RISK WORKSHOP
3rd-4th November, Royal York Hotel

OVERVIEW

The workshop on risk and uncertainty in the context of animal and zoonotic disease management was an opportunity to showcase and discuss the work of three RELU funded projects:

- Reducing E coli Risk in Rural Communities
  (www.abdn.ac.uk/reluecoliproject/)
- Assessment of Knowledge Sources in Animal Disease Control
  (www.lec.lancs.ac.uk/cswm/LiT/po.php)
- Assessing and Communicating Animal Disease Risks for Countryside Users
  (www.forestry.gov.uk/fr/animaldiseaserisks)

Held over two days, the workshop involved presentations of findings from the projects and an exploration of their relevance and potential future applications. The first day included sessions on Decision-Making Frameworks, Risk Perception and Communication and a European perspective presented by Prof. Ekdahl from the European Centre for Disease Prevention and Control. The second day looked at Identifying Uncertainty, and Policy Relevance and Priorities for Future Research.

Copies of the presentations are available from the following website
www.forestry.gov.uk/fr/animaldiseaserisks

The first session highlighted issues around how to deal with multiple pathogens and ways in which research can help facilitate decision-making. For example, a lack of lack of surveillance data can limit the certainty of responses and understanding of how wide scale certain zoonotic diseases might be. What is needed to help identify policy priorities? Where are the gaps and how does this impact on policy?

The potential of complex modelling to connect all information sources and data was raised. During discussions it was noted that things could be more complex to include an inter-disease model; how does action to mitigate *Cryptosporidium*, for example affect *E. coli* O157? It was felt that there is a need to look at a range of diseases to explore how each disease may be affected by changes made to another. However, mathematical modelling is only one route. There are also problems such as a complex policy landscape and potential difficulty in understanding complex models.

Session two on risk perception and communication again identified the need to communicate with policy and decision-makers but also provide practical solutions. All projects were able to highlight how they are doing this. Discussions around information provision and knowledge exchange highlighted that understanding and influencing individual behaviour is difficult. Multiple actors and situations are involved and information delivery has changed from hierarchical to multiple interactions. Ownership (of the problem) and accountability are not always clear i.e. who is responsible for what?

A key question introduced during the third session on frameworks and identifying uncertainties was how to check or validate intervention effectiveness where we have a lack of data. In relation to surveillance data, knowledge on the scale and practices of small animal farmers was considered by some to be limited. Session four focussed on identifying major knowledge gaps, further research development and

dissemination. In terms of gaps and further research needs, key factors included understanding human behaviour (what can social scientists tell us?), the dynamics and patterns of disease and how they are interlinked, the role of modern forms of communication, economic costs and valuation, and implementation and testing of methodological approaches developed such as frameworks for intervention. Knowledge exchange and dissemination was largely divided between policy and practitioners.

Day 1: Wednesday 3rd November

Welcome from Chair (Professor Philip Lowe)

The Chair highlighted that the workshop will help to clarify the issues and messages for each project's practice and policy note. The projects are exemplars of different ways of thinking and the wider relevance of the research. There will be a RELU document produced on animal disease management, bringing together findings / lessons from the three projects.

SESSION 1: *Integrating Evidence on Intervention for Policy*

MAIN PRESENTATION:

Reducing Escherichia Coli O157 Risk in Rural Communities: Integrating Evidence for Policy Norval Strachan, John Farrington and Colette Jones (Project: Reducing E coli Risk in Rural Communities)

Escherichia coli O157 is viewed currently as a relatively rare but frequently severe gastrointestinal pathogen that causes outbreaks and can kill. Those living in rural areas are at greatest risk of infection and the young and elderly at greatest risk of poor outcomes from disease. Pathways of infection are eating contaminated food, drinking contaminated water or coming into contact with the faeces of cattle and sheep. 40% of cattle and sheep in the UK shed *E. coli* O157 in their faeces. *E. coli* O157 has no apparent effect on their health or productivity and infected livestock are symptomless. The RELU project has been investigating the potential of a number of interventions to reduce *E. coli* O157 in the UK rural environment. These interventions have been evaluated by a variety of means including quantitative risk assessment, expert opinion on effectiveness and practicality as well as cost benefit (cost of implementing the interventions versus financial benefits in reducing the disease). These diverse types of data need to be integrated in a format suitable for informing policy in collaboration with policy advisors. Can we take a pragmatic approach to data and analyses or do mixed methods, inter-disciplinary and case study approaches offer more? The process of integrating empirical research findings from different disciplines using methods predicated on diverse epistemologies will be discussed in this session.

SHORT PRESENTATIONS:
Phil Haygarth (Project: Assessment of Knowledge Sources in Animal Disease Control); Sarah Randolph (Project: Assessing and Communicating Animal Disease Risks for Countryside Users)

PANEL DISCUSSION (Chair: Philip Lowe, Co-Chair: Norval Strachan)

Cryptosporidium in the UK

The distribution of Cryptosporifium across the UK is not known. The scale of Cryptosporidium getting into water supplies is not known and there is a problem with the ownership of data. There was a discussion on drivers for removing sheep from around reservoirs, which may be economic (the price of lambs falling) or coercive. One delegate stated that the land was owned by Scottish Water in the example given. The explanation for the removal of sheep from reservoirs was an economic one as prices reduced.

Another question was how big the public health impact of the diseases is, as it would appear to be low. In relation to Cryptosporidium the impact can be big such as the Milwaukee outbreak in 1993 that affected over 400,000 people. This was identified through the pharmacies when more people came in to buy anti-diarrhoeal medicines. It could be millions and we need to convince policy makers of the iceberg.

Targeting disease management – practice and policy
It was noted we need to remember that disease is rare and exposure needs clarifying, particularly in relation to vulnerable groups such as pregnant women, the young or elderly. These groups could then be targeted.

One delegate described how policymakers are not just dealing with one pathogen they are looking at all and have to deal with multiple pathogens. This needs to be considered by researchers in their approach. What do we not know? What do we need to know in more detail? Where are the gaps? Are we in a position to do anything about it? How does this impact on policy? DEFRA and other policymakers need evidence to help set policy priorities:
-    Evidence for policy people to know where to put their efforts/money.
-    How to integrate evidence for policy decisions in a rationale manner.
This view was described as the 'policy maker synoptic', and it was suggested that what we can act on may not be a helpful way in analysing the problem.

A question was raised about why in environmental services we are so hesitant over the translation of science into policy. In the health service they have had NICE compiling bodies of evidence for example in the treatment of cancers. We could do the same for the environment.

It was noted that there is a new climate introduced by the new government: a demand for less regulation. If new regulation is introduced another must be removed. And of course there is a problem with any guidance on how to achieve compliance.

Data and modelling

Regarding RELU *E. coli* proformas one delegate said that they liked the format for summarising research for policy using the headings of findings and meanings etc. This yielded a small (and manageable) subset of meanings. However, he asked if both positive and negative results were included in the process to derive meaning. There was a discussion of how to unpack the meaning from the findings. Further that this would be triggered by positive research results not negative ones (or ones that were not statistically significant). A panel member agreed that negative results were important and yet often omitted. It was important to include them. The example was given of the *E. coli* O157 risk team leaving out an inconclusive result on the metabolic activity of *E. coli* O157 in clay soils in their presentation. *E. coli* O157 had a tendency to be more active in the Scottish soils in comparison to the Welsh soils

used in the experimental microcosms. But there were confounding factors that hadn't been eliminated as an alternative explanation for this effect. Hence the results were not included in the presentation.

With all the different information collected by the project one question related to how all the issues were brought together. Complex modelling may be required to connect all the pieces and potentially produce all the information that was required for policy. Unlike some other RELU projects this round has not focused on models. There was a view that we are not yet in a position to describe all the facets of a model and we are trying to supply some of the data that is missing from traditional biological models. There is a need to look at a range of diseases to explore how each disease may be affected by changes made to another. These models introduce uncertainty.

During discussions it was noted that things could be more complex if we wished to include an inter-disease model; how does action to mitigate *Cryptosporidium*, for example affect *E. coli* O157? A delegate concurred that mathematical modelling has its place, particularly with integrating information for a different audience but that there is no one route. There are also problems of a complex policy landscape, difficulty in understanding complex models, and decisions over who should pull the levers, assumptions and objectivity of model development. Another delegate reminded the workshop that the biggest disaster to farming where policy was based purely on modelling was Foot and Mouth Disease in 2001

There is a lack of surveillance data, which limits the certainty of responses. Policy decision-making is an issue of resources and information gaps; therefore there is a need to have something to help identify priorities. Does increased scientific knowledge help or is it a governance issue? The challenge is to demonstrate to policy that the problem is much larger than the tip of the iceberg indicated by the lack of a monitoring facility.

Risk assessment
There was a question on the risk assessment framework described by Norval Strachan. One delegate commented that exposure to *E. coli* O157 was likely to be frequent or common whereas disease was relatively uncommon or rare. It was not understood why this was the case and the iceberg metaphor for Lyme disease was useful for *E. coli* O157 as well.

A panel member described how epidemiologists were grabbing at clues like detectives as cases of Lyme disease do not come with "I am infected from" labels attached. We tease out the causes from the clues. Humans only react to what is present in terms of surveillance of infectious diseases, *e.g.* in livestock, wild animals and humans. Disease or the vulnerability to diseases are only indicators: for example should we be targeting middle-aged men with no shirts on? It was suggested that we would only arrive at answers to these questions with more data on people and more science might not get us there. It was about joining-up governance.

The importance of stakeholder and practitioners
Project teams were asked 'what is the response from practitioners "Is this useful"?'. For all projects, interaction with these groups was an essential part of the iterative process and production of management strategies.

In terms of presenting data for policy it was suggested that better dialogue with policy makers would be useful asking policy makers, "do you find any of this useful"? The projects/panel was asked if they had done this and what was the response. One panel member put this question to a stakeholder in the audience who stated that he

had found the project useful. One of the presenters described how the *E. coli* O157 project presented evidence to the Godstone Farm *E. coli* O157 Outbreak Investigation Committee on the results from their survey of farmers and visitors. This made use a window of opportunity in policy making and researchers should attempt to be responsive to these cycles of policy making.

SESSION 2: *Organisational responses: influencing behaviour and communicating risk*

MAIN PRESENTATION:

Organisational Responses: Influencing Behaviour and Communicating Risk
Julie Barnett (Assessing and Communicating Animal Disease Risks for Countryside Users)

A focus on the project exemplar of Lyme borreliosis in the context of an overarching set of policy initiatives to encourage public use of the countryside led to articulation of what we termed a 'health conundrum'. On the one hand a combination of novel hazards and countryside users that are unfamiliar with them may lead to communications that encourage appropriate precaution. On the other, raising awareness of the hazard and the recommended precautions, could heighten concern, disrupt countryside practices and even lead to withdrawal from countryside pursuits. How then to encourage participation and precaution without triggering alarm and avoidance? In this presentation we will address this issue against the backdrop of a framework of a range of possible organisational responses. We will focus in detail on a consideration of the issues that arise when we consider the response that is often integral to policy and practice initiatives – that of influencing behaviour. Drawing on data collected during this RELU project we will suggest the importance for organisations that wish to communicate risk of systematically considering issues of timing, audience, and place. Finally, we suggest the common organisational focus on information provision is at best partial and may even be counterproductive. A framework is suggested that may be helpful to articulate alternative organisational actions and how they can be aligned over time with relevant publics and places.

SHORT PRESENTATIONS: Colette Jones and Dan Rigby (Reducing E coli Risk in Rural Communities) and Zoe Austin (Assessment of Knowledge Sources in Animal Disease Control)

PANEL DISCUSSION (Chair: Philip Lowe, Co-Chair: Darren Moseley)

Communication and audiences
A delegate asked 'are we marketing science properly, *i.e.* showing the worth of what we do?' One view was that the task is not just to communicate through experts, we need to target policy and key decision makers.

Control of individual behaviour is complicated and we have to consider multiple actors and situations. Information delivery has changed from hierarchical to multiple interactions, with the biggest change in information delivery being away from the information deficit approach. How people get information is now much more complicated as each medium has its own dynamic. This led to the question 'do we accept the proposition that this has led to a loss of innocence and public agencies can't be paternalistic and keep people in the dark?' It was thought that this is no longer an issue outside of high level security. The real issue is at what point do you

have robust findings as emerging findings are often rushed through to get information out (although this may actually change later). There are differences in ESRC and NERC policy. ESRC let researcher publish at any stage, NERC wants material that can appear in a top 20 publication.

The role of social science is to bring an inclusive approach to determine what people think, often through the process of shining a light upon a subject area. Social science bring participatory and self-examination of the person, organisation and colleagues.

Who are going to use outputs?
We may want to work at a level below policy, *i.e.* practitioners. Some practitioners, *e.g.* farmers, ask what practical issues they can adopt, but there are also issues of increased risk to farmers in undertaking action, *e.g.* broken bones, by complying with measures such as clean livestock policy. However, one question 'whose problem are you solving?', suggested that if there is no owner of a problem then the solution may be irrelevant.

Ownership, accountability and politics
The accountability of some zoonoses is blurred, *i.e.* what part of responsibility belongs to whom? We need to identify who is responsible for what. Farmers are now aware they are part of the food industry and therefore responsible for their practices. However, food producers believe the responsibility rests with consumers and vice versa. It was suggested that organisations do not incur economic losses through Lyme disease. However LD is a contested disease, so if someone thinks they will be sued then they may be more responsive. There are also medical and personal economic consequences of the disease and treatment.

Policy making was suggested to be subject to political influence. Politicians like very simple solutions, *e.g.* tick removal tools, directions on hand washing and proximity to livestock and open water.

Day 2: Thursday 4th November

SESSION 3: *Devising frameworks and identifying uncertainties in animal disease management*

MAIN PRESENTATION:

Devising Frameworks and Identifying Uncertainties in Animal Disease Management Zoe Austin (Assessment of Knowledge Sources in Animal Disease Control)

Uncertainty is an inescapable feature of decision making within strategies to contain all diseases. During many disease outbreaks, quick decisions are required as the risk of disease spreads and as new information becomes available. While it is often accepted that such information may bring with it many uncertainties, these factors are rarely identified and accounted for during the stage of an outbreak where time is limited or indeed during non-outbreak times where planning and prevention policies are key for effective animal disease management strategies. The aim of this RELU-funded project is to provide a better understanding of the social, technological and natural dynamics of animal disease management. Central to this project is the question of how we can better understand issues of complexity and uncertainty in animal disease outbreaks and their containment in order to help develop more integrated and ultimately more effective strategies of management for animal

disease. In order to focus our analysis but also to provide a novel cross-disease approach, we examine three contrasting examples of endemic and/or exotic disease in the UK: Foot and Mouth disease (FMD), *Cryptosporidium* and Avian Influenza. Integral to our methodology is the consultation with experts and stakeholders across several policy levels using a combination of semi-structured interviews and workshops. The interviews to date have addressed the central issue of scientific uncertainty and its translation into policy but have also resulted in a number of other emerging themes. The aim of the disease-specific workshops is therefore to provide an opportunity for experts to examine and provide feedback on the initial outcomes of the interview data and other data gathering aspects of the project. In this session we present a novel framework for assessing animal disease management that not only encompasses the alleviation stage of disease containment, but also prevention, anticipation and post-outbreak recovery stages at a number of policy levels. We then present preliminary themes from our semi-structured interviews on cross-disease issues of uncertainty in animal disease management and reflect on the new insights that have been acquired from the disease-specific expert workshops. The opportunities and challenges of working at a cross-disease level will also be explored.

SHORT PRESENTATIONS: Paul Cross (Reducing E coli Risk in Rural Communities) and Chris Quine (Assessing and Communicating Animal Disease Risks for Countryside Users)

PANEL DISCUSSION (Chair: Philip Lowe, Co-Chair: Sophie Latham)

Methodologies for communicating
On site signage is a popular method for organisations, although there is evidence of 'guerrilla signage' being used where no official signs exist. Temporary signs are sometimes used to avoid sign fatigue, conversely there are still 'no entry – foot and mouth' signs being used to restrict access in Northumberland.

One approach to 'selling' zoonotic disease management could be through Ecosystem services, where disease regulation is one of the regulating services. The promotion of Ecosystem Services has been on the basis of 'nature good', whereas disease originating from the countryside suggests that sometimes there is a view of 'nature bad'. We also need to consider the cost of interventions on public health, *i.e.* restricting access to countryside and letting social science explore issues to produce the simple, distilled message that RELU require.

Providing evidence
How do we check / validate intervention effectiveness where we have a lack of data and what are the moral implications of having a control site? Trials are costly and the need for evidence now outstrips resources. One view was that the role of social science was important, but this should be evidence-based and we need to recognise the limitations of social and natural science. Some people view social science as exploratory.

Levels of governance
The degrees of uncertainty are focused on small (hobbyist) animal farming, rather than mass production which is covered by regulation. The number and spatial spread of hobbyists is unknown as they don't figure on the regulatory radar. Politicians are adverse to regulating public (and therefore voter) views). There is a lack of institutional regulation, *e.g.* cryptosporidium in swimming pools.

Experts & other stakeholders

Does the use of expert panels engender 'old boy' views where there is a risk that they may constrain the frame from which subsequent opinions are sought? Perhaps practitioners should be consulted first, then the experts. However, they can be difficulties in engaging non-expert stakeholders. There is also an issue of closing off expertise if the focus is on human health or if it is on animal health. One example was to engage with experts, practitioners, countryside workers, and disease sufferers.

SESSION 4: *Applications and Implications of the research*

Group discussions focusing around three key questions:

1. What do you think are the major knowledge gaps currently in animal disease management?

Human behaviour and decision-making processes

- Narratives/stories/histories of how farmers/people behaved in the past to derive lessons learned/potential good practice.
- What is the role of 'the small people' – hobby farmers/owners of a few animals
  - Would they/how would they recognise disease?
  - Where does their information come from? What information do they seek?
  - How do they interact with their animals?
- How to change/understand group dynamics and common understandings between people – what are the traditional and cultural practices that may hinder interventions working – this applies across scientists as well as groups such as farmers.
- How to identify people's decision making processes?
- How do people discern 'trustedness' correctness of information?
- Human behaviour – how to understand and influence. Do we understand human behaviour? Too difficult? No grand unifying theory.
- Understand the behaviour and motivations of people who can take action, *e.g.* farmers. Understand at what level action can be taken – regional, local, and national.
- Responsibility

Animal disease management: science and practice

- Knowledge systems of field based professionals – do we understand their role/influence? What is the implication of these people being private in the UK – not a government extension service as in other countries – for example the information that is passed on?
- Plan for 'headless chicken' outbreaks as well as disease outbreaks.
- There is a lack of appreciation of the dynamics of disease and more attention needs to be paid to this.
- Need to look at the processes underlying the observed patterns (in disease cases) and identify factors that drive changes in rates of processes (social science as well as natural science) and changing patterns.
- What are the barriers to adopting different practices for practitioners?
- What sort of problem are the diseases?
- What are the benefits and dis-benefits of intervening?

Communication

- How does government get to grips with 24/7 information stream?
- How best does government use social networks/intermediaries to share information?
- How to gather intelligence information via social networks?

Institutions, disciplines and individuals

- Lawyers. We need their participation.
- The relationship between institutions – who does what and when? How do we link them up? How do we create cross-institutional linkages across human and animal health?
- Social science contribution is intellectually focused at present rather than focused on a problem. The development of social science is an important contributor to disease management.
- Use social science methods to show/highlight variation in attitudes and motivations.
- Is there benefit in the possible generation of a social model that can be used with economic and biological models – more notice may be taken of this (this led to a debate about qualitative and quantitative data and whether we help policy makers to understand qualitative results or adapt these into quantitative measures/models that policy makers find easier to understand)
- Can decision-making processes only deal with the quantitative?
- More access to quantitative social datasets on behaviour so we can validate.

Costs

- Cost of disease – current lack of economic information on costs.

2. Which aspects of the project research would you be interested in seeing developed further? For what purpose? In what context (policy or practices)?

Human behaviour and decision-making processes

- Continue to push home the importance of social/behavioural elements.
- Important to understand actual behaviours, *e.g.* handwashing behaviours, not just that someone thinks this is important/most effective action
- Exploit social unacceptability for certain activities – related to the above point on self-policing.
- Can the disgust factor be a driver of behaviour change? Example given on intervention to encourage hand washing that had no effect until people were told about the bacteria on their hands and how dirty they were.
- What are people willing to do? This information would be useful for controlling the disease,
- Unmask myths about disease risks – old wives tales (are they valid?), hotspots etc.

Methods and results

- How can methods applied in RELU be applicable more widely?

- Important to gain an understanding of people's attitudes from the use of social science methods – views that some natural or economic scientists consider some behaviour by different groups to be irrational. They have built their models based on rational decision making and that people will maximise their utility. However, qualitative depth studies can bring out the cultural, traditional practices that explain why it is difficult to implement particular interventions.
- More about methodological approach-why used certain methods
- More information about individual subject areas so you get an overall feel for the subject, history and lessons learnt.
- Capturing the value of the environment, *i.e.* 'soft' measures, in economic valuations.
- Effectiveness of interventions could be validated using health measures.
- Systematic reviews not always useful as they reduce data to a dozen or so papers that might only be applicable to a few situations. Can use weighting of evidence and use that with expert opinion to review previous research rather than only focus on systematic reviews.
- Frameworks – can they be applied robustly to other diseases? Where should interventions occur?
- A single framework encompassing all the frameworks heard today?
- Can the projects solve the problem of animal disease risks to humans?
- Evidence that involving social sciences in animal disease risk has influenced the behaviour of farmers/publics (although not everyone in agreement that this is the approach we should take). Next step- what are the implications of these findings in terms of animal disease.
- Need validation of results.

Policy and practice

- How can policy makers get better at synthesising information to make resource allocation decisions, *i.e.* prioritisation tools, integration of the evidence base.
- Push it through to the clinician.
- Knowledge exchange platforms.
- Implementation of conclusions and a review of how effective this might be *e.g.* this might be a next step or road testing a framework/method.
- Application at different scales is important, what is the wider applicability *e.g.* success of smoking ban and seat belt wearing.

Risk and animal disease management

- How are relative risks (that we have seen in small samples) distributed in larger/different populations?
- In the context of tightened funding it is important to identify cross-disease issues.
- Assessment of relative risk
- There are tools that can be used to look at a range of risks – quite a lot of work in this area (DEFRA D2R2). Will such a tool be available soon?

Communication

- Explore self-policing options rather than providing information (in your face!) – peer pressure mechanisms and shifting norms of behaviour.
- Can we inform the policy community about human behaviour?

3. How can the knowledge generated by the three projects be best exploited?
   - Who would be the target audience? What forms of knowledge exchange/dissemination would be most appropriate?

General

- Having a rather top down model of stakeholders may mean missing out important groups lower down. Everyone is a potential audience.
- Possible use of social media/social networking opportunities
- Identification of cross project commonalities
- Need clarity on the role models, the leaders, actors who might use the research for impact and decision making.
- Are we in a transition period with changing actors – and changing landscape in risk management?
- Advice, legislation, incentives as options.
- Importance of partnerships.
- Unions can target specific audiences

Policy

- How to engage policy makers – they are often too pressurised for involvement. There are however different levels of policy and it is possible to go in at a lower level.
- How do we ensure Defra continues with the RELU type approach? Difficult bearing in mind the limited institutional memory. This suggests an enhanced role for external experts that can remember.
- Publish all project results – even what did not 'work' even if it is in the grey literature – to help with policy reviews.
- Practitioners - Need to think beyond papers and policy notes and use different sources, *e.g.* popular media
- Target at the right groups that make policy decisions.
- Misunderstanding of how policy is made.
- Workshops have a strong role in helping policy people become more intelligent customers (increase awareness of other work)
- Need to decide if policy is a good outcome

Practitioners

- Focus on the tactical and operational level. When communicating it is useful to think in terms of tactical, strategic and operational (some felt it was more useful to communicate at the strategic level - others felt institutional memory was better at a lower level)
- Dealing with low risks – focus on a specific group and trial at a practical level, *e.g.* in a forest.
- At operational level we would want to know the implications of findings

Public

- Possible lack of knowledge re *consumer* focused engagement

Science

- Scientific audience – what is the new biological knowledge?

Overall Final thoughts from Philip Lowe

- Who owns the problems – is this a helpful question?
- All of the projects talked about and discussed behaviour change – but this question is complicated by whose behaviour we are talking about.
- Soft approaches may be preferred and practical approaches.
- What is missing from the Ecosystems framework is disease management. Ecosystem services is ideological where nature is cast as benign and good with no covering of environmental bad issues.
- Do we need a universal framework for these diseases?
- Risk communication – how can we do it without undermining good behaviour, *e.g.* visiting the countryside?
- We cannot always wait for certainty on disease management issues but we do need transparency.

Participants

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