Impact from applying innovation and optimising global funding in support of research and innovation.

Prof Nigel Gibbens CBE, UK CVO
Overview

1. Harnessing modelling in support of FMD control

2. Applying new approaches to knowledge transfer

3. Maintaining and making best use of global funding in support of research and innovation
UK experience of modelling in support of FMD control
FMD modelling in 2001
2001: Models

• Three models were used to predict the spread and control of the 2001 FMD epidemic

• Developed prior to outbreak
  
  • InterSpread model (Morris et al. 2001)

• Developed during outbreak
  
  • Cambridge-Edinburgh model (Keeling et al. 2001)
  
  • Imperial model (Ferguson et al. 2001)
2001: What worked well

• **Model ready for use** – InterSpread model developed in peacetime and available for use by MAFF

• **Good collaboration** – MAFF & NZ InterSpread modelling group

• **Run-time and delivery of outputs** – delivered to MAFF by following morning

• **Modelling led to targeted control** – identification of the unusual and unexpected helped to better target controls
2001: What didn’t work well

- **Internal capability** – no internal modelling capability existed within MAFF

- **Engagement** – limited engagement between MAFF and external modellers in peacetime

- **Data** – access to demographic data and understanding of case and clinical data

- **Costs** – costs associated with control options were not fully explored by modelling

- **Challenge function** – limited challenge function to external modelling by internal government officials involved in outbreak control
FMD UK 2001: the epidemic curve

Estimated Infected Premises
Confirmed Infected Premises

Contiguous cull

Week commencing

Number of premises
0 10 20 30 40 50 60

UK experience of modelling in support of FMD control

FMD modelling in 2016
2016: Lessons learnt from 2001

• **Capability** – in-house epi & economic models; QM standing capacity framework; meteorological model (NAME)

• **Engagement** – annual modelling symposium; QUADS studies

• **Data** – access to demographic data and outbreak reporting systems

• **Costs** – integrated approach to epi and economic modelling

• **Commissioning and Challenge** – ICF group, SAC-ED

• **QA** – government guidelines for producing quality analysis for government
2016: Integrated epi & economic outputs

Day 8 - Vaccination starts on day 14

- 3-6 km ring, cattle
- 2-5 km ring, cattle only
- 2-5 km ring, all species
- 1-3 km ring, cattle only
- 1-3 km ring, all species
- Stamping out

Graph shows distribution of:
- Number of IPs (No. of IPs)
- First to last IP in days (First to last IP [days])
- Total Cost (£m)
2016: Economic breakdown

Day 8 - Average cost by category

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<tr>
<th>Category</th>
<th>Stamping out</th>
<th>1-3 km ring, all species</th>
<th>1-3 km ring, cattle only</th>
<th>2.5 km ring, all species</th>
<th>2.5 km ring, cattle only</th>
<th>3.6 km ring, cattle</th>
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<td>Disease control costs</td>
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<td>Compensation</td>
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<td>Wider economic costs</td>
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Modelling for decision-makers
Modelling for decision-makers

Value

• **Peacetime** – developing strategies in preparation for an outbreak.

• **Outbreaks** – predicting and evaluating the effectiveness of control policies during an outbreak.

• **Integrated modelling** – Epidemiology, Economics, Resource.

• **Communicating impact** – visual communication of an outbreak and the impact of control measures.
Modelling for decision-makers

Limitations

• **Early in an outbreak** – high uncertainty, expert judgement may be more appropriate.

• **Not reality** – they are an approximation of possible outcomes.

• **Limited certainty** – communication of limitations.

• **Interpretation of outputs** – beware the central estimate being received and then presented as fact, without caveat.

• **One part of the decision-making process** – many other considerations for policy…
Modelling for decision-makers

Challenges

• **Communicating uncertainty** – especially important in the early stages of an outbreak.

• **Data** – access to real outbreak data.

• **Engagement with policy** – trust in validity of models.

• **Engagement with external modellers** – maintaining ongoing communication and collaboration.

• **Conflicting advice/outcomes from models** – what is right? consensus may not be the correct approach.
Applying new approaches to knowledge transfer
Overview

- EuFMD online training platform
- APHA training initiatives
- National and regional disease exercises
- Forward Look
EuFMD online training platform
FMD Emergency Preparation Course (FEPC)

• Flexible online interactive training delivery

• Course runs over four weeks (approx. 12 hrs study in total)

• Participants undertake training at their own speed and around business as usual work

• Experienced course tutors drawn from EuFMD, The Pirbright Institute and APHA

• Opening & closing webinars

• Pre-course quiz

Applying new approaches to knowledge transfer
FEPC: content

- Aetiology & Pathogenesis of FMD
- Clinical & Laboratory Diagnosis
- Epidemiological Investigation
- Biosecurity
- Scenario exercise
- Interactive discussion forum for each module for tutors to pose (e.g. differential diagnosis) and answer questions from participants
- End of course assessment
- CPD certificate (12 hours) awarded to participants who complete the course and pass the assessment
FEPC: post course

- Participants retain access to course content and a wide range of other EuFMD resources after the course closes.

- Successful participants can also register to join EuFMD networks on:
  - FMD Modelling
  - FMD Contingency Planning
  - FMD Vaccination

- Participation in other EuFMD webinars

- Access to EuFMD monthly Global Reports
FEPC: Feedback

• 100% of participants would recommend the course to other UK veterinary colleagues

• Feedback at conclusion of both courses run so far demonstrated an increase in confidence to be able to:
  
  o Recognise clinical FMD in pigs and ruminants
  
  o Collect the correct diagnostic samples
  
  o Undertake a detailed veterinary inquiry and collect essential epidemiological information
National and regional disease exercises
Disease Exercises

- National Exercises:
  - FMD (2010)
  - CSF (2013)
  - FMD desktop (2015) to explore issues around decision to vaccinate
  - FMD desktop (2016) to explore resourcing for a large scale FMD outbreak

Regular programme of **regional exercises** e.g. AI, Rabies, AHS

Applying new approaches to knowledge transfer
Forward Look

• APHA Operations Manual currently available to all staff on-line and can be downloaded onto laptops for out of hours access.

• Work in progress to develop a format compatible with waterproof, disinfectable devices (e.g. tablets) for bio-secure use on farm.

• Access to operational instructions and ability to stream images and commentary from suspect premises in ‘real time’.

• Facilitation of electronic capture and transmission of essential epi information.

• Potential to develop training modules similar to EuFMD FEPC for other major exotic notifiable diseases e.g. avian, swine fevers.

Applying new approaches to knowledge transfer.
Maintaining and making best use of global funding in support of research and innovation.
The Plowright high containment building at Pirbright: Opened 2015
Current Challenges

• Continued economic uncertainty since 2008
  o Contraction of public sector activities
  o Increasing difficulties in securing research funding for animal health

• Geopolitical instability
  o Impacting on veterinary services
  o Displacement of people and their animals

• Increasing disease challenges

We can’t all do everything
STAR-IDAZ Global Network for Animal Disease Research

“Global Strategic Alliances for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonoses”

A global initiative to address the coordination of research programmes at international level in the area of animal health and in particular infectious animal diseases including zoonoses.
Issues identified by the STAR-IDAZ foresight activities needed to protect against future challenges

- Research pipeline – investment in basic research
- Sound public polices relating to science and technology
- Maintenance of capacity
- Partnerships/collaborations are needed
- Knowledge management system
- Knowledge/technology transfer
The Research Pipeline

- **Gap Analysis**
- **Tools**
  - Vaccines
  - Diagnostics
  - Therapeutics
  - Scientific information

- **Research Roadmaps**
- **Basic Research**
- **Translational/Applied Research**

**Knowledge & Technology Transfer**
- Livestock Sector
International Research Consortium on Animal Health (IRC)

Initiative to coordinate research at the international level to contribute to new and improved animal health strategies for at least 30 priority diseases/infections/issues.

The deliverables include:
• Candidate vaccines
• Diagnostics
• Therapeutics
• Other animal health products and procedures
• Key scientific information/tools to support risk analysis and disease control

• 16 partners from 13 countries plus one international organisation and three from industry with the EC planning to join
• Total combined research budget of $US 2.5+ billion
• IRC Secretariat supported by €3 million EU H2020 grant
IRC Governance Structure

IRC Executive Committee (Representatives of Funders)

Scientific Committee

Working Groups

- Immunology/Vaccinology
- Diagnostics
- Influenza
- Innovative anti-infective approaches
- ASF
- Vector-borne diseases
- Brucellosis
- Bovine Tuberculosis
- FMD
- Emerging Issues
- One Health
- Coronaviruses
- Mastitis
- Animal genetics/genomics
- Foresight
- Epidemiology
- Helminths
- Porcine Respiratory Disease Complex
- PRRSV
- ????
IRC Launch

Maintaining and making best use of global funding in support of research and innovation
IRC Partners (to date)

- National funding bodies/Programme Owners
- Research Institutes which function as Programme Owners
- Pharmaceutical Industry
- Representatives of the Diagnostic Industry
Global FMD Research Alliance

VISION OF GFRA
A coordinated global alliance of scientists producing evidence and innovation that enables the progressive control and eradication of FMD.

MISSION OF GFRA
To establish and sustain global research partnerships to generate scientific knowledge and discover the tools to successfully prevent, control and eradicate FMD.

PROGRAMS OF GFRA
GFRA aims to expand FMD research collaborations worldwide and maximize the use of resources and expertise to achieve its five strategic goals (see below).

Several research programs are currently active in Europe, North America, South America and South-East Asia. GFRA programs will continue to expand the alliance in these areas and will actively reach out to new areas of the world that have a stake in the progressive control and eradication of FMD.

STRATEGIC GOALS OF GFRA

- Goal 1. Facilitate research collaborations and serve as a communication gateway for the global FMD research community.
Further information on the STAR-IDAZ International Research Consortium on Animal Health (IRC)

www.star-idaz.net

STAR-IDAZ IRC Project Office

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Summary

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2. Applying new approaches to knowledge transfer

3. Maintaining and making best use of global funding in support of research and innovation