis, relating to a bioterrorist action, has been considered, but there is no specific evidence for this.)

EPIDEMIOLOGICAL INVESTIGATIONS SPECIFIC TO THE OUTBREAK

3. In addition, on 3 February two risk factors specific to this outbreak were identified. One was a reported gull and rook problem on the premises. The other was the presence of poultry processing plants separated but on the same site as the finishing unit and under the same ownership. This plant was
known to import poultry meat from Hungary for further processing and packing.

4. Details of imports into the processing plant were requested immediately from the company. In addition, to investigate the role of wild birds the Ornithological Expert Panel (OEP) was convened in the afternoon of 3 February. The OEP had been set up as part of the contingency plan for the operation of the National Emergency Epidemiology Group (NEEG) and comprises expert ornithologists to assist in the Group’s investigations.

5. The subsequent investigations have resulted in two possible hypotheses relating to wild birds and the importation of poultry products from Hungary being examined in more detail. A summary and discussion of the findings to date for these is provided in the following paragraphs.

**INTRODUCTION FROM A WILD BIRD SOURCE**

6. Since late October 2006 there has been a targeted surveillance programme for the detection of H5N1 in wild birds in GB. This has a number of components and is targeted to those species of birds considered to be at most risk of harbouring the H5N1 strain of the virus as determined by the European Food Safety Authority (EFSA):

   (i) Requesting the public to notify Defra of dead birds belonging to the species of interest in the areas of GB which have been identified as most at risk in terms of the abundance of species of interest and the density of outdoor reared domestic poultry.

   (ii) Identifying bird reserves which support the greatest populations of the species of interest and requesting the wardens at these sites to conduct weekly patrols to identify dead birds for laboratory examination.

   (iii) The sampling of live birds at wetland sites with the necessary facilities.

   (iv) The submission of samples from birds shot in the normal course of wildfowl shooting.

7. H5N1 has not been isolated during the course of this surveillance programme to date. Similarly the surveillance programmes within EU Member States (MS) have not identified H5N1 infection in wild birds as result of the surveillance in the 2006/2007 migratory and subsequent residency period.

8. The results of virological and molecular genetic studies, available on 3 February 2007, on the virus isolated from the Suffolk farm had revealed it to be of the Asian lineage. The molecular genetic studies revealed that the nucleotide sequence of the HA gene, one of eight genes, was identical to that of the isolate of HP Al virus isolated from affected domestic geese in two outbreaks in Hungary. The first of these commenced on 19 January 2007 in
the county of Csongrád. A second outbreak in domestic geese in Hungary the same county 9km from the first outbreak in 2007 was detected on 25 January 2007. The Suffolk isolate was clearly different, at this time, to isolates from wild birds and domestic poultry in EU MS in 2006. These results suggested a common source for the outbreaks in Hungary and Suffolk or a direct link between these Hungarian incidents in 2007 and the Suffolk incident. By the 8th February the sequences of 6 of the 8 genes were available indicating that the Suffolk and one Hungary isolate were virtually identical. The definitive results from sequencing the eight genes, which became available on 13 February 2007, confirmed this initial finding. Comparison of the sequencing results from the Suffolk isolate and the two Hungarian isolates from the two Hungarian outbreaks revealed a 99.96% and 99.97% (homology) identity.

9. Discussions with expert ornithologists, the first of which was on the morning of 3 February, have centred on the possibility of a wild bird common source. In summary this seems to be highly unlikely. As indicated above there have been no isolations from wild birds in Europe during the 2006/7 wild bird migration period and subsequent residency. There have been no weather induced movements of wild birds from mainland Europe as occurred in the early part of 2006 which could provide a link between Hungary and Great Britain and no common source of migratory birds is evident.

10. At present therefore there is little evidence to support the hypothesis that wild birds are the source of this outbreak.

11. Wild bird surveillance in the locality of the affected farm in Suffolk continues and has been enhanced by the recruitment of additional reserves to conduct active patrolling, increasing the rate of patrolling to at least twice per week and identifying gull roosts to obtain carcases for laboratory examination.

INTRODUCTION OF INFECTION VIA OR FROM HUNGARY ASSOCIATED WITH THE IMPORTATION OF POULTRY PRODUCTS

12. The premises in Suffolk comprises a turkey finishing unit, a slaughterhouse and two processing plants. It occupies an area of approximately 0.9 square kilometres. The slaughterhouse and processing plants are physically separated from the finishing units by a fence and has a separate entrance. There is no interchange of staff between the factory units and the turkey finishing component.

13. The processing plant receives regular consignments of turkey products, predominantly breast meat, imported from Hungary. The details of these consignments, imported in the six weeks before the identification of clinical signs to the present time, are currently being analysed.

14. Pest control reports for the whole premises on 10 and 24 January 2007 specifically comment that there had been an ongoing problem of gulls on uncovered waste bins and of them roosting on the finishing units. Similar
comments had been made following previous visits of the pest control company employed by the company in 2006.

15. A specific epidemiological investigation, involving expert ornithologists, of the whole premises, including the processing plant, was conducted on 6 February 2007. This revealed relatively large numbers of gulls, mostly Black-headed Gulls (70%), Herring Gulls (25%) and Lesser Black-backed Gulls with single figures of Common Gull. These were clearly attracted to the site by the presence of the processing plant and more particularly the access to waste trimmings held in bins outside the plant. Gulls were observed feeding on these trimmings and carrying trimmings away from the processing plant and into the area containing the finishing units. Gulls were observed roosting on the roofs of the finishing unit sheds more than 0.5 km from the processing plant.

16. Polythene bags which had apparently contained meat products and contained residual liquid were also seen in the uncovered bins and have the potential to be blown across the site.

17. An inspection of the shed, in which clinically affected birds were detected, at the visit on 6 February revealed that there were several points of entry for small birds and rodents (rats and mice). This is consistent with previous pest control reports for this shed. There was no evidence of wild birds having entered the house except for some old droppings, which were likely to have been deposited before the start of the infection window. There was extensive water leakage from the roof surface that could allow physical transfer of infection. In addition, the plastic covered bales of wood shavings used for topping up the bedding were stored outside the sheds. The bedding in the affected shed had been topped up 2-3 times per week in the period before the first signs of clinical disease occurred. There was no evidence of contamination of the plastic coverings observed but these bales represent a potential means of introduction of infection.

18. The biosecurity regimen included a change of rubber boots on entry to each house. However, the possibility of infection being introduced into the shed by contaminated footwear and clothing could not be ruled out.

19. In summary, there are a number of ways that infection could have entered the shed with the clinically affected birds.

20. Samples were taken for virological and laboratory examination from the turkeys in the other 21 sheds when they were culled. Results indicate the presence of HP H5N1 AI infection, of the Asian lineage, in three other sheds only. The birds were sampled from two of these sheds two days after culling of the clinically affected shed and from one shed three days after the confirmation of infection in the clinically affected shed (see below). The level of sampling indicates that the prevalence of infection might have been 15%. No clinical signs were reported in these birds during the period of culling.
21. On-site epidemiological investigations indicate that these sheds might have become infected as a result of a reduction of biosecurity measures following the initial laboratory results from the clinically affected birds. Staff previously assigned to groups of other sheds were used for the depopulation of the affected house. Personnel movements between the sheds is therefore a possible means of dissemination.

22. The virological findings in the clinically unaffected birds suggests that turkeys might be slaughtered in the initial stages of infection when clinical signs have not become apparent.

23. These findings are potentially important. Unpublished results of research conducted by the research group within the Community Reference Laboratory, VLA, Weybridge indicate that the results are consistent with true infection of the birds in these sheds. Detectable excretion of the virus following exposure occurs one to two days after exposure, dependent on the virus dose.

**CONTINUING INVESTIGATIONS**

24. The ongoing epidemiological investigations will continue to be all embracing with respect to possible sources of infection and means of introduction of the virus into the premises. Further reports will be made when significant findings are revealed by our investigations.

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