Joint (Industry/Government) Working Group on Sharing Responsibility and Costs of Animal Disease

The Economics of Risk Management in Exotic Animal Disease

Introduction

1. Economic appraisal will be required to assess the costs and benefits of alternative options for cost sharing schemes. An appraisal will need to show the final incidence of costs and benefits, so that the Government can determine how well this meets its objectives for a sustainable farming industry. It will also need to identify which options perform better in reducing the net economic cost to society of animal disease. This paper identifies some of the features of risk management arrangements that will have significant impacts on costs and benefits and their final incidence.

Background

2. The context for this analysis is work being taken forward by the Joint Government/Industry Working Group on sharing responsibilities and costs in dealing with outbreaks of exotic disease.

3. Arrangements for dealing with exotic disease outbreaks generally involve 3 distinctive elements:

a) direct action by government agencies;
b) compulsory slaughtering of livestock and other restrictions and obligations on businesses;
c) compensation for the costs imposed as a result of (b).

4. The direct costs associated with exotic disease control include:

a) Slaughter
b) Haulage
c) Disposal
d) Veterinary input
e) Administration
f) Serology
g) Vaccination
h) Cleansing and disinfection
i) Loss of economic value of slaughtered animals

5. In addition, there will be indirect costs to farm (and other) businesses that are consequential to an exotic disease outbreak. These losses include business interruption, lost market access, lost genetic stock, and increased surveillance and testing costs, and may, in some cases, exceed the direct costs of controlling the disease outbreak.

Market Failure and Rationale for State Involvement

6. As explained in the Animal Health & Welfare Strategy (2004)[1], Government intervenes in animal health for a number of reasons where the market on its own cannot deliver some or all of the objectives.

(i) To protect human health against "zoonotic" diseases[2].

(ii) To protect the interests of the wider economy, environment and society against the spread of infection.

(iii) To maintain disease free status for notifiable diseases in order to trade without restrictions.

In addition to specifically animal health reasons, the Government also has an aim to protect and promote the welfare of animals.

7. Market failure arguments, as sketched out in Annex A, lead towards the conclusion that government intervention in disease control strategies are highly desirable in the form of:

(i) compulsory culling for disease control purposes;
(ii) a suitable framework of regulations and incentives (including compensation for culled animals) to encourage early reporting of disease outbreaks;
(iii) promotion of financially viable effective risk management strategies on the part of private and public stakeholders,

Who should pay?

8. The Farm Regulation & Charging Strategy reviewed how disease risks are managed and costs are shared between the livestock industry and government in other countries. Denmark, the Netherlands, France, Germany and Australia all use some form of production levy. The main lesson from these countries is that where industries share the costs of managing disease risks with government, there is greater participation by their members in reducing risk on farms. Industry also has a bigger say in how a particular disease outbreak is managed.

9. Defra's Charging Handbook (2005) sets out 6 practical factors that are relevant to cost sharing arrangements and the following 5 important principles.

i. The polluter, risk owner or beneficiary pays[3]. As the Handbook implies, it is not always straightforward to identify 'beneficiaries'

[1] Animal Health and Welfare Strategy for Great Britain (2004), pp 28-29

[2] those which are transmissible between vertebrate animals and man.

[3] Such identification always begs questions about what rights people are endowed with in the beginning. For example, does the right of international tourists to travel freely carrying whatever they

and 'polluters'. Such indeterminacy is particularly significant in the case of animal diseases.

ii. If the regulated do not obviously conform to the description of polluter, risk owner or beneficiary then the taxpayer pays all or part of the cost of the regulatory service

iii. Aim for full cost recovery

iv. Charges paid by the individual or firm should broadly reflect the cost incurred by the regulator in regulating that firm or individual.

10. The first principle recognizes that in general efficiency is served best when those who are in a position to take important decisions affecting disease risks also bear the costs arising from their decisions. There are 2 relevant types of decision: one consists of decisions about measures to prevent or control disease; the other consists of decisions to invest or not in the disease-susceptible enterprise. In the case of exotic disease, EU and member state governments and the general public are the main agents to take effective action to prevent disease from entering the country, although farmers' own biosecurity measures would provide an additional line of defence. The government's contribution to disease costs should reflect its contribution to disease control, so that it faces incentives to take beneficial action. In diseases that spread slowly and which can easily be managed on individual farms, on the other hand, it would be efficient for the farmers to bear more of the cost, as high levels of government contribution would deliver an element of production subsidy. Zoonotic disease inflicts risks on the wider community, which investors should have to take into account when deciding whether to enter or exit the industry. Therefore, farmers should bear some of the costs of the public health risks caused by their business.

11. In Australia criteria along similar lines are used to classify diseases into four categories and the proportions of government and industry funding are varied accordingly.[4]

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like take precedence over the right of livestock keepers to an environment free of dangerous pathogens?

[4] Category 1 diseases (funded 100% by government) are those that predominantly seriously affect human health and/or the environment (depletion of native fauna) but may only have minimal direct consequences to the livestock industries. Category 2 diseases (funded 80% by government and 20% by the applicable industry(s)), have the potential to cause major national socio-economic consequences through very serious international trade losses, national market disruptions and very severe production losses in the livestock industries that are involved. Category 3 diseases (funded 50% by government and 50% by the applicable industry(s)), are of moderate public impact that have the potential to cause significant (but generally moderate) national socio-economic consequences through international trade losses, market disruptions involving two or more states and severe production losses to affected industries, but have minimal or no effect on human health or the environment. Category 4 diseases (funded 20% by government and 80% by the applicable industry(s)), are those that could be classified as being mainly production loss diseases. The main beneficiaries of the successful emergency response to an outbreak of such a disease would be the affected livestock industry(s).

In the case of a disease affecting only one species, that industry alone bears the industry proportion of costs to be shared. Where more than one animal species is affected by a disease, the contributions from the affected industry parties takes account of both the gross value of production (GVP) of each industry and the importance of that particular disease for that industry.

Who will bear the final incidence of costs?

12. If an animal disease levy were to be introduced to create a fund out of which the industry contribution to controlling a disease outbreak would be met, a question arises as to the incidence of the actual charge. Given that livestock outputs are normally internationally traded and demand for the major UK outputs can be expected to be very responsive to prices, there will be little scope for passing through any increased costs arising from UK-specific charges. However, if as expected, the Community introduces a harmonised cost sharing scheme, then this should not put English livestock producers at a competitive disadvantage vis-à-vis other Member States. An illustration of the possible impact of a hypothetical levy on English livestock producers' farm types is provided in the accompanying note : Farm-level Costs of the Livestock Disease Levy, using hypothetical rates.

Risk Responsibility

13. In designing a possible levy, it would be desirable to vary levy payments so that they reflect livestock managers' effectiveness in dealing with disease risk. If a prudential element were not included in the scheme, farmers might be encouraged to neglect risks that did not impact on profits. Hence, it would be desirable to vary levy payment rates for individual farms to encourage good livestock husbandry that would reduce disease incidence.[5] Rebates or "bonuses" would be based on, for example, high biosecurity and farm hygiene standards[6]. In addition to specific biosecurity practices, modulating the levy rates to reflect the elevated risk factors associated with certain husbandry systems could be helpful. See hypothetical rebates that are outlined in Section 3 of the accompanying note: Farm-level Costs of the Livestock Disease Levy. In the event that levy rates were a very small proportion of total farm costs, the incentive effects would of course be weak and this issue would assume a lower importance.

Prospective vs retrospective funding

14. The manner in which the payment scheduling would be arranged may also have a bearing on risk management. There are basically three options:

i. a standard advance levy calculated on the basis of epidemiologically determined risk factors;
ii. a retrospectively determined levy based on costs arising from actual disease outbreaks;
iii. a combination of the two[7].

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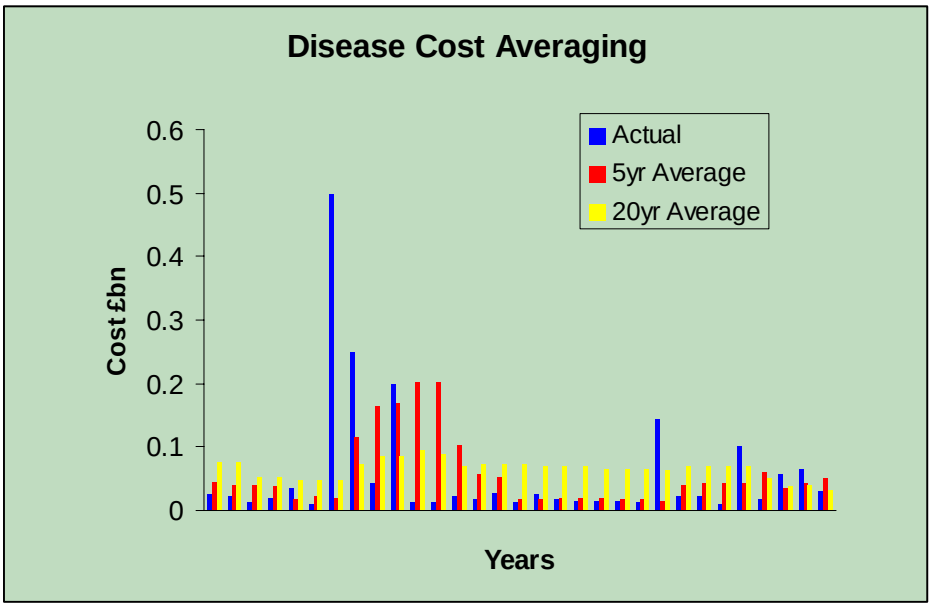
[5] These incentives for good practice would be in addition to standard basic liabilities which certify that the insured would be denied compensation for deliberate malfeasance.

[6] Organising a system of verification may take some time but it could potentially be linked in due course to farm health planning and other inspection schemes.

[7] In some Continental EU member states some form of statutory system to co-finance the direct losses (that are not compensated by EU funding) involve variations according to the needs of the fund. Annex B describes these.

15. Any retrospective scheme would need to average levy payments over a number of years. Generally speaking the longer the averaging period over which the costs of a disease outbreak are paid, the smoother the payments profile will be, as illustrated in Figure 1. An actuarially calculated prospective levy would probably need to be based on the same historic data, therefore the initial levy rate for a retrospective scheme would converge on the levy rate for a prospective scheme as the averaging period was lengthened.[8]

Figure 1



16. Advance payments will tend to highlight to farmers the on-going disease risks that they face and provide a useful signal to guide long-term investment in the sector. On the other hand retrospective payments better reflect the actual costs for which producers, as a group, would in part have some responsibility and therefore provide incentives to reward good collective performance. If producers are paying an amount in advance to cover full contingent liabilities over time and no significant disease outbreak occurs for a lengthy period, considerable dissatisfaction would be likely among levy payers. Conversely, a string of severe outbreaks in close succession would also create strong incentives to abandon a retrospective scheme or leave the industry, thus inflicting even higher residual liabilities on other farmers and/or the government.[9] Some elements of retrospective payment are part of cost sharing schemes abroad, e.g. Germany, Belgium and Australia.

[8] In addition, a prospective scheme might incorporate information not contained in the historic data, such as the discovery of an effective new vaccine.

[9] Farms/businesses might either be forced to close or would choose to close, but the scheme agreement would be with the relevant producer' organisations and the levy would be compulsory on all registered farms in the particular industry, so if some go out of business the rest would have to pay the industry share. There would be a financing cost in making upfront payments to cover the costs after an outbreak which were then repaid from revenue over the succeeding years. These would be met by either the Government in a State-sponsored system or by a bank in a private-based scheme (as is the case in the Netherlands). However the repayments could include appropriate interest charges.

17. An appropriate solution might be to combine elements of both advance and additional retrospective payments into one scheme.[10] The balance of that combination should be weighted towards prospective funding, both to highlight the long-term underlying risk and to enable the fund to become self-sustaining as soon as possible.

18. In some countries, levies are capped so that the state bears any cost over a certain threshold. For a given percentage share of long-term disease costs, a lower threshold would imply a larger fixed element of the levy or extending the period over which levy contributions were averaged. A cap based on a percentage of enterprise output value would help to keep levy rates in line with ability to pay, whereas other ways of reducing variability in levy rates might have the opposite effect, given that output value would fluctuate for reasons independent of disease costs (such as exchange rates). There might therefore be a case for setting the rate of a prospective levy as a percentage of output value rather than as a flat rate.

Conclusion

19. This paper has looked at a number of key economic factors that are relevant to deciding how to share the responsibilities and costs for livestock diseases. The costs and benefits of a levy based cost sharing scheme have been shown to be heavily influenced by the incentive properties of the funding arrangements. In particular, incentive effects will arise from:

a. the levy shares for different categories of disease;
b. the degree to which individual farmers' contributions are risk-rated; and
c. the degree to which levy contributions respond to historic disease costs.

20. The Working Group may wish to consider how these factors could most practically and usefully be manipulated. It may also wish to recommend the relative priority to give to the following features:

i. perceived fairness of the system as against its potential for reducing costs;
ii. administrative cost and simplicity as against rewarding good husbandry.

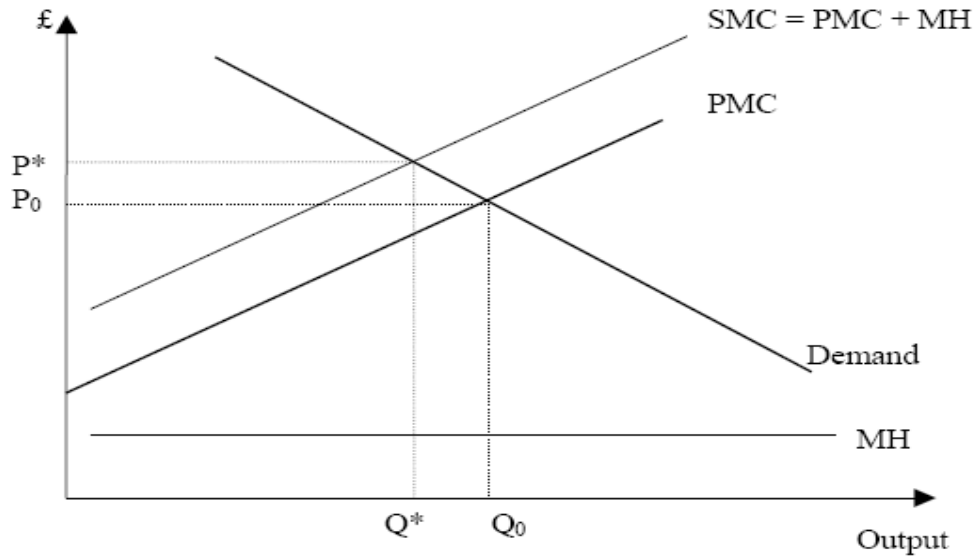
[10] See Van Asseldonk, 2002, p. 21

Annex A

1. Several potential sources of market failure arise in relation to livestock disease. Externalities are the primary problem, exemplified by the transmission of livestock disease from one farm to another and by the transmission of disease from livestock to humans. When situations arise in which uncompensated third party harm stems from the actions of a given individual or organisation, externalities are said to exist. A potential for inefficiency arises from the fact that the third party side-effects may not be fully taken into account in relevant private decisions. In particular, a divergence could arise between the costs that an individual/business would face from engaging in a particular level of high-risk (disease prone) detrimental farming activity and the total costs that this activity could give rise to when impacts on all parties are taken into account. This can result in an inefficiently high level of the potentially harmful activity being undertaken.

2. A simple graph of the effects of a negative externality resulting from the production of a high-risk product might help to illustrate the consequences. Assuming for illustrative simplicity a perfectly competitive market, the market level of production is determined by the intersection of the private marginal cost (PMC) of production curve and demand. However in addition to the normal representation, if one now assumes that each unit of production gives rise to some level of risk-related[11] expected marginal cost, or expected marginal harm, equal to MH, the social marginal cost of production (SMC) would be equal to PMC + MH.

Figure 1: Illustration of market failure resulting from a negative externality



[11] This can be determined on a probabilistic basis at the aggregate level and is assumed here for simplicity to be constant.

3. It is the intersection of this expected social marginal cost curve with demand that gives the socially optimal level of output and price (Q*, P*). It can be seen that given the probability of risk factors, the socially optimal output level would be lower than the actual market equilibrium level (Q_0). It is this divergence that gives rise to the identification of a probable 'market failure' in this context and underpins the rationale for governmental intervention. When this latter effect becomes significant, issues arise around the most appropriate precise role for the State.

4. In principle, these externalities could be resolved through private litigation or through bargaining between the parties, but in reality these potential solutions are inefficient because they typically involve huge transaction costs. Hence, state regulation and direct action, such as compulsory slaughtering, testing or border controls, turn out to be more efficient. However if there were a potentiality for a private insurance market to exist, a possible 'moral hazard' issue could arise for prospective private insurers, namely that the government may shift costs onto producers rather than take efficient but costly or unpopular countermeasures in the knowledge that insurers would ultimately pay. Furthermore, low-frequency and massive-impact events, such as a FMD epidemic, are particularly difficult for the insurance industry to accommodate because of the dual difficulty of assessing the risk and of diversifying it sufficiently once it materialises. As a corollary of this situation, livestock owners would be concerned about a potential lack of choice between competitors in dealing with insurance providers.

Annex B

1. In Germany and Belgium the schemes, which are compulsory, do not have annually fixed levies and the Government guarantees to partly finance the losses in advance. The compensation payments are made from the available funds and the Government will pay for the costs if the fund runs out of money. The input of the Government will however be repaid over the following years, which means that usually after a disease outbreak the levy increases[12]. In the Netherlands the farmers and the Government have agreed on a bank guarantee system in which the farmers only have to pay in advance a relatively limited levy. The amount of the surcharges will depend on the actual cost of any outbreak. Capital funds that are provided by the bank are paid back in five years by the primary sector through additional assessments. Thus the amount that is payable by the farmer depends mainly on whether or not there were major outbreaks in previous years[13].

[12] Van Asseldonk, M. & Meuwissen, M. , Strategies to Manage Animal Disease Control Costs: Evaluating Risk financing Instruments. (Wageningen University) (for DEFRA), November 2002; pp.17-18

[13] Ibid., p. 18

Annex C

Farm-level costs of the livestock disease levy, using hypothetical rates

1. Introduction

1.1 In determining levy rates Government would need to assess the risk of outbreaks of specific diseases and their severity. This would mean taking into account biosecurity standards prevailing at the time, the animal movements regime, possible means of incursion, how disease could spread, what control measures could be introduced and so on. Assumptions will have to be made about likely expenditure on costs to be covered by the disease levy. Assumptions will also have to be made about the frequency of disease outbreaks and therefore how quickly a disease fund (if a prospective disease fund was to be established) should be built up. Therefore, setting levy rates would require detailed work to be done around the time when an animal disease fund was established. However, for **illustrative purposes,** we have modelled the costs to farms of a **hypothetical** livestock disease levy. The hypothetical levy rates used are based on estimates of disease outbreak costs. This analysis considers three 'contribution scenarios' for the split between the farming industry and government of livestock disease costs:

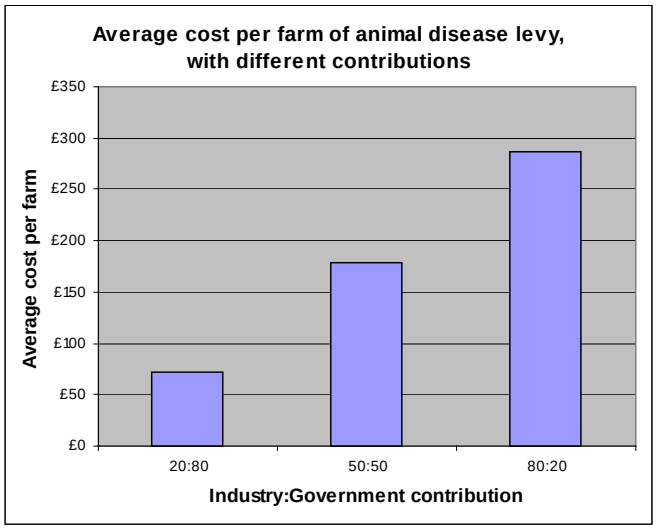
- 50:50 contribution, between Government and a levy payable by industry
- 80% Government contribution; 20% contribution by industry
- 20% Government; 80% contribution by industry

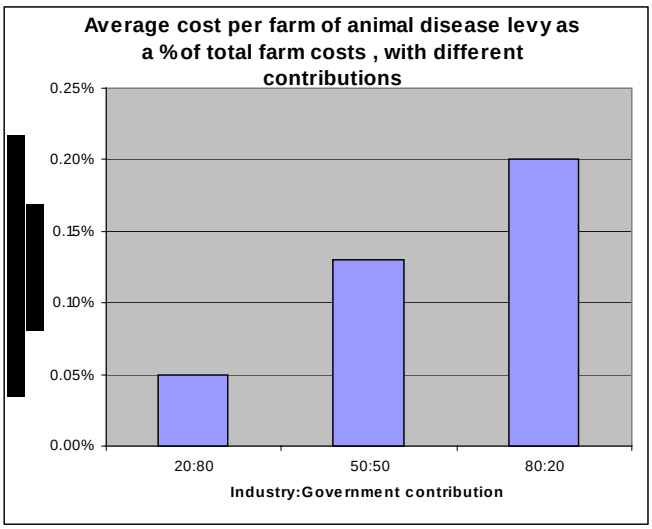
Section 3 explores a scenario where levy rates are reduced to incentivise good biosecurity practices.

1.2 The hypothetical levy rates used have been derived from projections of the costs and likelihood of different disease outbreaks. . More robust calculations of expected disease costs will be needed for a live scheme. The disease outbreak assumptions used are given in section 4.1.

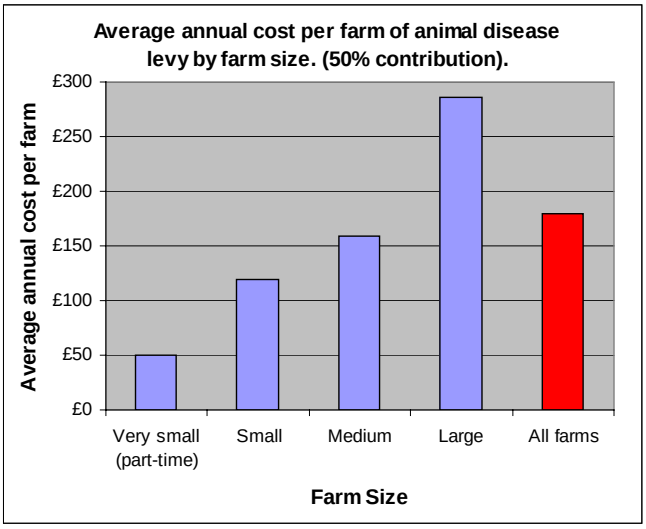
2. Farm-level costings

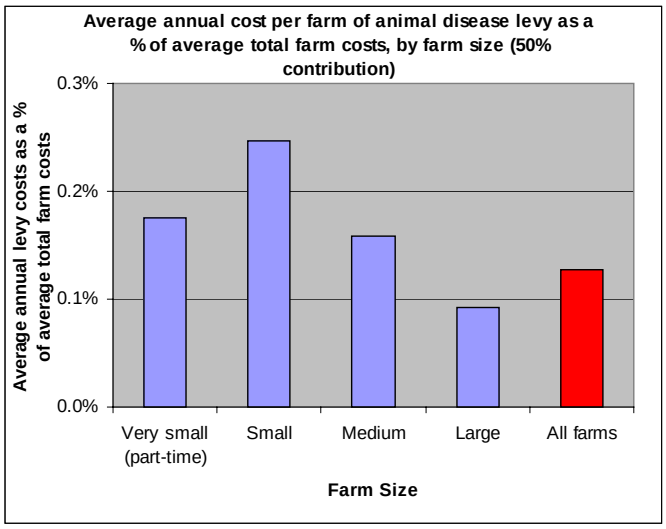
2.1 The average cost of the disease levy per farm is calculated *for those farms that would incur disease levy costs* (i.e. the total cost divided by number of farms with these costs). This average cost per farm is also expressed as a percentage of the average total farm costs, *for those farms that would incur disease levy costs*. Data on livestock numbers and farm costs are taken from the Farm Business Survey (FBS) for 2004/5. These data cover those farms in England that have a labour requirement of at least half a full-time equivalent. These farms account for approximately 96% of production in England. The average costs under the three different contribution scenarios are given below:



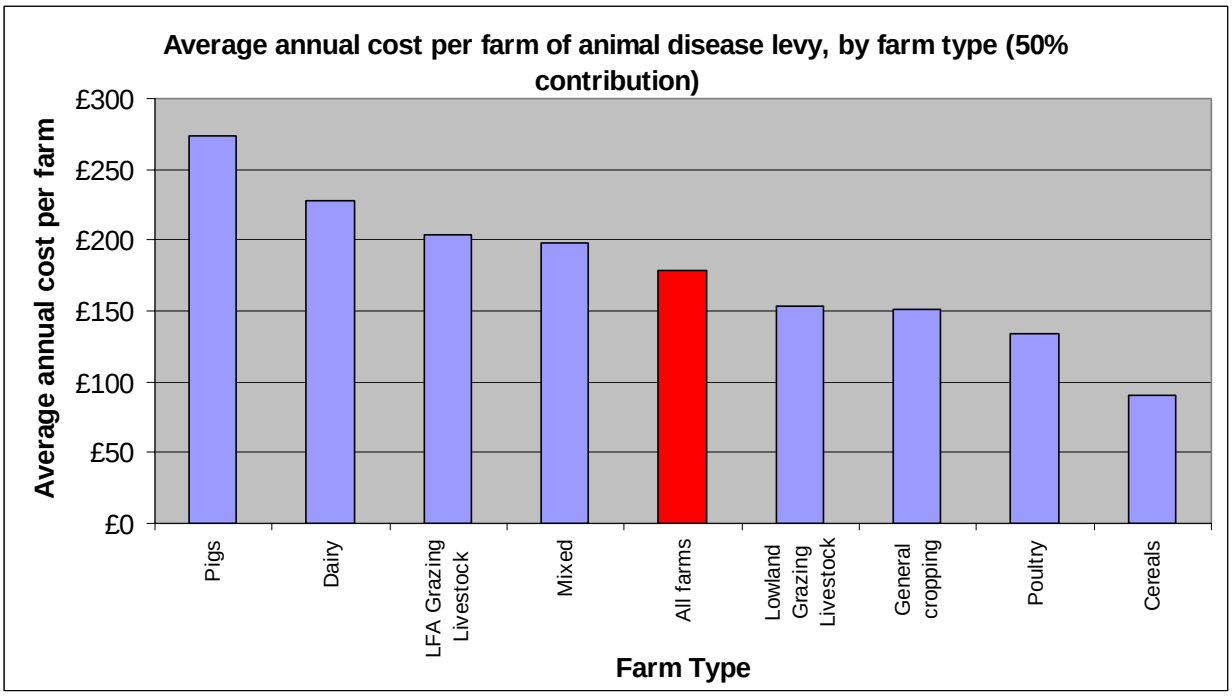


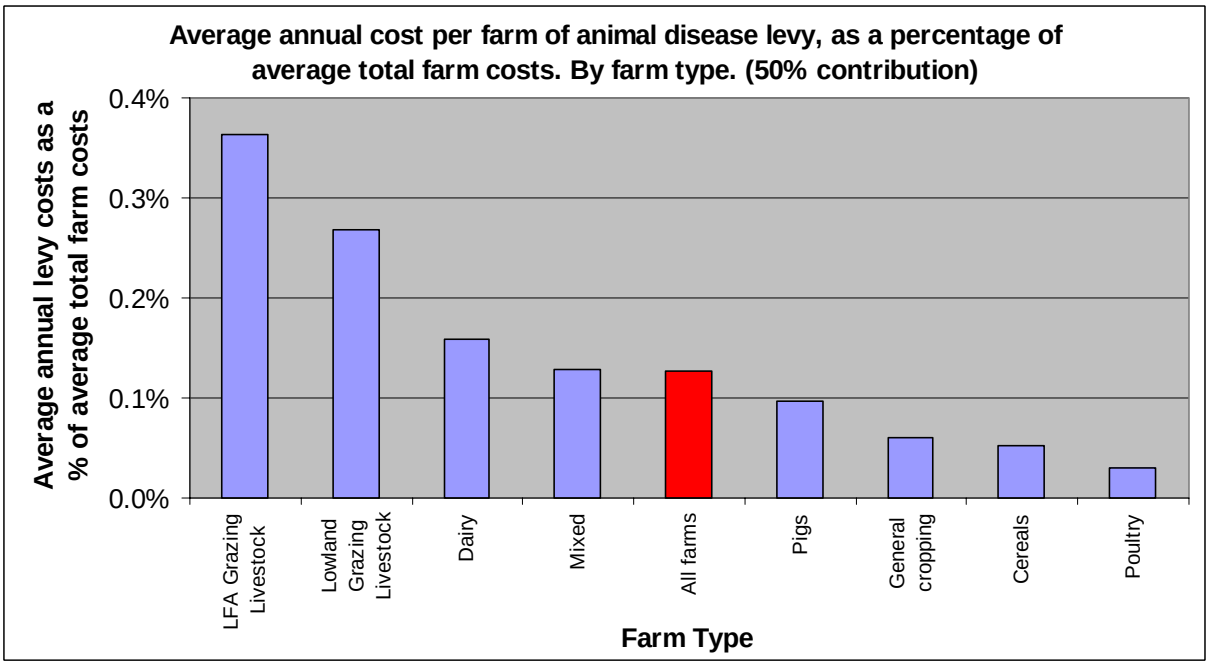
2.2 The following charts give the estimated farm-level costs under the 50% contribution scenario. The first set of charts gives a breakdown by farm *size*; the second set gives a breakdown by farm *type*.





[Farm size defined on the basis of the labour required to operate the farm: Very small = 0.5 - <1 person-years; Small = 1 - <2 person-years; Medium =2 - <3 person-years; Large = 3 - <5 person-years.]





[Farm type is defined based on the *principal* type of output. Therefore, some farms not defined as being livestock farms will still have livestock disease levy costs where they stock animals as well as their principal, non-livestock output.]

3. Levy reductions for farms with good biosecurity

3.1 One option for setting levy rates is to give a levy reduction to those farms that are certified as having good biosecurity, e.g. by being a member of an assurance scheme which includes a biosecurity plan. By encouraging farms to improve their biosecurity these reduced rates would decrease the risk

of an outbreak, thus reducing the levy payments required to cover the *expected* cost of diseases. The following is a **hypothetical** example of how this system of reductions could work:

1. Suppose that if 50% of farms sign up to approved biosecurity measures then the risk of disease outbreak would drop by 25%.
2. Making these improvements to biosecurity and/or being able to provide relevant certification would have some cost for farms. Some farms would however choose to adopt these measures if it meant they would get a reduction in their levy rate. Suppose that a 50% levy reduction would encourage 50% of farms to make the improvements and get certification.
3. This leads to a reduction in total levy payments **from industry** of 25% (50% of farmers receive a 50% reduction in their rates). If the industry:government contribution ratio is 50:50 then **total** contributions will drop by 12.5%.
4. As the risk of disease has dropped by 25%, the **total** contribution from industry and/or government can be lowered by 25% whilst still being able to cover the *expected* cost of outbreaks. If only the **farming** contributions were lowered to reflect the decreased risk (i.e. **government** contribution remained stable) then levy rates could be lowered further than the 50% reduction given to those farms with good biosecurity (step 1). This would equate **total** contributions with total expected costs.

3.2 The size of the levy reductions would be based on estimates of:

- The cost of making biosecurity improvements. The size of the levy reduction would need to be sufficient to act as a financial incentive to encourage enough farms to incur the costs of making these improvements.
- The extent to which the improvements would decrease the risk and cost of disease outbreaks. This would also be dependent on the number of farms that make the biosecurity improvements.

4. Assumptions on disease outbreak costs and levy rates used

4.1 The assumptions used for disease outbreaks (likelihood and costs) are given below. This was based on modelling work carried out in 2003. Further work is needed on updating, expanding and revising these calculations and the levy rates.

Cattle: Assumes that exotic cattle diseases will occur every 10 years and that outbreaks will cost about £124 million (compensation + disease control costs) equivalent to 92,000 animals slaughtered with average compensation of £600/animal and an average disease control cost of £750/head. A 50%

contribution from industry would amount to £62 million over 10 years or £6.20 million per year.

Sheep: Assumes that exotic sheep diseases will occur every 10 years and that outbreaks will cost about £48 million (compensation + disease control costs) equivalent to 300,000 animals slaughtered with average compensation of £60/animal and an average disease control cost of £100/head. A 50% contribution from industry would amount to £24 million over 10 years or £2.4 million per year.

Pigs: Assumes that exotic pig diseases will occur every 10 years and that outbreaks will cost about £ 10.6 million (compensation + disease control costs) equivalent to 62,000 animals slaughtered with average compensation of £70/animal and an average disease control cost of £100/head. A 50% contribution from industry would amount to £5.3 million over 10 years or £0.53 million per year.

Poultry: Assumes that exotic poultry diseases will occur every 10 years and that outbreaks will cost about £4.0 million (compensation + disease control costs) equivalent to 2 million birds slaughtered with average compensation of £1/bird and an average disease control cost of £1/bird. A 50% contribution from industry would amount to £2 million over 10 years or £0.2 million per year.