

# The governance of livestock disease: putting epidemiology in context

A Rural Economy and Land Use project investigating the control of endemic disease in livestock



## Policy and Practice Notes

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**Persistent (or “endemic”) diseases of livestock are numerous and common. They impose considerable costs on production and suffering on animals. Biological, economic and political processes, including the efforts of producers and Government to control the disease or mitigate its consequences, determine the epidemiology of a disease (which animals and herds are affected and when). How can policy on the control of animal disease take all these factors into account?**

## Which diseases are endemic?

**For a disease to be continually present in UK livestock it must survive in the political, biological and economic spheres:**

- **Political:** The political profile of a disease is largely driven by whether it can cause disease in humans, its public profile (its relation to animal welfare or wildlife conservation) and its significance to international trade. Higher profile diseases are more likely to be eliminated, but may persist if there are technical and political barriers to elimination (e.g. bovine tuberculosis). Lower profile diseases may be eliminated if there are strong economic incentives (eg warble fly).
    - High political profile diseases such as BSE and foot and mouth disease typically provoke legislation, requiring Government to act to eliminate them. The legislation often derives from international trade agreements and international law that force Government intervention.
    - Low political profile diseases such as mastitis or infectious bovine rhinotracheitis receive relatively little Government attention or funding. They are typically considered “production diseases” or “industry problems”.
    - The difference in Government funding, public profile and legal position locks each disease into a public or private status that may bear little relationship to its actual impact on production, health and welfare.
  - **Biological:** The pathogen/infection has to survive in a herd (animals that are managed together) or meta-herd (group of herds connected by movement of animals, people or equipment that might transmit infection). Persistence is enhanced by mechanisms such as:
    - Carrier animals – individuals that are infected for life (e.g. with herpes virus diseases such as infectious bovine rhinotracheitis).
    - Environmental contamination – where the pathogen survives in premises, wild populations, etc. (e.g. the bacteria that cause Johne’s disease).
  - **Economic:** Farms are commercial enterprises, and disease-related reductions in production (growth, fertility, survival, etc) or the perceived risk of such impairments determine farmers’ decisions about control of disease.
    - Farmers might be able to mitigate loss and/or manage the associated risks as well as, or instead of, controlling a disease.
    - Financial viability of the herd and farmer’s actions are influenced by the farm’s economic environment including market reactions and policies such as farm subsidies, compensation for disease etc.
    - These forces, in turn, depend on the information available to stakeholders (including consumers), the incidence of costs (e.g. insurance and legal liability for disease-related losses), regulatory constraints on individual farmers and the structure of animal movements (sales, grazing, etc).
- Endemic diseases exploit disconnects between the biological, economic and political domains, especially differences in objectives, incompatibility of tools and over-reliance on one aspect (e.g. biological measures or market forces).

## What determines the epidemiology of endemic disease?

**In the absence of any concerted control programme, the epidemiology is determined by biological, social and economically-motivated processes operating at different levels.**

- **For an individual animal** the risk of infection is determined by the prevalence of infection in the herds/premises to which the animal belongs throughout its life.
- **For an individual herd** the pattern of infection is determined by contamination of the herd premises and transfer of infection between farms, especially through movement of animals.
- **Within the meta-herd** the pattern of infection is determined by the movement of animals between herds. Some diseases (e.g. bovine viral diarrhoea) probably have to move between herds to persist since their biological characteristics mean they will naturally fade out in all but the smaller herds. Other diseases (e.g. neosporosis, Johne's disease) can persist in the smallest of herds, and are transported to others through movement of infected animals.

## What influences control and control options?

**Currently, endemic diseases are controlled at the herd level by individual farmers, relying on the information available to them. Information, like disease, flows in networks and the influences include veterinary advice, other farmers and the Government.**

The control a farmer chooses to apply is determined by the technical ability to diagnose, treat and vaccinate, combined with the perceived potential commercial and welfare consequences of disease, expected costs and uncertainty of control and social norms.

Individual farmers' actions lead to changes at the meta-herd level that might be beneficial (e.g. vaccination) or detrimental (e.g. preferentially selling infected animals) to other herds. It is this linkage that complicates control and regulation:

- Farmers without the disease in their herd have a competitive advantage.
- Farmers who remove the disease from their herd/farm will enjoy an economic benefit, but other farmers also benefit from a reduced risk of moving infection into their herd. This leads to the "free-rider" problem, ie farmers who do nothing benefit from the actions of all the others without bearing the costs of control.
- Farmers might eliminate the disease from their herd, but there will always be the possibility of reintroduction from the meta-herd in the absence of concerted effort.
- Uncertainty about other farmers' actions can lead to inappropriate risk transfer and hedging, instead of risk reduction and efficient reallocation of resources.



## Could more co-operative action help?

**Successful long-term disease control to improve livestock production, health and welfare generally has to operate at the meta-herd level. This requires co-operative, concerted action from all farmers who exchange livestock:**

- A well-designed self-regulatory structure with wide participation, attention to information collection and sharing, and strong adherence to transparency and accountability principles could foster co-operation and effective intervention at meta-herd level.
- Mandatory routine testing and reporting, paid for by those who benefit from reducing uncertainty and improved disease management, would provide further incentives for meta-herd intervention.
- Government and industry initiatives might spread the costs and encourage concerted action, but care has to be taken to avoid the free-rider problem.
- Information is critical, both as a foundation for policy-making, and as an instrument of transparent, proportionate and effective intervention. The Animal Health and Welfare Board for England must have access to well-informed scientific advice if it is to enhance the development of co-operative action.

## Further information

**This research has been carried out at the University of Warwick.**

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**Project Website:** [http://www2.warwick.ac.uk/fac/cross\\_fac/gld](http://www2.warwick.ac.uk/fac/cross_fac/gld)

**Useful resources:**

<http://www.defra.gov.uk/animal-diseases/>

<http://www.bis.gov.uk/bre>

## What are the implications for policy makers?

**There are significant implications for policymaking on endemic disease control:**

- The status of diseases should be challenged. The allocation of resources to specific diseases should take into account the true impacts of the disease, the potential for policy to influence the disease, market developments and farmer behaviour.
- Efforts to control endemic disease will be sub-optimal if left to individual farmers' decisions. Policy support to create co-operative, concerted action is necessary.
- Individual farmers should be bound by rules that encourage appropriate precautions and control and discourage behaviours that spread disease. These must be enforced by an overarching regulatory body.
- Policy interventions should also take into account, and seek to exploit, market forces and incentives to ensure compliance:
  - Livestock buyers should be made fully aware of any known risks of possible infection in the herd from which they are purchasing. The influence on market prices would increase the incentive for farmers to eliminate disease from their herd.
  - Disclosure of such information by sellers should be mandatory, and there should be more objective assignment of risk liability.
  - Policy should take the relative influence of different players into account, for example the significant power wielded by large retailers within the livestock value chain.
  - The flows of animals, information, money and disease among farms should be actively monitored in order to identify emergent problems and balance the effectiveness and proportionality of policy interventions.
- Regulatory arrangements, in particular those aimed at improving coherence and effectiveness by cost- and responsibility-sharing, should be explicitly based on Better Regulation Principles as set out by the Department for Business, Innovation and Skills.
- The Animal Health and Welfare Board for England needs to apply a systematic framework for risk and cost sharing. Stakeholders must be engaged in the development of this framework and public support will have to be engendered if the new Board is to gain legitimacy.