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Lost in Translation: Assessing knowledge sources, exchange and effectiveness in animal disease control

A Rural Economy and Land Use project investigating uncertainty in animal disease management in order to help develop more integrated and effective strategies.

Policy and Practice Notes

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The Rural Economy and Land Use Programme is a UK-wide research programme carrying out interdisciplinary research on the multiple challenges facing rural areas. It is funded by the Economic and Social Research Council, the Biotechnology and Biological Sciences Research Council and the Natural Environment Research Council, with additional funding from the Scottish Government and the Department for Environment, Food and Rural Affairs.

Animal and zoonotic diseases cause major environmental, social, health and economic problems globally. If uncontained they have potentially devastating consequences for communities. Containment strategies vary in scale and scope, from planning and prevention policies through to critical outbreak responses. Quick and timely decisions are often required as new information becomes available, at every stage of disease containment, but such information is often compromised by uncertainty. An open, holistic, and interdisciplinary approach to relevant knowledge sources is called for.

What do we mean by uncertainty?

Uncertainty is present whenever knowledge and understanding are weak, unsettled or inadequate, but also arises due to inherent (and often unpredictable) variability in systems and processes.

— Uncertainties may range from those associated with a particular procedure or technology, through to the relationships within and between organisations concerned with containing disease.
— Knowledge may be lost in the process of translating it from research into the practical implementation of disease containment. This can lead to further uncertainty.

Why is an interdisciplinary approach needed?

An interdisciplinary approach to understanding these issues is essential because:

— While many of these uncertainties are linked to scientific approaches, technologies and innovations, they are rarely quantifiable and benefit from social science approaches to improve understanding.
— Typical risk assessment and containment strategies may ignore the human dimension and social science knowledge, and yet what counts as a disease, its impact and the effectiveness of controls, are often inherently socio-technical judgements.
— Learning from stakeholders is important, whether they are policy practitioners, scientists, farmers or veterinarians.

Which diseases were investigated?

Animal diseases vary greatly in their biological characteristics, risk to human health, scale of threat, degrees of urgency, and the challenges they pose for strategies of containment.

The research took a cross-disease approach using three contrasting diseases:
— **Foot and Mouth Disease**: A highly infectious disease mainly affecting farm livestock. Causes a fever, followed by blisters and ulceration around the mouth and feet. Severe economic and societal consequences of outbreaks.
— **Avian Influenza**: A viral disease of both wild and domestic birds. Can cause risks to human health and significant economic losses. Potential for transformation into a pandemic disease of humans is a great concern for world health policy.
— **Cryptosporidiosis**: Gastrointestinal disease in animals and humans caused by ingestion of the water-borne parasite *Cryptosporidium*. Responsible for between 3000–6000 human cases of illness per year in the UK.

As evidence the researchers used secondary data from social and natural science databases and combined these with interviews and focus groups, as well as disease-specific workshops with stakeholder groups.

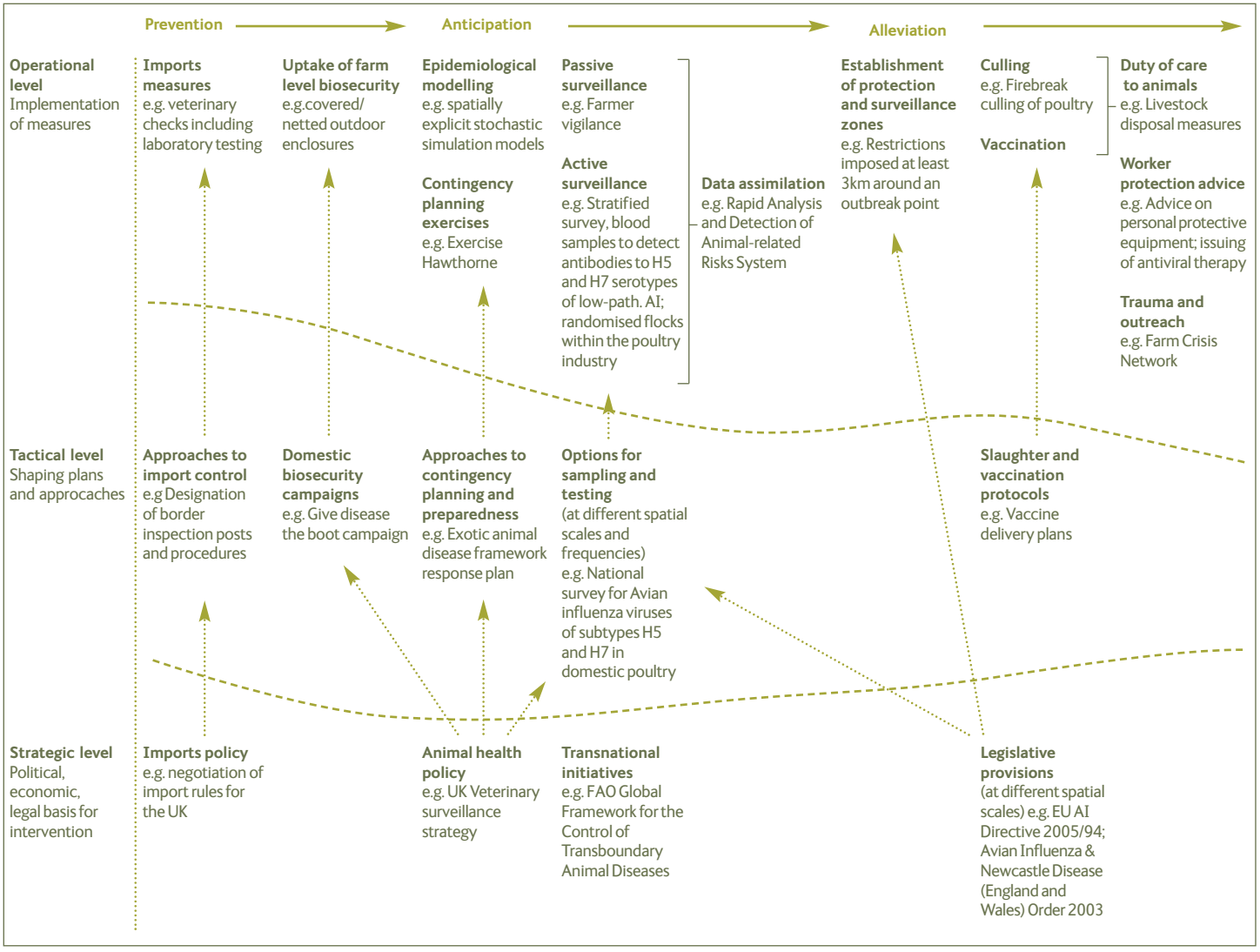
What are the different arenas of action in disease management?

Prevention *(Reducing the occurrence of animal disease)*	e.g. Constraining disease transmission within livestock populations or changing livestock management practices
Anticipation *(Predicting and preparing for disease outbreaks)*	e.g. Experimental modelling of disease scenarios and the design and testing of contingency planning arrangements
Alleviation *(Responding to disease occurrence)*	e.g. Procedures adopted to control and eradicate disease and manage the long-term repercussions of outbreaks

How does policy influence disease management?

The strategic level *(Structures and processes that shape containment)*	e.g. The use of legislation to mandate stakeholders to act on disease risks, such as continuous sampling in the UK under the 1999 *Cryptosporidium* Regulations
The tactical level *(Procedures and tools for decision making)*	e.g. Elaboration of criteria for intervening in disease outbreaks, such as the creation of surveillance protection zones
The operational level *(Practical contexts of disease containment)*	e.g. The process of vaccinating birds or livestock or the implementation of biosecurity measures at livestock markets

The cycle of disease containment applied to Avian Influenza (Fish et al 2011)



What is uncertain?

A range of uncertainties may occur at different levels of disease management. For example, in the case of Avian Influenza:

	Strategic	Tactical	Operational	
Priority given to disease	*	*		May vary with reference to human/animal health by different organisations
Changes in regulation	*			Mainly in response to outbreaks rather than planned
Research & development		*		Lack of funding for some diseases
Role of industry	*	*	*	Funding and innovation may only happen when legislation forces action
Animal & land management		*	*	Some production methods may conflict with mitigation measures and biosecurity
Stakeholder communities	*	*	*	May cause complexity in cross-agency working and collaboration
Development of new technologies	*	*	*	May be too costly and difficult to integrate with existing practices
Use of new and existing technologies	*	*	*	Innovations such as vaccines, detection technologies and mathematical modelling may bring new uncertainties
International differences	*	*	*	Regulation and containment strategies may hinder management, particularly for transboundary diseases
Behaviours	*	*	*	Behaviour of communities or individuals difficult to predict in contingency planning
Outbreak response objectives	*	*		Can vary, leading to disproportionate alleviation policies
Role of individual	*	*	*	When key individuals leave an organisation there may be institutional memory loss

What are the implications for policy and practice?

- Policy makers should continue to take an interdisciplinary approach, combining economic and social as well as technical perspectives.
- Policy should aim to improve communication between sectors (e.g. between the policy sector and the livestock industry and between animal and human health communities) especially regarding information on uncertainties.
- When designing regulation, policymakers should consider how issues of scale (both within the UK and up to EU/international levels) can increase complexity.
- The processes that drive the prioritisation of disease management by different organisations needs to be made more transparent in order to facilitate more co-ordinated responses to disease risks.
- A common understanding of existing uncertainties is needed as a basis for collective and authoritative priorities for managing disease. Currently, the perception and understanding of uncertainties vary dramatically between different stakeholders.
- Institutional memory is important in the translation of knowledge from science to policy. Expertise can be lost over time and mechanisms need to be put in place to address this across all scales, stages and levels of disease management.
- Trust in 'authorities' needs to be enhanced in order to improve uptake of regulations and policy change. Problematic decisions or policy implementation can create a lack of enthusiasm for new legislation or uptake of novel guidelines.

Further information

The research has been carried out at the universities of Lancaster and Liverpool.
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Project Website: http://www.relulostintranslation.co.uk/

Useful resources: Fish, R., Austin, Z., Christley, R., Haygarth, P.M., Heathwaite, A.L., Latham, S., Medd, W., Mort, M., Oliver, D.M., Pickup, R., Wastling, J.M., Wynne, B. (2011) Uncertainties in the governance of animal disease: an interdisciplinary framework for analysis. Philosophical Transactions of the Royal Society B 366, 2023–2034

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