



relu

Rural Economy and
Land Use Programme

Growing concerns:

Animal and plant disease policy for the 21st century



Growing concerns:

Animal and plant disease policy for the 21st century

We live with many animal and plant diseases. Some we barely notice, while others set alarm bells ringing at UK Government and even international level. Between these two extremes lies a multitude of diseases of farm animals, crops and our native fauna and flora that may affect human and animal welfare, food supplies and landscapes to varying degrees. In an era of economic uncertainty, climate change, new disease threats and increasing pressures on our food and energy resources, is it time to rethink policies and priorities for the 21st century? Where should responsibility and financial liability lie for animal and plant diseases, whether they are endemic or exotic, whether they threaten animal or human lives, or whether it is our livelihoods or our food security at stake?

How does disease appear?

“Exotic” diseases are sometimes brought into the country on imports. Global trade and movement of plants and animals and their products, have increased the number of new introductions, and climate change may also make the UK more vulnerable. Plant imports, whether by individuals or commercial companies, pose particular risks, because so few plant diseases are readily recognizable and many are unknown.

“Endemic” diseases are in the UK already, but may be spread more widely or introduced into previously disease-free areas by a variety of means. Climate and/or environmental change may affect the distribution or evolution of the pathogen, or change its relationship with its host. New stock may bring disease to a farm, and wildlife can carry disease, as may vectors such as ticks. Some disease is waterborne, while visitors to public gardens or the countryside could be moving pathogens around on their shoes, clothing or vehicles.

Because trade is worldwide and supply chains so complex, responsibility for animals and plants, and their products, may be transferred many times. Those buying and selling within the chain may have very different levels of financial and personal investment in biosecurity.

How do we identify disease?

Identifying diseases may be difficult, even for trained experts such as veterinarians or plant health inspectors. Hosts may be asymptomatic but infectious. New diseases may simply be unfamiliar, or similar in appearance to existing endemic diseases. Some pathogens may move between wild and domestic species, complicating detection and control. For example Bovine Tuberculosis moves between badgers and cattle, and *Phytophthora ramorum* – or “Sudden Oak Death” – was introduced via the international movement of plants, but is now found in woods and heath land.

Who takes responsibility for animal and plant disease?

Outbreaks of disease have diverse biological, environmental, economic and social impacts, and different groups of stakeholders respond in a variety of ways. For example, an outbreak of ring rot in potatoes may have serious financial implications for the grower. The supermarket will turn the crop down, but there are no health or food security impacts on the food chain, and minimal implications for the transport company that unwittingly brought in diseased seed potatoes. Meat contaminated with *E coli* O157, on the other hand, may have serious, even fatal, implications for members of the public. It could lead to a butcher being prosecuted, but may have no impact on the original supplier of the meat. Whether these varied consequences seem fair or rational may depend, in part, on one's perspective.

The farmer can practise biosecurity on the farm, and keep out much of the disease that might otherwise threaten stock, crops and livelihoods. But keeping out some diseases may depend on collective effort. This has been demonstrated by some serious epidemics, including Foot and Mouth Disease, which spread across the country in 2001. Can individual farmers always be held accountable or should we be thinking in terms of the national herd, or indeed the national food-supply, for which we all take responsibility?

Taking all these factors into consideration, how does Government create a regulatory framework that would be effective in preventing and managing diseases, whilst simultaneously ensuring a fair allocation of responsibilities and costs between the various stakeholders and taxpayers?

Professor Ian Crute, Chief Scientist, Agriculture and Horticulture Development Board:

“The market provides a very strong force when research has been done and provides a commercial opportunity to be exploited. In an ideal world the producer would own the problem. But in a situation of market failure, it has to be the Government.”

How can Relu research help in allocating cost and responsibility?

As the *Disease History* project found, policy may be fossilized from past events, rather than being modelled on present realities. Prior assumptions about responsibility may not be relevant in novel circumstances. Significant differences abound, such as the compensation paid for some animal diseases but not for others, and the lack of any equivalent payments for losses resulting from plant disease, but the rationale for these differences is often unclear or even lacking.

The *Governance* project found that the way in which we categorise diseases, for example as “endemic” or “exotic”, can lead to lack of consistency or coherence in how we deal with them and how we allocate responsibilities and costs. Here again, we may be stuck in a self-reinforcing and historically-derived rut, from which it is difficult to escape in the light of changed circumstances, not least because the information collected on risk varies according to the way it has been classified. This in turn can lead to considerable variation in how farmers are held responsible for the overall health and welfare of their livestock and, consequently, the impact on their livelihoods.

The history of previous outbreaks and their management can, on the other hand, provide some valuable lessons. The Government should be stewards of this basic knowledge and make more effective use of it. This is often made more difficult by a loss of institutional memory. Stakeholders and the public could also have a role to play. The *Memory and Prediction* project used personal memories as an important resource in

reconstructing the course and consequences of Dutch Elm Disease.

All Relu research has involved stakeholders throughout and has concluded that inclusive and genuine stakeholder engagement is essential for making policy that is effective and possible to implement. This view is endorsed by the approach taken to the appearance in the UK of Bluetongue in sheep and cattle in 2007. Government, working closely with the farming community, developed a control strategy. This was supported by a communications campaign that used roadshows, with veterinary and industry bodies, to raise awareness of the disease. Focused consultation also helped to achieve buy-in to the control strategy, which included a vaccination delivery plan for dealing with outbreaks. Engaging stakeholders at an early stage helps the Government to understand better the roles of the affected stakeholders and the likely impact upon them of policy options. It also enables stakeholders to contribute their own expertise to addressing the problem, giving a sense of ownership, which encourages compliance.

The *Plant Health* project found that integrating socio-economic perspectives into risk analysis of an outbreak makes stakeholders more likely to accept the findings. The project advocates transparent governance, coupled with a more focused approach to identifying the stakeholders for disease and engaging them in formulating policy.

But does being a stakeholder necessarily mean accepting some ownership of the risk, and does that automatically imply responsibility and, potentially, financial liability? Stakeholders may have responsibility but lack the necessary resources. The *Memory and Prediction* project noted that in an era of free trade, it may be difficult for Government to impose adequate restrictions

to protect native species, and actions at local, national and European levels may not mesh. What happens when responsibility is not clear? Who will take responsibility for disease in the wild areas and woodland?

Risk ownership of any disease may also shift. The *Knowledge Sources* project found that the balance of responsibilities between stakeholders and the Government is likely to change between a disease-free period and the management of an outbreak and its aftermath: as one moves from prevention, through anticipation to alleviation. It also varies across different levels of dealing with disease outbreaks, from strategic planning, through to front line activity. Contingency planning needs to anticipate these shifting horizons of responsibility.

As the *E coli O157* project found, pathways to the same disease may be very varied too, leading to different risk-ownership structures. Although they found that most people associate *E coli* infection with contaminated food, animal faeces are a common source of infection. Ensuring children wash their hands after touching livestock could be as important as the strict implementation of hygiene rules in slaughterhouses.

Zoonotic diseases tend to have even more complex pathways and when vectors such as ticks are involved these are multiplied. If a member of the public walking in a country park is bitten by a tick carrying Lyme borreliosis, who takes responsibility? The *Lyme Disease* project has been investigating the most effective means of communicating this kind of risk to countryside users and finds that even within Government there can be a lack of clarity and agreement about roles and responsibilities. The public could take action to protect themselves, but who should be informing them about how best to do this?

Dr Helen Ferrier, Chief Science and Regulatory Affairs Adviser, National Farmers' Union:

“Who can control animal and plant disease and who deals with the consequences? The key issue is cost and who should be picking up the costs. What controls would actually make a difference? Where in the supply chain can we intervene with any real effect? If responsibility is unclear and must be shared, how do we share it out?”

Professor Graham Medley, Principal Investigator, Relu Governance project:

“Disease is driven by the movement of livestock. Some cannot be controlled by the individual farmer, others are farm-based, so this creates a public/private continuum.”

How can policy deal with complexity and uncertainty?

Diseases are complex and change all the time. How can Government create policy to deal with so many uncertainties?

When dealing with new and “exotic” diseases of livestock, one of the main challenges is how to create an inspection and monitoring regime which maximises the opportunities for identifying infected animals at an early stage. This is essential in order to prevent or minimise further spread of disease. Such a regime must target known disease pathways, while remaining receptive to potential changes in the way the organism targets its hosts. That requires an understanding of how the trade and movement of animals and animal products are developing over time, and how this may affect the epidemiology of disease.

The challenges of endemic disease are different, but may also be complex, not least because the farmer may have to deal with several

diseases at any one time, and yet these pathogens receive little attention from Government.

For plants, there is often a problem in identifying new threats, and in developing robust defences, with little or no information upon which to draw. Plant pests and pathogens may have very complex and uncertain interactions with different hosts or in different environments and climates, which themselves might change with time. The sophisticated risk analysis required to determine the complexities, and to devise proportionate responses, demands what may be an impossibly high level of resources and expertise.

Prevention will not always be effective and the Government must have contingency plans in place to deal with outbreaks. These have to be

flexible and adaptable to take account of the changing nature and extent of these incidents. Authorities must be able to escalate resources in the face of very large, complex or multiple outbreaks. Plans will only be effective if they are well grounded in the reality of the trade and take into account the capacity of stakeholders to respond. The outbreak in Germany of *E coli* O104 during the summer of 2011, for example, and the misidentification of cucumbers and other imported salad crops as a potential source, had very serious economic consequences for growers across Europe. Stakeholders must be involved in planning for this kind of contingency, rather than simply being directed by experts on what must be done.

Kenneth Clarke, President, Veterinary Public Health Association:

“As a practising vet, I worked in an environment of unavoidable clinical uncertainty. Uncertainty is, and always will be, present in biological systems; we must retain the ability to make rational decisions in the face of uncertainty and to be flexible and to change our approach when more information becomes available.”

Nigel Gibbens, UK Chief Veterinary Officer:

“We are making policy in a complex world – we have to know how to integrate evidence in a world of risk and recognise there is no such thing as certainty. But how people perceive and react to risk is an important strand.”

How can Relu research help us to manage complexity and uncertainty?

Relu research has been groundbreaking in its interdisciplinary approach to animal and plant disease. This immediately opens up new perspectives and all the projects have brought to light social and human aspects that have not previously been explored. In this respect they complicate the picture but also offer new avenues for addressing the problem.

The *Disease History* project points out that the evolution of livestock health policy and its implementation is not just a function of scientific and technological developments, but has involved interaction between farm economy, wider agricultural policy, veterinary interests and expertise, public health concerns, food security and consumer politics.

The *Memory and Prediction* project has been looking back at the epidemic of Dutch Elm Disease which began in the 1970s, and the lessons it holds for those dealing with plant diseases today. They conclude that in order to respond to this kind of rapidly-changing and developing epidemic an effective mechanism is needed to adapt responses. The researchers argue that prevention is better than cure, pointing out that even a textbook response to Dutch Elm Disease might not have beaten its biology. We cannot always eradicate or manage these kinds of invasive diseases. It may be that only by adopting more stringent controls, such as exist in some other countries, such as Australia, could we keep out new infections.

The *Plant Health* project emphasises the importance of understanding the socio-economic as well as the technical issues if governance is to be effective. People make decisions on a personal, as well as a financial basis, and are influenced by those who advise them.

Thus, many factors beyond the purely technical are being taken into account by growers and farmers when making decisions. The *Plant Health* project has found, however, that this does not necessarily imply a lack of scientific understanding. Decisions on what crops or varieties to grow, for example, may be driven by local knowledge and experience, or by commercial considerations. Supermarkets may want new varieties but these could be more susceptible to disease. Squeezed profit margins have driven trends in livestock production, leading to more specialisation by farmers and increased movements of animals between herds. In order to understand these socio-economic complexities, and to promote a shared sense of responsibility for preventing and resolving disease outbreaks, engagement of stakeholders in decision making processes is essential.

Zoonotic diseases pose particular challenges. The complexity of disease pathways for the varied pathogens involved add to the problems for policymakers. As the *Lyme Disease* project points out, effective management depends, not just on a detailed knowledge of the complex biology, but also on an understanding of human behaviour, and how to communicate the public health issues. The way in which the complexities and uncertainties are communicated can have an important impact on how successful

authorities are in containing zoonotic diseases. As the *E coli O157* project finds, the responses of different groups of stakeholders may vary and the general public may have markedly disparate perceptions and responses to disease hazards. These are often influenced by the media.

Conveying complex information and uncertainty about risk is always difficult. The public often display very conflicting acceptances of different kinds of risk. Emotional newspaper headlines can be a driving force for governments, and the *Bovine TB* project has examined the ways in which opinion can become increasingly polarized as a consequence. This may be exacerbated if there is a lack of clarity about the aims of policy, or these seem to shift during the course of an epidemic. Stakeholders may begin to question the role of Government and its impartiality. Trust is then lost, and sources seen as independent of Government may have greater credibility.

The *Knowledge Sources* project has shown that viewing disease within a broader framing involving both health and environmental issues is particularly important. Many uncertainties are likely to be linked to communication between the different interests and organisations involved in the management of disease. The team concluded that governance frameworks need to be opened up to those who are not policy or science specialists. This demands a more cross-disciplinary approach to the framing of natural and social scientific knowledge. That change in approach could engender a policy culture more open to unforeseen and unpredictable events and more able to deal with them.

Dr Joan Webber, Principal Pathologist, Forest Research:

“There are conflicts of interests within organisations – the ethos of the Chelsea Flower Show, which is the flagship of the RHS, involves gardens from ‘around the world’, so encouraging exotic imports.”

Dr Pieter van de Graaf, Scientific Adviser (Food and Crops), Scottish Government:

“How do you demonstrate the benefit of preventing disease?”

How can Government prioritise resources?

Resources available within both the public and private sectors are always limited. These resources have to be allocated to the prevention, eradication and management of all categories of disease: animal and plant, endemic, exotic and zoonotic. In this process of prioritisation we should take into account the varied impacts of disease on the health and welfare of animals, plants, the environment and people. This requires access to the most up to date natural, economic and social science evidence.

To prioritise effectively we need to establish a rationale about aims and objectives, and a mechanism to determine the split of resources between animal and plant health. We have to be clear about how this relates to human health, both in respect of zoonotic disease and social and economic effects, and also to the wider Government strategy for dealing with non-native species.

Such a rationale should make it possible to rank disease threats more transparently and consistently. We could then create a list of priorities for action, in collaboration with stakeholders. It would, however, be essential to build flexibility into this resource prioritisation, in order to cope with the contingencies that inevitably occur.

How can Relu research help us to design a coherent rationale?

The *Plant Health* project finds that there has been no strategic framework in the past, with policy decisions often being reactive and shaped by narrow and short-term commercial considerations. A fresh approach is needed.

Relu research urges the application of a wider range of stakeholder and academic expertise to the problem of prioritisation. This will involve greater openness not only in procedure but also in outlook. The *Plant Health* project advocates a risk governance framework that is more inclusive and the *E coli O157* project points to the need to accommodate differences in lay and technical knowledge that can lead to different appreciation of risk and approaches to prioritisation. The public may have very different priorities from landowners too, as the *Lyme Disease* project finds, and we have to understand these different perspectives so that strategies to address disease can take them into account.

The *Memory and Prediction* project found that the importers of plants tend to be a fragmented community of small businesses who may be difficult to engage. The public has low awareness of plant disease and may also pose risks by their behaviour. The project calls for more resources being put into informing people about the risks.

Above all, a framework is required, that can respond to changing understanding about the biology of pathogens and changing circumstances. The *Governance* project underlines the need for models that include both political and epidemiological dimensions, which are dynamic in nature and which acknowledge that diseases are not independent. The control interventions for one disease will have impact on others. For example, the ban on meat exports to the EU as a result of BSE effectively removed any incentive that farmers had to control diseases such as Infectious Bovine Rhinotracheitis. Policies that enhance control of many diseases simultaneously bring multiple benefits and should be prioritised.

Dr Joan Webber, Principal Pathologist, Forest Research:

“Should resources be prioritised for diseases where a real impact can be achieved or where there are really serious consequences from the disease?”

Alan Spedding, Editor, RuSource information service:

“We need to agree a balance between different demands – the endemic and exotic, prevention and management. We have to learn from history and appreciate the limits of our understanding. And we need to involve people who are affected – the farmers and consumers and get their buy-in. Too often farmers feel policy is something imposed upon them.”

Professor Lesley Torrance, Leader, Plant Pathology Programme, The James Hutton Institute:

“The pathogens *Phytophthora ramorum* and *Phytophthora kernoviae* which cause diseases such as Sudden Oak Death are spreading in the UK and infecting other species like heather, larch and rhododendron. The effects are at landscape level, with stripping of larches and extensive infections of rhododendrons. They pose a threat to moorland and heath lands.”

How can the evidence be integrated into a common framework?

In the past governance for plant and animal diseases has relied heavily on biological evidence, and veterinary and plant health expertise. Particularly following the 2001 outbreak of Foot and Mouth Disease, there has also been a growing emphasis on economic cost-benefit analysis. But increasingly we can see that these kinds of evidence need to be integrated more effectively and used alongside a range of other kinds.

The lack of a fully integrated approach using natural, economic and social scientific evidence can result in animal and plant health policy failing to deliver effective outcomes. For example, controls that we assume should be effective, based on the evidence from natural science, may not succeed because stakeholders don't put them into effect, perhaps because they don't understand the processes properly, or cannot afford the costs, or perceive the problem differently. Policymakers must have all the information they need if they are to take decisions and make effective policy. They must avoid relying on a small subset of specialists and a limited range of stakeholder interests. Decision making has to be transparent and consider the range of interests if it is to be acceptable.

**Professor Peter Mills,
Principal Investigator,
Relu Plant Health project:**

“Before Relu, plant disease research looked only at the crop or the individual plant. As a natural scientist I found myself challenged by different perspectives when working with social scientists and we developed more integrated techniques.”

**Nigel Gibbens, UK Chief
Veterinary Officer:**

**“The natural science
underpinning policy is important
but we need social science to
achieve behaviour change, for
example on animal movements.”**

How can Relu research help the integration of evidence?

All the Relu projects bring social, economic and natural sciences together within their research so are able to view the problem from an interdisciplinary perspective. Researchers have to learn to communicate effectively within and beyond their teams. Plain English helps, and is a useful principle for integrating disciplines in any context, including policymaking. It enables policymakers to communicate easily with a wide range of experts and stakeholders.

The *Plant Health and Memory and Prediction* projects note that formulation of plant health policy in the past has been technocratic, based primarily on a natural science analysis of pest risks and that this needs to be widened. Social science can assist, not least in opening up the framing of the questions that need to be addressed.

The *Plant Health* project proposes a transparent governance model that explicitly takes a more interdisciplinary and holistic approach, with a pre-assessment stage that involves socio-economic and political framing of the problem. The *Memory and Prediction* project would like more historical analysis to be included, to challenge constructively the current decision making process. This would help to identify where a too narrowly focused technical analysis fails to take account of past institutional failures.

The *Knowledge Sources* project has noted that, in the past, basing policy on natural science evidence alone did not result in a clear and consistent process of decision making. They argue that a more integrated approach would help policymakers to accept the inevitable uncertainties in our understanding of disease that need to be accommodated.

The *Governance* project points out that the spread of livestock diseases involves both natural and social processes. It is people who move livestock (and their diseases) from herd to herd. Ignoring this dual influence means that the epidemiology is misunderstood and interventions are less likely to be effective.

In zoonotic disease this human aspect is, of course, even more important. The *E coli O157* project argues strongly that social sciences can provide decision makers with an understanding of how people’s perception of risk is dependent on their personal values and experience, and their social and cultural context. Without that understanding our ability to mitigate the risk of zoonotic disease is severely hampered.

Mitigation must depend heavily on effective risk communication. The *Lyme Disease* project points out that this must involve both landowners and countryside users to ensure that they can address the risk in a proportionate, informed way, by taking appropriate precautions. Success depends as much on how and when the message is transmitted as its actual content.

How can we influence or change behaviour?

When current strategies for preventing or mitigating animal and plant disease outbreaks are not succeeding, then we have to consider whether human behaviour is an obstacle. There may be specific points in the supply chain where a change in behaviour would have a major impact on disease risks. For example, could we ensure all plant importers followed effective biosecurity protocols? If we could, it would reduce considerably the risk of further invasive plant pathogens entering the UK. Alternatively, a broader educational campaign to raise awareness of disease risks throughout the supply chain could have a more generic but diffuse impact.

Why is it difficult to persuade some stakeholders to take action to reduce risk? In some instances this is because these stakeholders are not bearing the risks involved in their lack of action. So, for example, in the food supply chain, risks may be passed back to farmers, who are unable to reduce them.

There are also problems with policymaking. Regulators may have difficulty themselves in understanding the results of highly technical risk analyses, or in translating it into policy proposals that stakeholders can understand and subscribe to. It is important to ensure communication is effective and two-way. Regulators need to listen to and interpret messages they are receiving (or in some cases not receiving) from stakeholders. Farmers, growers, conservationists may have important contributions to make to policy development, but not all will be good at making their voices heard.

How can Relu research help to influence and change behaviour?

Policy makers have to ensure their engagement with stakeholders is genuinely constructive and not just rely on a formulaic consultation process, and they too must be open to change. The *Memory and Prediction* project suggests they need to be receptive to a range of specialist advice and willing to question accepted truths and current biosecurity protocols. The *Governance* project finds Government-defined structures of responsibilities too rigid. For example, the Government-led testing and compensation for Bovine Tuberculosis leads farmers to regard it as a Government problem. On the other hand, there is no Government policy to address endemic diseases such as Infectious Bovine Rhinotracheitis. This makes it difficult for individual farmers to apply effective controls. Policy could be more effective if it was formulated with stakeholders with the aim of enabling collective action to tackle diseases.

Groups such as farmers, plant importers and the public will have different perspectives, and policymakers must be alert to these differences. In the case of zoonotic disease this may be critical, and the *E coli O157* project has found that these different groups require different approaches and analytical tools. They also emphasise the need for communication to be two-way, so that as well as sharing information the authorities incorporate public knowledge, values and context into risk management decisions.

To what extent should the public take more personal responsibility? Effective, well targeted and easily understood information about risk management could help them to do this, according to the *Lyme Disease* project. One way of addressing the complexity of this kind of zoonotic disease is for individuals to take precautions that reduce their own risk. Achieving

this requires a strategy that integrates both a biological and social understanding of the nature of the disease and the risks that it presents. Communications have to be customised to the circumstances and the audience, which requires a more sophisticated social analysis of the activities that need to be addressed, and of public attitudes. For example, the project found that people were resistant to covering up to protect themselves from tick bites while walking in high risk areas, but were open to examining themselves for ticks afterwards. The best strategy, therefore, may be to make tick removal devices easily available so that ticks can be removed before they have spread infection.

The *Memory and Prediction* project warns, however, that in some instances the precautionary principle may be the only effective approach, rather than trying to influence a complex set of behaviours. Heritage garden visitors may be influenced to modify their behaviour and adopt simple biosecurity measures to avoid spreading disease. But it may be that only very strict regulation would prevent new plant diseases from entering the country.

The media often have an obvious role in influencing public opinion. The *Knowledge Sources* project also warns of the particular difficulty in communicating risk uncertainty to the media and to the public, and the *Bovine TB* project has mapped the way in which the press can reinforce opposing opinions. The *Governance* project showed that negative influences of this kind can contribute to policy failure. At the same time, the media have played an important part in improving standards of animal welfare, with the demise of the battery hen, and can be a helpful means of raising awareness about disease risks. For example, the *E coli O157* Project found that awareness of *E coli* was comparatively high in the Grampian Region of Scotland, which they say is probably the result of media coverage of local cases. This is, therefore, a conduit that requires very specific consideration.

**Simon Richards, Park Manager,
Richmond Park, The Royal Parks:**

“It is imperative we find more effective ways of communicating risk to our visitors. We will not always achieve prevention so are always dealing with consequences. Do most site managers even recognize how many different publics use our parks?”

**Professor Ian Crute, Chief Scientist,
Agriculture and Horticulture
Development Board:**

“Epidemics of human, animal and crop disease proceed in similar ways but we react differently to them – in human disease we are interested in individuals, maybe also in an emblematic tree, but not a field of wheat.”

How should we rethink disease management for the 21st century and beyond?

We are living in economically straitened times, with limited resources available from tax payers. Successive governments have indicated that they favour more sharing of responsibility and costs of disease. At the same time, the present Government has acknowledged that the frameworks for decision-making need to be based on better, interdisciplinary research that integrates natural, economic and social sciences. As yet this kind of research is rare, and natural science still provides the dominant evidence for risk assessment, management and communication.

A strong case can be made for a more interdisciplinary approach which would enable more effective framing of research questions and, it may be argued, produce more useful and applicable evidence. But in uncertain economic times, and given the international nature of much plant and animal and plant health regulation, how far can the UK go unilaterally in changing the present technocratic approach? For example, there is resistance in some quarters, such as the European Food Safety Authority, to using socio-economic data in risk assessments, while the precautionary principle is not accepted in the risk assessment procedures of the international sanitary and phytosanitary regulatory systems sanctioned by the World Trade Organisation. Gaining acceptance for a more interdisciplinary and inclusive approach to animal and plant health controls will require considerable persuasion and persistence.

How can Relu research help us to rethink our approach to animal and plant disease?

The message coming from Relu research is that animal and plant disease policy needs a radical rethink from basic principles, and that risk analysis must be more widely based, incorporating socio-economic evidence. In an ideal world, we would begin again with a blank sheet, and map disease within the context of our current commercial, social and cultural realities. We would challenge established ideas, question our motivation for intervening in disease, consider whether producers should be given full responsibility for production losses, and carry out cost benefit analyses across the whole range of diseases, drawing on evidence from both natural and social sciences. Given that policy is always made from the position in which we find ourselves, this may not be feasible. However, the Relu research can give some basis for reassessing established ideas.

The *E coli O157* project concludes that responsibility for disease can only be built on knowledge and understanding of the risks. There is, however, continued reliance on the regulatory authorities to collect, collate and disseminate information on those risks. This suggests they must continue to have a central role in the process. But the *Governance* project finds that the data produced do not always meet the needs of users. There is variability in the quality and amount of risk information available for different diseases. Bound up with this is the regulatory labelling of diseases, which leads to responsibilities being allocated without consistency or coherence. This is also seen in the differences in how animal and plant diseases are treated, with no compensation for any plant crop failures. Stakeholders are often unable to discern any strategic rationale behind such discrepancies.

Transmission of disease creates anomalies: the *E coli O157* team points to the different pathways for the same disease that can lead to very different, but unacknowledged, ownership structures. There are also anomalies in responsibility for individual diseases versus that for the overall health and welfare of livestock.

A recurrent theme from across projects is the importance of involving stakeholders in any attempts to implement new plans or structures but this must be done without allowing small but vocal interests to wield disproportionate power. Current stakeholders may have vested interests in the status quo. The *Plant Health* project pinpoints the need for a better process for mapping out stakeholders and their interests and influence. This kind of clarity would promote fairer and more effective representation.

The *Lyme Disease* project advocates greater clarity about responsibilities within Government and points to lack of agreement among different departments. They would also like to see greater cooperation between health authorities and land managers and sharing of expertise to address zoonotic disease.

The *Memory and Prediction* project has highlighted a need for more awareness and public debate about the threat from tree diseases and this may reflect a need for wider debate across the spectrum of animal and plant disease risk generally. The research finds that low awareness of the threat is accompanied by a lack of willingness to pay for control measures and may also result in people being less open to implement such measures. Organisations such as the National Trust, that are independent of Government, may have an important role to play in raising awareness. The project also calls for more critical and interdisciplinary analysis of the threats to biosecurity posed by liberalisation of international markets. They would like to see the horticultural industry taking greater responsibility for preventing and dealing with disease outbreaks.

Any revision of policy must, of course, be carried out within the context of the major and overarching challenges posed by climate change and the demands of ensuring food security for the UK. These pressures are likely to make crop wastage through disease less acceptable, both politically and commercially. It could, for example, be desirable for supermarkets and consumers to accept produce that shows some pest or disease damage. Social science could play an important role in understanding attitudes and influencing behaviour in this area.

Not only must strategies be adaptable for new pests and diseases, they must allow for changing social and environmental circumstances. Water availability will become much more critical, for example, affecting the types and varieties of crops grown, and this will impact on how we address disease. It will become necessary to identify our real priorities. Animal welfare has risen up the agenda in recent years and seems to be important to consumers. However, if food supplies are threatened or become much more expensive,

this could change, and we are already seeing moves towards more sustainable intensification of production. Faced with the possibility of serious shortages, more people could start growing their own crops, or even keeping animals for food. Such shifts would inevitably impact on disease risk. Some mainstream agricultural practices could cease to be productive: for example, continual use of longer term rotation to create cleaner soils for susceptible crops such as potatoes.

We will also have to strike a balance between prevention and dealing with the consequences of disease. As an island, we may be able to secure our borders against some diseases, but this could only be achieved by challenging the current ethos of free international trade. Where do our priorities lie?

New technologies and the behaviours that they engender will also play a part. How might new media, such as Twitter and Facebook be used, either positively, or negatively, during a major epidemic of animal or plant disease? They could be useful tools for informing stakeholders, or means for protesters to promote civil unrest if the Government's actions fail to carry popular support. This needs to be taken into account in any future strategy.

It may be impossible to start with a completely clean sheet, but it would be possible to bring much more clarity and transparency to policymaking. There are useful lessons that could be incorporated into this new thinking from a range of different sources: from research, including the Relu programme; from stakeholders; from the experience and strategies adopted by other countries; and from our own history. There are also useful lessons that can transfer across the varied categories of disease – endemic, exotic and zoonotic, animal and plant. But we have to construct a strategy that is fit for the 21st century and beyond, rather than one that merely harks back to the 20th.

Relu animal and plant disease projects:

E coli O157

Reducing *E coli* O157 Risk in Rural Communities

Principal Investigator Norval Strachan,

University of Aberdeen

n.strachan@abdn.ac.uk

Research team:

Ken Forbes, *University of Aberdeen*

Colin Hunter, *University of Aberdeen*

Davey Jones, *Bangor University*

Jenny Roberts, *London School of Hygiene and Tropical Medicine*

Gareth Edwards-Jones, *Bangor University*

John Farrington, *University of Aberdeen*

Dan Rigby, *University of Manchester*

Colette Jones, *University of Aberdeen*

Prysor Williams, *Bangor University*

Iain Ogden, *University of Aberdeen*

Marion MacRae, *University of Aberdeen*

Ovidiu Rotariu, *University of Aberdeen*

David Chadwick, *North Wyke Research*

Peter Teunis, *Rijksinstituut voor*

Volksgezondheid en Milieu, The Netherlands

Rowena Kosmider, *Veterinary Laboratories Agency*

Ada Wossink, *University of Manchester*

Seda Erdem, *University of Manchester*

Paul Cross, *Bangor University*

Richard Quilliam, *Bangor University*

Andreia Santos, *London School of Hygiene and Tropical Medicine*

Laura Macritchie, *University of Aberdeen*

Ken Killham, *University of Aberdeen*

Caroline Millman, *University of Manchester*

Helen Gordon, *University of Aberdeen*

Helen Taft, *Bangor University*

Campbell Skinner, *Bangor University*

Plant Health

Assessing the Potential Rural Impact of Plant Disease

Principal Investigator Peter Mills, Harper Adams University College

petermills@harper-adams.ac.uk

Research team:

Mike Jeger, *Imperial College*

Brian Ilbery, *University of Gloucestershire*

Damian Maye, *University of Gloucestershire*

Alan McLeod, *Food and Environmental*

Research Agency

Stephane Pietravalle, *Food and Environmental Research Agency*

Governance

The Governance of Livestock Disease

Principal Investigator Graham Medley, University of Warwick

graham.medley@warwick.ac.uk

Research team:

Wyn Grant, *University of Warwick*

Laura Green, *University of Warwick*

Jonathan Cave, *University of Warwick*

Habtu Weldegebriel, *University of Warwick*

Justin Greaves, *University of Warwick*

David Carslake, *University of Bristol*

John McEldowney, *University of Warwick*

Mat Keeling, *University of Warwick*

Knowledge Sources

Assessment of Knowledge Sources in Animal Disease Control

Principal Investigators Brian Wynne, Lancaster University

b.wynne@lancaster.ac.uk and

Louise Heathwaite, Lancaster University

louise.heathwaite@lancaster.ac.uk

Research team:

Maggie Mort, *Department of Sociology, Lancaster University*

Rob Christley, *University of Liverpool*

Robert Fish, *University of Exeter*

Sophia Latham, *University of Liverpool and*

National Centre for Zoonosis Research

Zoe Austin, *Lancaster University*

Jonathan Wastling, *University of Liverpool*

Roger Pickup, *Lancaster University*

Memory and Prediction

Lessons from Dutch Elm Disease in Assessing the Threat from Sudden Oak Death

Principal Investigator Clive Potter, Imperial College

c.potter@imperial.ac.uk

Research team:

Isobel Tomlinson, *Soil Association*

Tom Harwood, *Commonwealth Scientific and Industrial Research Organisation, Canberra*

Jon Knight, *Imperial College*

Joan Webber, *Forest Research*

Alan MacLeod, *Food and Environmental*

Research Agency

Susana Mourato, *London School of Economics*

Simon Leather, *Imperial College*

Lyme Disease

Assessing and Communicating Animal Disease Risks for Countryside Users

Principal Investigator Chris Quine, Forest Research

Chris.Quine@forestry.gsi.gov.uk

Research team:

Julie Barnett, *Brunel University*

Andrew Dobson, *University of Oxford*

Afrodita Marcu, *Brunel University*

Mariella Marzano, *Forest Research*

Darren Moseley, *Forest Research*

Liz O'Brien, *Forest Research*

Sarah Randolph, *University of Oxford*

Jennifer Taylor, *University of Oxford*

David Uzzell, *University of Surrey*

Relu Interdisciplinary Fellowships:

Disease History

Reinventing the Wheel? Farm Health Planning 1942-2006

Abigail Woods, Imperial College

a.woods@imperial.ac.uk

Bovine TB

Science Communication on Badgers and TB

Angela Cassidy, University of East Anglia

angela.cassidy@uea.ac.uk

Growing concerns: Animal and plant disease policy for the 21st century

Rural Economy and Land Use Programme Briefing Series No 14
by Anne Liddon September 2011

Contributions from Relu stakeholders and researchers are gratefully acknowledged. Particular thanks to Stephen Hunter for all his invaluable assistance.

Further reading:

Lowe, P., Phillipson, J., Green, L.E., Hunter, S., Jeger, M.J., Poppy, G.M. and Waage, J. (eds) (2011) Interdisciplinary Perspectives on the Management of Infectious Animal and Plant Diseases. Theme Issue of Philosophical Transactions of the Royal Society B, 366 (1573)

The Relu policy and practice note series, available at:

<http://www.relu.ac.uk/news/policyandpracticenotes.htm>

The Rural Economy and Land Use Programme is a £25 million interdisciplinary research programme, funded by an unprecedented collaboration between the Economic and Social Research Council (ESRC), the Biotechnology and Biological Sciences Research Council (BBSRC) and the Natural Environment Research Council (NERC) with additional support from Defra and the Scottish Government. It runs from 2003 to 2012 to investigate the strategic challenges facing the UK countryside.

Rural Economy and Land Use Programme
Centre for Rural Economy
School of Agriculture, Food and Rural Development
Newcastle University
Newcastle upon Tyne
NE1 7RU

Telephone: 0191 222 6903
Email: relu@ncl.ac.uk
www.relu.ac.uk

Rural Economy and Land Use Programme Briefing Series No 14
Growing concerns: Animal and plant disease policy for the 21st century, September 2011
Design www.infinitdesign.com.





