SAC subgroup on Exotic Diseases

Key points from meeting on 26th November to consider HPAI H5N8

1. Summary of meeting

Ian Boyd (CSA) and Nigel Gibbens (CVO) thanked the SAC-ED members and co-optees for attending the meeting; and summarised the areas that SAC-ED should focus on in this meeting:

- the evidence in relation to the outbreak H5N8; and
- advice on further evidence needs in addressing the outbreak.

SAC-ED was provided with a range of evidence from varying Defra and APHA[1] officials covering the policy context; the current understanding of the epidemiology of the outbreak; the risk from contact with wild birds; economic trade analysis; and possible social research.

A list of attendees is given in **Annex 1**; and the register of interests in **Annex 2**.

SAC-ED members confirmed that they were content to continue to be engaged, either individually or as a group, as issues arose, if required. SAC-ED were advised, however, that the information provided at the meeting should be regarded as confidential.

This report of the meeting was prepared by Defra and Mark Woolhouse (SAC-ED).

2. General feedback to Defra

Overall, the SAC-ED was impressed by the inputs from Defra staff and the quantity and quality of work that has been undertaken in response to this outbreak.

The SAC-ED was entirely satisfied that Defra was actively seeking scientific input and was managing this outbreak according to the available scientific evidence.

[1] Animal and Plant Health Agency

Inevitably, an event of this kind highlights any gaps in scientific knowledge and tests Defra's response capability and this, in turn, provides an opportunity to learn lessons.

3. Immediate actions to take

Epidemiological scenarios

SAC-ED accepts the point made by the CVO that the uncertainties around the route of introduction of H5N8 into Europe and the mode of transmission within Europe mean that there is a wide range of possible future scenarios to be considered, and this makes prioritising actions particularly challenging.

Information obtained from epidemiological tracing studies, risk assessments and virus genetics can all contribute to resolving these uncertainties and thereby guide outbreak management. SAC-ED endorses Defra's continuing efforts to obtain such information in a timely manner.

A major source of uncertainty is the role of wild birds in the epidemiology of H5N8 in Europe. SAC-ED notes that Defra has assessed the level of risk of the introduction of AI into commercial flocks from wild birds as "low" and advises the industry accordingly. SAC-ED considers that the occurrence of a single outbreak in the UK – whether or not this turns out to be linked to wild birds – should not alter that assessment.

Wild bird surveillance

SAC-ED agrees that the current level of wild bird sampling (in the UK and elsewhere in Europe) is of limited value from an epidemiological perspective. Neither the absence of positive cases nor occasional positives from a small sample size would change the assessment of risk or policy recommendations.

However, the isolation of virus from wild birds would inform phylogenetic analysis (see below) and consequently help to refine the set of likely epidemiological scenarios and reduce the level of uncertainty.

SAC-ED therefore recommends that sampling of wild birds should continue and should include active sampling of healthy birds (especially anseriforms) in addition to passive sampling of dead birds. However, we would not prioritise a major increase in sampling effort at this time.

Genetic analysis

The phylogenetic analysis report from APHA was helpful in many respects but SAC-ED considered that more analyses could shed greater light on the origins and transmission of H5N8 in Europe.

To be useful for informing outbreak management such analyses require timely sharing of all available sequences, from throughout Europe and elsewhere. SAC-ED considers that it is important that the UK continues to set a good example in this regard and to encourage EU partners to do the same, to our mutual benefit.

SAC-ED recommends that Defra ensure that state-of-the-art phylogenetic analyses are conducted promptly as new sequences become available.

Diagnostics

Overall, SAC-ED was impressed by the virology work undertaken during the outbreak. At the close of the meeting SAC-ED raised a number of specific points which it was agreed would be dealt with bilaterally after the meeting. A short note of these discussions is covered in an **Annex 3**.

SAC-ED noted that the standard algorithm could, in some circumstances, result in a delay in detecting / qualifying serological responses, during the interval between testing with the generic antigen and developing and applying the specific antigen test. In responding to avian influenza outbreaks, speed is important; and therefore, in the longer term, better test (i.e. still generic but more sensitive) and testing protocols would be desirable (see **Annex 3**).

Risk assessment

SAC-ED noted the issue of identifying and understanding the differing epidemiological units, including backyard chickens. The point was made that not all holdings with birds will be epidemiologically significant in relation to disease spread, and management of different epidemiological units (from back yard units to large scale industry unit) is not the same.

The lack of standing information on the structure of the poultry industry was also noted and in this instance the complexity of the breeding/ multiplier pyramid and its network connections took time to assemble for epidemiological purposes. SAC-ED therefore noted that it would be useful to have information on an infected premise's position within an integrated sector as quickly as possible and as a matter of course (and possibly as a requirement for such integrated flocks). This is both in terms of tracing pathways but might also provide important information regarding the relative security of for example elite and other stock.

SAC-ED accepted that these uncertainties make it difficult to deliver reliable model-based, quantitative risk assessments in real time (noting the contrast between what can realistically be expected for AI compared to other exotic diseases, e.g. FMD).

Wider engagement and exchange of information

Given the many uncertainties with regard to H5N8, it would be valuable to obtain information on epidemiology and management of outbreaks in Asia. SAC-ED encourages Defra to ensure that they have access to all available information and lessons learned by countries with greater experience of this virus, particularly China and Korea.

SAC-ED notes that pooling information from all affected countries in Europe is extremely helpful in this case. Defra is encouraged to ensure that there are good links, both formal and informal; with EU partners and that there is timely exchange of information in both directions.

Resources

SAC-ED recognised that APHA resources were stretched in responding to this outbreak and was impressed by volume of work undertaken since disease was first reported. APHA's experience with AI had enabled appropriate prioritisation of tasks, but it had still not been possible to complete all tracings from the index case more than 10 days after disease was reported.

SAC-ED were concerned that if this was the effect of an outbreak on a single "typical" farm then there are clearly likely to be significant challenges should multiple outbreaks occur in the immediate future.

Defra pointed out the logistic implications of the 72 hour stand-down period imposed on officials working on different farms. SAC-ED agreed that this was a significant issue but felt that more information would be needed before revising this and were doubtful that could be obtained in time to help with the current situation. If a reduction in hours were supported by evidence, there would need to be clear messages to the industry about the changes to demonstrate that standards are being maintained.

Economics

SAC-ED welcomed the overview of the economic analysis undertaken by Defra. The committee noted the challenges in producing reliable models of the economic impact of the outbreak and suggested that Defra consider the use of rapid appraisal techniques. Rob Fraser is willing to engage with Defra on this issue.

The point was made that the economic consequences of relatively minor changes in purchasing behaviour by consumers of poultry products could easily outweigh all other costs incurred. The timely reassurances that this virus poses no threat to public health had therefore been very important and attention should continue to be paid to public perceptions in this regard.

4. Longer term actions to take

Economic research

An improved understanding of the market response, particularly in light of the various scenarios that are being developed by Defra, would be valuable. Consideration of the situation in other countries should contribute to this work; given the close temporal outbreak in Europe, the response in the EU markets in terms of supply chain and prices may be significant.

Industry structure and governance

Due to the complexity of the breeding / multiplier pyramid and it network connections; it would be valuable to have information on a farms position within the section. This would enable pathways to be traced and also provide important information regarding the relative security of, for example, elite and other stock.

As there is little research on biosecurity in the poultry industry compared to other animal sectors; a review of the level of compliance of the industry with biosecurity measures; how the industry behaves; and governs itself is suggested. An assessment of co-operation received from small and large-scale farms would also be valuable in the longer term.

An evaluation of the effect of incentives and dis-incentives for timely reporting of outbreaks is specifically suggested, not least because poultry flocks in particular may act as sentinels for the presence of H5N8.

Contingency planning

Exploring scenarios of different strategies for dealing with outbreaks was suggested; in particular the issue of how Defra focusses its resources in an outbreak incident where disease occurs on multiple premises. Within the contingency planning exercise, a risk assessment of likelihood of multiple exotic diseases occurring in quick succession would be valuable to inform the appropriate staff compliment.

Annex 1: Attendees

In person:
Mark Woolhouse (Chair) – Professor of Infectious Disease Epidemiology, University of Edinburgh
Ian Boyd – Defra, Chief Scientific Adviser
Ann Bruce – SAC-ED, Research Fellow at School of Social and Political Science, University of Edinburgh
Morwenna Carrington – Deputy Director Animal Health & Welfare
Nigel Clark – British Trust for Ornithology, Head of Projects
Dagmar Droogsma – Defra, Deputy Director, Animal Health Policy and Implementation
Neil Ferguson – SAC-ED, Professor of Mathematical Biology, Imperial College London
Rob Fraser – Professor of Agricultural Economics, University of Kent
Nigel Gibbens – Defra, Chief Veterinary Officer
Gemma Harper – Defra, Chief Social Scientist and Evidence and Analysis Deputy Director
Steven Hinchcliffe – Professor of Human Geography, University of Exeter
Ulrike Hotopp – Defra, Director Analysis and Chief Economist
Nicholas Moiseiwitsch – GO-Science, Part of the Resilience team in BIS[2]
Helen Roberts (APHA) - Exotic and Risk Team
Stuart Wainwright – Defra, Deputy Chief Scientific Adviser, Deputy Director Strategic Evidence and Analysis
Defra, SAC Secretary

By teleconference:
Nia Ball – SAC-ED Scottish Representative
Jonathan Cave – SAC-ED, Doctor of economics, Warwick University
Les Eckford – SAC-ED Wales
Jane Gibbens - Head of Epidemiology & Risk Team, APHA
Michael Hatch – SAC-ED Northern Ireland
Quintin McKellar – SAC-ED, Professor of Veterinary Science (2.30 – 3.30pm only)
Peter Nettleton – SAC-ED, Doctor of Veterinary Virology
Defra, Team Leader: Evidence Policy & CSA's Support Team

Defra officials for parts of meeting:
Ian Brown (APHA) - Head of Virology
Simon Hall (APHA) - Veterinary Director
Ian Mitchell - Deputy Director for International and Strategy Analysis, Deputy Chief Economist
Social Research lead on Animal Health
Economic Adviser

Apologies
Dirk Pfeiffer – SAC-ED, Professor of Veterinary Epidemiology, Royal Veterinary College, University of London

[2] Department for Business, Innovation & Skills

Annex 2: Register of Interests

SAC-ED members and co-opted attendees	Declaration of interest
Ann Bruce	- 3 month placement at Defra, funded by Defra and ESRC - worked for the Pig Improvement Company, now owned by Genus. A major multinational pig breeding company - worked for Roslin Institute and know the people developing Genetically Modified chickens resistant to Avian Influenza - worked with Unilever, but not concerning poultry - Had indirect contact with Costco in the USA on their attempts to reduce the carbon footprint of their free range eggs.
Jonathan Cave	None
Nigel Clark	Defra has funded a considerable number of BTO projects over many years. Some of these projects I have negotiated on behalf of the BTO but I have not been the lead scientist. Since the first occurrence of H5N1 the BTO has been actively involved in Defra's Ornithological Experts Panel and I have been one of the BTO Staff involved. When H5N1 first emerged in Europe the BTO was commissioned by Defra to undertake various analyses and to produce the bird Migration Mapping Tool to assist Defra in quickly identifying the potential for wild birds to come to the UK from any point outside the UK where AI might be found. While I actively advised on this work I did not lead. As part of Defra's investigations into outbreaks the BTO has been funded to investigate the likelihood of wild birds being vectors for the spread of AI during each outbreak. I have been the senior BTO staff member undertaking this work which has included visits to infected premises and assessment of bird populations in the area. Each of these studies has required a few days of staff time. I believe that the nature of this involvement gives me considerable insights of value to the SAC-ED and does not put me in a position of a conflict of interest.
Neil Ferguson	None
Rob Fraser	None
Steven Hinchcliffe	1. Financial: Co- on Defra funded SE3045- an exploration of factors that influence the expansion of the area affected by endemic btb. 2. Non-financial - Member of the Social Science Research Committee, Food Standards Agency

SAC-ED members and co-opted attendees	Declaration of interest
Quintin McKellar	• Vice-Chancellor, University of Hertfordshire • BBSRC Animal Health Club (Chairman) • UK India Research Initiative (Chairman) • Pirbright Institute Trustee • Animal and Plant Health Agency (APHA)(non-executive director) • Hertfordshire Local Enterprise Partnership (LEP) • Consultancy, Norbrook Ltd • REF advisor for Lincoln University, and Glasgow University
Peter Nettleton	None
Mark Woolhouse	Remuneration: My salary is paid by the University of Edinburgh. In addition, from time to time I receive allowances or honoraria from the following sources: - UK research councils for attending funding committee meetings - UK government agencies for reviewing grant applications - Wellcome Trust and other charities for assistance with funding decisions - Academic publishers for reviews of books and book proposals - Other UK university external examination fees - Non-UK universities for advice on academic promotions My current research income comes from: UK research councils; Scottish Government; Wellcome Trust; EU. I do not currently receive research funding from DEFRA nor do I have current or currently planned applications for funding from DEFRA. However, I have done so in the past and may do so in the future. I have no conflicts of interest relating to business interests or family connections. I note that I am one of the principal investigators of EPIC, the Scottish Government-funded Centre of Expertise in Animal Disease Outbreaks. EPIC is currently advising SG with regard to the H5N8 outbreak and its implications.

Annex 3: Diagnostics

A bilateral teleconference between Peter Nettleton and Ian Brown (APHA) addressed SAC-ED's comments on this area as detailed below.

N-typing

SAC-ED were interested to explore whether N-typing could be done more quickly with molecular and sequencing techniques.

APHA confirmed that the protocols followed are as prescribed in EU legislation and that a variety of tools beyond standard, including molecular, were used.

Serology

SAC-ED noted that this outbreak seemed to present, clinically, in the Driffield ducks, as a result of an intercurrent infection; and questioned whether the updated serology panels and poultry survey can pick up any H5N8 in non-galliform sub-clinical domestic stock in the future.

APHA acknowledged that this is a valid point and that this was urgently addressed by EURL at Weybridge to define EU need and therein UK. Reassurance to SAC-ED is that this antigen is now included in duck/geese serology investigations in the UK and work through APHAs EU role has been urgently progressed to ensure a consistency of approach across Europe, better protecting the UK.

SAC-ED noted that there was a potentially significant delay in obtaining accurate serological data from the affected flocks, though refined assays were quickly developed as is normal practice given current testing protocols.

APHA explained the need for this approach. The maximum serology sensitivity is always to use the exact virus causing the outbreak. Therefore, at the time of the report of the outbreak and in the absence of H5N8 in the UK, APHA used standard prescribed strains. Within two days, i.e. once the virus culture was available, initial results were repeated and then this virus used as standard thereafter.

It was agreed that the unavoidable delay in data availability did not impact any control decisions at the time.

The antigenic variation and drift in the virus over time continues to be closely monitored and the utility of new technologies for faster more robust serology are investigated. SAC-ED identified peptide microarrays as an example of new serological testing technology that might be considered.

Additional points covered at the meeting

The meeting also noted the chronology of the test results:

- Friday 14 November: Suspected outbreak
- Sat 15 November: Samples received at Weybridge
- Sunday 16 November: H5 Highly pathogenic avian influenza virus confirmed by sequencing
- Monday 17 November: Report to OIE by CVO
- Tuesday 18 November: Isolate serotyped as H5N8
- Friday 21 November: Pathogenicity confirmed following chicken intravenous inoculation

Two other points of interest that arose in the meeting were:

1) Ian Brown was in Korea two months ago and was able to discuss the virology and epidemiology of their H5N8 outbreaks.

2) APHA have Next Generation Sequencing capability at Weybridge.