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Working Party on Agricultural Policies and Markets

MANAGEMENT OF RISKS FROM EPIDEMIC LIVESTOCK DISEASES: OVERVIEW OF KEY ISSUES AND COMPARISON OF COMPENSATION AND COST-SHARING SYSTEMS IN SELECTED COUNTRIES

14-16 November 2011
OECD Conference Center, Paris, France

This document is submitted for DISCUSSION under item 8a) of the draft Agenda of the 55th session of the Working Party on Agricultural Policies and Markets to be held on 14-16 November 2011 at the OECD Conference Center, Paris, France.

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Note by the secretariat

The work on management of risk from animal diseases is mandated under the 2011-12 Programme of Work and Budget of the CoAg under Output Area 3.2.1. 2.1. on risk management and output area 3.2.2.2.1. on non-tariff measures. It was described in the scoping paper [TAD/CA/APM/WP(2011)5]. Two consultant reports have been commissioned to cover two complementary areas, one covering prevention and control systems in selected countries, and the other compensation and cost sharing systems.

The two reports are:

- This paper "Management of risks from epidemic livestock diseases: Overview of key issues and comparison of compensation and cost-sharing systems in selected countries". Prepared by a team from Civic Consulting (Germany), led by **Frank Alleweldt**. [TAD/CA/APM/WP(2011)26].

- And the paper "Management of risks from epidemic livestock diseases: Review and comparison of Prevention and Control systems in selected countries", prepared by a team from Phylum consulting (France) led by Francois Gary, [TAD/CA/APM/WP(2011)27].

These two consultant reports are intended to serve as **background for the discussion during this meeting of the Working Party and for further OECD work, helping to identify possible policy issues and areas where further study might be of interest**. Based on the two background papers and on the discussion that will take place during the Working Party, the Secretariat will prepare a note for presentation during the May 2012 meeting of the APM and whose purpose will be to highlight the main policy issues that arise from these reports and to identify which of those might warrant further study. Delegations are invited to focus on the following questions:

- Are the main elements of the animal diseases risk management systems reflected in these documents? Is there sufficient information to allow a definition of the policy issues?

- What are the policy issues that have most relevance and interest for the working party? Does any of these issues deserve further work by the Working Party?

These two documents are submitted to the Working Party for *discussion*.

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Introduction

Aims

This report presents the results of a study on "Compensation" commissioned by the Organisation for Economic Co-operation and Development (OECD) to assess the management of risks from epidemic livestock diseases in multiple countries. The ToR specified a two-fold objective: 1) to identify a spectrum of different approaches and learn from practices and frameworks to assess and manage risks related to animal diseases; and 2) identify the main policy choices and trade-offs in the design of these systems. Though compensation payable to livestock owners for losses incurred as a result of epidemic disease outbreak control measures was the primary envisioned focus, it was also requested that this report provide an overview of the role of relevant international organisations and regional agreements. To these ends, following collaborative development of a report outline in June 20111, information collection and analysis was carried out by Civic Consulting during July, August, September, and October 2011.

Approach

The report was to be based on 1) publically available information (e.g. websites, literature, and available reports); 2) previous research conducted in the animal health field by Civic Consulting; and 3) interviews with selected experts or organizations, if needed. Accordingly, in addition to consultation of previous relevant reports produced by Civic Consulting, the specified tasks were approached through desk research and – for the five country studies – interviews with compensation scheme-managing public organisations or not-for-profit public companies. Multiple interviews were conducted to produce the case studies for The Netherlands, Germany, and Vietnam, and a single, multi-party interview was held in the case of Canada. Where not otherwise specified the case studies presented in Part II of this report are based on this set of interviews conducted between July and September of 2011, as well as the findings of the previous work undertaken by Civic Consulting.

Interviews were also conducted with senior officials at the World Organisation for Animal Health (OIE), World Trade Organization (WTO), the Food and Agriculture Organization of the United Nations (FAO), and the World Health Organization (WHO) in order to gain insights on the roles of these international organisations in the animal health field. Finally, the descriptions of the pertinent activities of the European Union and the two selected regional trade agreements are based on desk research.[1]

The remainder of the report is structured as follows:

1. Civic Consulting also undertook sustained efforts to interview officials associated with NAFTA and Mercosur so as to gain a fuller understanding of the roles of these regional trade agreements. However, despite varied and best efforts, it proved unfeasible in the given timeframe to schedule relevant interviews.

- Part I provides an overview of both the main economic issues relevant for the management of epidemic livestock disease risk and the roles of relevant international organisations, the European Union, and the selected regional trade agreements in the animal health field;

- Part II comprises case studies examining public and public-private cost-sharing compensation schemes in five countries: Australia, Canada, Germany, The Netherlands, and Vietnam. The schemes' institutional frameworks, scopes of compensation, and financial structures, as well as the practical experience of managing agencies in scheme implementation are presented;

- Part III provides an overview of the main features of the compensation schemes described in Part II before drawing comparative conclusions and discussing potential areas for additional research.

Acknowledgements

Civic Consulting would like to express its sincere gratitude to all supporters of this report, including officials from Animal Health Australia (Dr Eva-Maria Bernoth); Agriculture and Agri-Food Canada (Bruce Stephen, Elise Legendre, Ian Rogalski, Todd Hunter, Ryan Brunt, Pascal Tanguay, and Nicole Johnson); the Canadian Food Inspection Agency (Wendy Shearer); the German Federal Ministry of Food, Agriculture and Consumer Protection (Dr Hans-Joachim Bätza); the *Tierseuchenkasse* of the federal state of Lower Saxony (Dr Uta Flebbe); the Dutch Ministry of Economic Affairs, Agriculture and Innovation (Inge Hardenberg and Quirien Boone); and the Ministry of Agriculture and Rural Development in Vietnam (Dr Do Huu Dung and Dr Nguyen Thanh Son), who were so helpful as to participate in semi-structured interviews and subsequently review case study texts.
Senior officials at the OIE (Dr Bernard Vallat), WTO (Gretchen Stanton), FAO (Dr Juan Lubroth), and WHO (Dr Bernadette Abela-Ridder) also took time to inform this study through in-depth interviews and document provision.
We would also like to thank OECD, as well as OIE, staff members for their collaboration and assistance in providing contact points at various national-level bodies and selected international organisations.

Part I.Main economic issues and role of international organisations and agreements in epidemic livestock disease risk management

1. The following sections provide an overview of both the main economic issues relevant for the management of epidemic livestock disease risk and the roles played in this area by relevant international organisations, the European Union, and selected regional trade agreements.

Overview of main economic issues relevant for the management of epidemic livestock disease risk

2. Economic characteristics of epidemic livestock disease. It has long been widely recognised that disease in farm animals has a significant economic impact on livestock production and incurs substantial costs for societies in both developed and developing countries. Epidemic trans-boundary animal disease, due to its infectious and rapidly spreading nature, can have particularly large and extensive economic impacts, especially in the case of zoonoses.[2]

3. Disease in livestock has nine main economic impacts. These are:

- A loss of capital (i.e. animal mortality);
- A reduction in the level of marketable outputs;
- A reduction in (perceived or actual) output quality;
- A waste (or higher level of use) of inputs;
- Resource costs associated with disease prevention and control;
- Human health costs associated with diseases (zoonoses) or disease control;
- Negative animal welfare impacts (i.e. animal suffering) associated with disease;
- International trade restrictions due to disease and its control; and
- A range of other impacts such as effects on rural economies, tourism, etc.

4. The incidence, intensity, and duration of all these economic impacts are subject to risk and uncertainty. This complicates the design of management policies for epidemic diseases. In order to illustrate the impacts of livestock disease on production it must be assumed that points on the response curve are expected or average values for a typical producer, as in Figure 1. As a result of disease in livestock, producers operate at equilibrium point B rather than point A, which means that output of livestock products is lower by O_{ah}-O_d and inputs use (feed, veterinary medicines, etc.) is higher by I_d-I_{ah}.

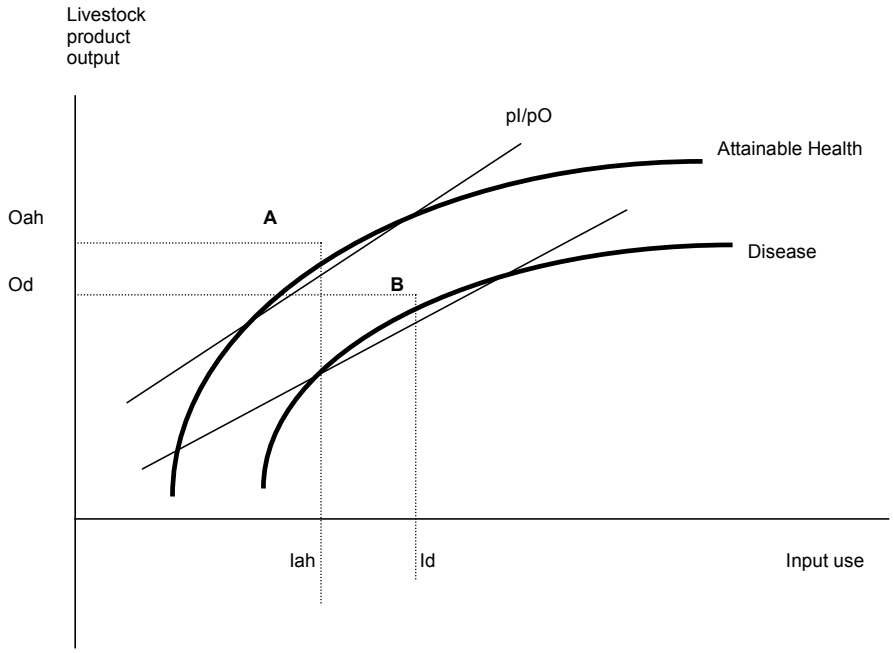
Externalities and market failure

5. In addition to the direct effect on production, livestock disease and its control have a number of indirect effects on third parties. These are often referred to as ‘externalities’ which occur when an

2. A zoonose is “any disease or infection that is naturally transmissible from vertebrate animals to humans and vice-versa”. In total, more than 200 zoonoses caused by bacteria, parasite, fungi, viruses, or unconventional agents have been identified (World Health Organization, 2011b).

individual's production or consumption effects the production or consumption of others through means other than market prices. In the context of livestock disease, potential important negative externalities include impacts on the livestock of other producers, on human health, and on animal welfare. Because such important externalities are not taken into account by markets, they are a potential source of market failure where resources are not allocated in an optimal way and where human welfare is lower than it might otherwise be.

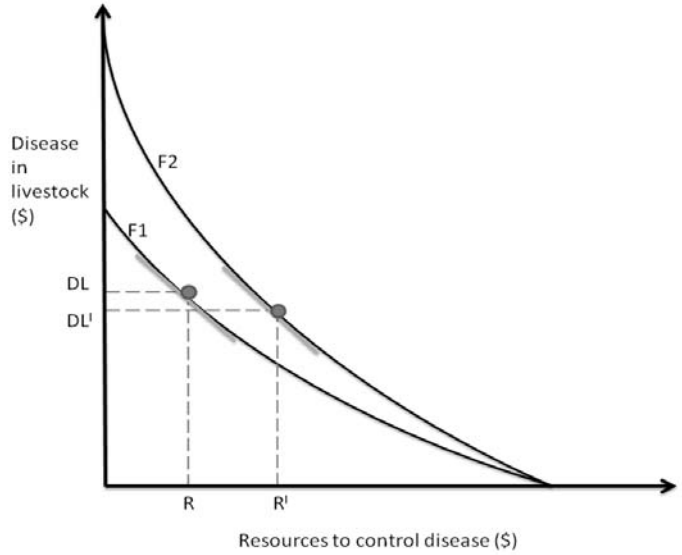
Figure 1: The effect of livestock disease on production



Source: Note that there are points on the 'Disease' production function (i.e. to the left of the line at Iah) where livestock product output is so greatly affected by disease that input use is reduced (e.g. due to animal mortalities). Source: Bennett, R. 2003 (The 'direct costs' of livestock disease: the development of a system of models for the analysis of 30 endemic livestock diseases in Great Britain. Journal of Agricultural Economics 54, 55-71).

6. Thus, there are difficult decisions to make concerning the quantity of resources to devote to disease control to achieve an economic optimum which maximises the net welfare of a society. Figure 2 contains a loss-expenditure curve (F1) which shows the relationship between resources used to control disease and the economic impact of livestock disease, both in money terms. The economically optimum level of expenditure on disease control is shown first at the level of resource expenditure R and disease loss DL. This is the combination of disease control expenditure and disease loss where the total costs of disease (DL+R) are minimized. However, if the value of disease losses is actually higher than supposed, for example due to externalities mentioned above, then the loss-expenditure curve might be as shown by F2 and the optimum level of resource expenditure should be at a higher level R' and disease losses lower at DL'. The fact that the curve cuts the x-axis shows that the disease could be eradicated, although in this theoretical diagram, at least, it would not be the least-cost, economic optimum.

Figure 2: The livestock disease loss-expenditure frontier



Source: F1 is the situation where externalities are not taken into account whilst F2 takes externalities into account. Source: Adapted from McInerney, J. 1999 Livestock disease as an economic problem. In: Bennett, RM and Marshall, BJ (eds.) Economic assessment of livestock disease problems. University of Reading, UK, 25-40.

Animal health and welfare as public goods

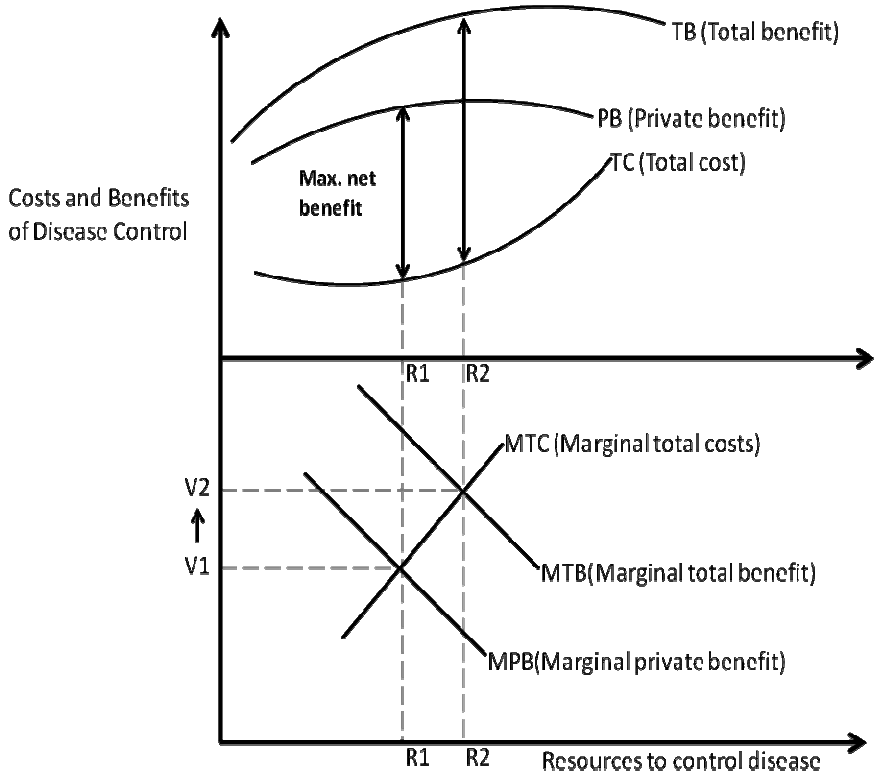
7. Livestock disease also has important 'public good' characteristics needing consideration. In the economics discipline, public goods are described as those that even if consumed by one person can still be consumed by other people. In effect then such goods are inexhaustible in terms of their consumption. In addition, it is not possible to exclude people from consuming such goods. In the context of livestock disease and its control, good biosecurity/good disease risk management is a public good, as is good animal welfare. For example, good biosecurity at a country's borders against a zoonotic livestock disease benefits everyone within the borders of that country, regardless of how many people benefit and regardless of whether they pay anything towards it (e.g. whether they are taxpayers or not). Similarly, good biosecurity by livestock farmers benefits all other livestock farmers whilst poor biosecurity, even of one livestock farmer, may increase the disease risk for all farmers (a negative externality associated with that farmer's actions which is, in effect, a public 'bad' for other farmers and possibly for society more generally). Sometimes the term 'club good' is used where, for example, producers might belong to a farm assurance scheme or other body and benefit from some activity of the body, such as information provision, from which others who do not belong to the scheme cannot benefit. In the case of some diseases, biosecurity may largely benefit a particular group of producers or industry (e.g. cattle farmers) rather than wider society or even a wider group of livestock farmers (i.e. an 'industry good'). Goods such as 'good biosecurity' or 'good animal welfare' are non-market merit goods[3] because they are not traded in markets (although goods associated with these characteristics might be – such as livestock sold with disease-free accreditations or free-range eggs) but we (in society) think them desirable. The OIE considers veterinary services to be a global public good (see http://web.oie.int/eng/OIE/organisation/en_vet_serv.htm).

8. Figure 3 shows how underestimating the benefits of good farm biosecurity by not taking into account the externality and public good aspects can lead to a misallocation of resources for disease control.

3. Non-market merit goods are deemed desirable by society but are not traded in markets. They are associated with positive externalities.

The private benefits for farmers practising good biosecurity, shown as PB, lead to an optimum level of resource to control disease of R1, which is where net (private) benefits are maximised.

Figure 3: Optimal levels of disease control/biosecurity



Source: R1 is the optimal level of resource use to control disease when externalities are not taken into account whilst R2 is the optimal level once externalities are taken into account.Source: Adapted from McInerney, J. 1999 Livestock disease as an economic problem. In: Bennett, RM and Marshall, BJ (eds.) Economic assessment of livestock disease problems. University of Reading, UK, 25-40.

9. However, taking into account the externality and public good aspects of biosecurity, shown by the total benefit curve TB, results in a greater (optimal) use of resource devoted to biosecurity disease control (R2) and a greater net benefit to society (particularly to livestock farmers). The associated marginal cost and benefit curves (showing the change in cost or benefits as resource use changes) in the lower section of Figure 3 (effectively supply and demand curves for disease control) show an equilibrium where resource use to control disease/for better biosecurity is valued at V1 in private markets whereas its real value to society should mean that it is valued at V2. If livestock producers received V2 instead of V1 for implementing disease control then, in theory, the economic optimum for society could be achieved because producers would respond to the price incentive and provide quantity R2 at price V2, as shown by the market equilibrium point where MTB (demand) is equal to MTC (supply).

Rationale for intervention by governments or other authorities

10. The reasons for government or other authority to intervene in markets include problems associated with: (i) anti-competitiveness (e.g. monopoly power – such as in the provision of pharmaceutical products for livestock); (ii) the presence of negative externalities (such as risks to human health or animal suffering); (iii) the provision of public goods (such as biosecurity, animal welfare); (iv) information inadequacies (e.g. which prevent the efficient functioning of markets – such as disease or

welfare status of livestock); (v) justice and equity (such as rationing during times of great scarcity or compensation payments for loss) and (vi) a range of socially desirable goals (including the provision of 'merit goods' that society believes should be provided in the public interest) (Farm Animal Welfare Council, 2008).

11. The inability of markets to take into account both externality and public good aspects associated with livestock disease can result in market failure where private markets fail to achieve an optimum allocation of resources that maximises the welfare of society. In such instances, there may be a strong case for government or some other authority to intervene to ensure a better use of resources.

12. There are a range of measures or policy instruments that can be used by authorities to seek to address the above needs. Below, Table 1 categorizes each of these different types of policy measure with examples applied to animal health, ranging from legislation and direct action by government, the payment of incentives (e.g. of V2-V1 in Figure 3) or use of taxation, to institutional arrangements and/or self-regulation. Amongst the various policy instruments listed is compensation.

Compensation as a policy instrument

13. Compensation involves something, typically money, being given to someone as a recompense for loss, injury, or suffering. There is usually a presumption that the loss or injury is not caused by, or is not the fault of, the person or persons on whom the loss falls. Compensation to injured parties might be paid by those responsible for the injury or loss, or by a third party such as insurers or by government (on society's behalf). In the context of livestock disease, injury or loss may be either as a result of disease (i.e. mortality, morbidity, effects on sales/markets etc.) and/or as a result of disease control strategies (e.g. compulsory slaughter, vaccination, movement restrictions, etc.).

Table 1: Types of government intervention instruments and their relative strengths and weaknesses

Type of policy instrument	General example	Example applied to animal health and welfare	Strengths	Weaknesses
1. Legal rights & liabilities	Rules of tort law.	EU/EC Treaties. WTO Agreements.	Self-help.	May not prevent events resulting from accidents +/or irrational behaviour.
2. Command & control	Secondary legislation. Health & safety at work.	Animal standstill.	Force of law. Forceful. Minimum standards set. Immediate. Transparent.	Intervention in management. Incentive to meet, not exceed standard. Costly. Inflexible.
3. Direct action (by government)	State provision of goods or services (e.g. housing)...	Animal slaughter, treatment, or inspections by state veterinarians. Border controls.	Assures acceptable/ desired level of provision.	Danger of being perceived as 'heavy handed'.
4. Public compensation/ social insurance	Unemployment benefit.	Compensation for animals slaughtered for disease control or welfare reasons. Cross compliance. Pillar II monies for farm animal health and welfare improvements.	Insurance provides economic incentives.	May provide adverse incentives. Can be costly to tax payers.
5. Incentives and taxes	Car fuel tax.	Cross compliance. Pillar II monies for farm animal health and welfare improvements.	Low regulator discretion. Low cost application. Economic pressure to behave acceptably.	Rules required. Predicting outcomes from incentives difficult. Can be inflexible.
6. Institutional arrangements	Departmental agencies, levy boards, local government.	Animal health and welfare institutions and authorities.	Specialist function. Accountability.	Potential for narrow focus of responsibility.
7. Disclosure of information	Mandatory disclosure in food/ drink sector.	Reporting of notifiable diseases. Animal welfare labelling.	Low intervention.	Information users may make mistakes.
8. Education and training	National curriculum.	Animal health and welfare in veterinary education, national school curricula, etc.	Ensures education and skills required by society.	Can be too prescriptive and inflexible.
9. Research	Research Councils.	Funding for animal health research through government funded bodies.	Provide information to policy.	May duplicate or displace private sector activities.
10. Promoting private markets a) Competition laws	Office of Fair Trading. Airline industry. Telecommunications.	Market power of companies in the food supply chain and prices to farmers to meet production costs.	Economies of scale in use of general rules. Low level of intervention.	No expert agency to solve technical/ commercial problems in the industry. Impact of global commodity costs. Uncertainties and transaction costs.
b) Franchising and licensing	Rail, television, radio.	Veterinary drugs/treatments. Animal husbandry equipment.	Low cost (to public) of enforcement.	May create monopoly power.
c) Contracting	Local authority refuses services.	Private veterinarians conducting public services missions.	Combines control with service provision.	Confusion of regulatory and service roles.
d) Tradable permits	Environmental emissions. Milk quotas.	Permits for intensive livestock production systems (e.g. the Netherlands).	Permits allocated to greatest wealth creators.	Require administration and monitoring.
11. Self-regulation a) private b) enforced	a) Insurance industry. b) Income tax.	a) Farm assurance schemes, veterinary profession, industry codes of practice. b) Animal health guidelines and codes (e.g. UK Defra animal 'welfare codes').	High commitment. Low cost to government. Flexible.	a) Self-serving. Monitoring and enforcement may be weak.

Source: Adapted from Bennett, R. and Appleby, A. (2010) Animal welfare policy in the European Union. In: Oskam, A., Meester, G. and Silvis, H. (eds.) EU policy for agriculture, food and rural areas. Wageningen Academic Publishers, The Netherlands, 243-251.

14. There may be 'direct' (as identified above) and 'indirect' effects/consequences of disease and its control. For example, there may be indirect effects on a farm business (such as ability to trade) or wider third party effects to others (such as impacts along the food supply chain or on other sectors, such as tourism). All of those incurring loss or injury may seek compensation, either from those thought to be responsible for (i.e. cause) the harm or from government.

15. Many governments have livestock disease compensation schemes usually relating to disease control measures that are compulsorily imposed by government on livestock producers. However, if government does not intervene in the form of compulsory disease control measures, then compensation may not be paid to individuals suffering loss.

16. Compensation can act in a similar way to insurance (a system of provision of financial protection against specified contingencies, such as loss or injury), although the latter usually requires payment of an insurance premium. Indeed, the basis of many insurance policies is to provide compensating financial amounts in cases of specified loss or injury.

17. There are a number of advantages and disadvantages to compensation in the case of animal disease events.

Advantages of compensation in animal disease events

- Encourages (early) reporting of infectious disease.
- Encourages cooperation of animal keepers in times of national disease threat (e.g. in relation to coordinated disease control measures).
- Provides a safety net to animal keepers to avoid catastrophic loss.
- Reduces risk (for individual keepers) and uncertainty which may hamper business decisions.
- Can encourage good practice with respect to disease risk management.

Disadvantages of compensation in animal disease events

- Can be costly.
- Requires resources to be expended on administration etc.
- Can cause 'moral hazard' and encourage risk-taking behaviour (i.e. in the knowledge that a large element of financial cost associated with the risk will be paid by someone else – e.g. government).
- Can cause market distortions (e.g. effects on competitiveness).
- Can be difficult to set compensation payments at the right level. If payments are not set at an appropriate level unintended consequences as a result of adverse/perverse behaviour may result. (For example, where compensation payments are set too high, animal keepers may fail to practise appropriate disease risk management because they would make more money from compensation if their livestock became infected and were compulsorily slaughtered than they would selling them through the market. Alternatively, where compensation payments are set too low, animal

keepers may not be sufficiently incentivised to report disease at an early stage (or indeed to cooperate with disease control measures more generally).

- System may have potential for manipulation/abuse (i.e. claiming higher compensation than is warranted – e.g. high value 'pedigree' stock).

18. These are similar problems to those encountered by insurers and can be tackled in similar ways (see the 2007 Report to OIE by Civic Consulting on 'Supporting insurance of disease losses').

Mitigation of disadvantages

- The cost of compensation and administration is paid (prospectively) in the form of an annual payment (akin to an insurance premium) to a compensation scheme by those eligible to claim payments for loss.[4] The annual payment can cover the full cost of the compensation scheme or be a shared cost with government or others (hereafter referred to as a cost-sharing scheme).

- The annual payment to the scheme is scaled according to individual risk (i.e. penalising those posing high risk).

- Annual payments to the scheme are reduced for good practice (i.e. that reduces risk) – (i.e. can form some or all of the payment shown by V2-V1 in Figure 3).

- Claimants pay some of the compensation being claimed from the scheme (e.g. the first £x) which is a disincentive to risk taking (a deductible in insurance terminology).

- Claims (i.e. compensation payments) may be invalid/not payable or reduced if certain conditions are not met (e.g. prescribed protective measures not taken – i.e. that corresponds with R2 in Figure 3, failure in early reporting, premium not paid etc.). Cross compliance might be required in relation to other farm payments.

- Claims are assessed and adjusted accordingly (although this adds to administration costs).

- (Legal) action is taken in cases of abuse/fraud.

- Where private insurance exists, it should be widely available within a competitive market (thus reducing premiums, providing choice in insurance products etc.). However, private insurance coverage for epidemic disease is available in only a very few markets.

Scope of compensation payments

19. In the case of infectious animal disease, it is usually not feasible for third party costs (i.e. disease losses experienced by other animal keepers due to disease spread from an original source) to be covered by an individual's membership of a scheme (or indeed by private insurance) and thus all animal keepers need to be covered by a compensation scheme to cover such costs. Compensation can cover animal deaths and some emergency disease control measures (e.g. vaccination, treatment etc.) and, in principle, other

4. Annual payments might serve to mitigate the potential disadvantages of compensation payments in several ways, including: 1) help to better spread costs over time; 2) lead to the creation of a fund comprising excess revenue which can be used for disease prevention or similar activities during 'peace-time'; 3) engender and demonstrate livestock holders' 'ownership' and participation in a compensation scheme; and 4) help to incentivise good practice in combination with points two and/or three.

'business losses' (although the latter can be difficult to define and are often restricted to specific categories of loss). Consequential losses can stem from business interruption (e.g. buildings must be dedicated to stamping-out efforts); movement restriction zones (i.e. animals cannot be moved from the property – sometimes in these cases 'welfare' slaughter is carried out); repopulation costs in excess of animal costs; emergency vaccination campaigns (because products from vaccinated animals are worth less); or general price declines. Globally, compensation schemes do not usually indemnify consequential losses (World Bank *et al*., 2006). Routine disease control measures may not be payable as compensation but may affect compensation payments for certain categories of loss or affect the level of contributions to the scheme (e.g. testing or vaccination may be at the individual animal keeper's cost but may be a requirement for cover or may reduce individuals' contributions).

Examples of compensation schemes

20. Compensation systems exist in different forms in many EU member states, as well as other countries, sometimes also involving private insurance. These include: (i) public schemes that are fully financed by the government (e.g. Canada); (ii) public schemes that are partly financed by livestock keepers/stakeholders (e.g. Germany, Netherlands, Australia); (iii) publicly supported schemes that involve private insurers (e.g. Spain); and (iv) private schemes that complement government compensation (e.g. the UK, the Netherlands, and France).

21. Private farm insurance against certain risks can be voluntary or mandatory and may, in part at least, be subsidised by government (i.e. subsidised premiums). Private insurance may cover some losses and government and/or industry compensation scheme funds may cover others. Farmers may be required to have private insurance to be eligible for government compensation.

22. In addition to government compensation schemes, there are a number of successful examples of producers coming together to tackle a disease involving compensation payments to affected producers paid for by the industry itself. For example, in Great Britain, Aujeszky's disease in pigs was eradicated as a result of such an initiative funded by a levy of pig producers (collected by the then Meat and Livestock Commission under the Pig Industry Levy Act) with compensation paid to affected pig producers to cover the market value of animals slaughtered.

23. A number of countries have public/private partnership cost-sharing schemes that aim to appropriately share both responsibilities and costs in relation to epidemic livestock disease. These schemes are very diverse and often vary greatly from one country to another or even from one area of a country to another, reflecting different needs, cultures etc. However, there are two main objectives of each of these schemes which are to (i) achieve an appropriate and fair balance of costs associated with disease and its control along the food supply chain (but particularly between livestock producers and government) and (ii) to better manage disease risks, improve animal health and welfare (e.g. through appropriate incentives to good practice) and reduce the total costs associated with disease and its control.

Principles of cost sharing

24. There are a number of principles that can be applied when considering how costs should be shared between stakeholders. Probably the main ones are (i) polluter pays (i.e. those who create the risk or contribute to the magnitude of the impact by their activities pay accordingly) and (ii) those who benefit most pay most (i.e. costs shared according to who gains and who loses from disease and disease control) - but there are others including 'those who can afford it pay'. Choice of principle is an ethical choice although economics may be able to provide some guidance as to which is likely to achieve the desired objectives and which is likely to be most cost effective at doing so.

25. Although the polluter-pays-principle is a widely accepted one, especially in the context of environmental negative externalities, it may not be easy, in an animal disease (negative externality) context, to obtain either evidence or consensus on who the polluters are and what their liability is. Moreover, disease 'polluters', certainly as individuals, may not have the financial ability to pay for the impacts of their actions (for example, where epidemic disease is proven to have been introduced or spread by a single producer which results in very large damages costing millions of dollars).[5] For this reason, it is more practical to consider risk creation as attributed collectively to an entire industry (e.g. all livestock keepers) or industry sectors (e.g. pig, poultry, cattle etc. producers). In terms of providing incentive for livestock producers to better manage disease risks by making 'risk creators' pay, it may be difficult to accurately define the risks involved (in terms of probability and outcome estimates) although some basic algorithms (such as membership of an appropriate farm accreditation/assurance scheme) could be used which appropriately reward and penalise good and bad disease risk management practice respectively.

26. The principle of sharing costs according to who gains (or loses) may be complicated to apply because the magnitude and distribution of benefits and costs of disease will depend on the precise nature of the disease incident. Thus, for every disease incident the distribution of costs and benefits will be different. This makes generic rules for cost sharing difficult to specify – although in some countries, such as Australia, industry and government have agreed specific proportional cost shares associated with specific diseases. Moreover, since costs and benefits may be shared along the food supply chain, and external to it, there is an issue as to who should be included in cost sharing – should it be just government and livestock keepers or does the principle extend to others such as food manufacturers, food retailers, or consumers? However, in practical terms this may prove difficult to administer and, anyway, in reality, because of the market system, both costs and benefits of disease and its control will be distributed along the supply chain by means of market prices and product quantities.

27. A general principle might be that where livestock producers (or a subset of them such as according to species or production system) are the primary beneficiaries of policy (e.g. a production disease that has no implications for human health, food safety etc.) then they should pay the greater share but where wider benefits accrue to others in society, for example in terms of reduced risks to human health, benefits to the environment, benefits to animal welfare etc., then government, on behalf of wider society, might pay relatively more. For example, the Animal Health Australia industry-government partnership shares the costs of responding to emergency animal diseases (EADs) according to an EAD categorisation system determined by the impact an EAD can have on livestock industry production, human health and the environment (see Australian case study below in Part II, Section I).

Conclusion regarding the use of compensation in animal disease policy

28. In conclusion, there would appear to be considerable scope for variants of animal disease compensation schemes tailored to specific industry/disease situations which can both reward and promote good disease risk management practices and appropriately share costs across producers and between producers and government. It is likely that other policy instruments are also needed to work in a complementary way with any system of compensation payments – such as enabling legislation, possible taxation by means of producer levy payments,[6] appropriate institutional arrangements to administer the scheme and other measures.

5. These difficulties tie into the general problem presented by the high monitoring costs associated with 'pollution' in the case of epidemic livestock diseases.

6. Payment of levies should be compulsory in order to prevent free-riding and help incentivise good practice – producer participation/inclusion in cost-sharing schemes should be as comprehensive as possible.

Role of selected international organisations

World Organisation for Animal Health

29. The World Organisation for Animal Health predates all other international organisations working in the field of animal health. International trade in animals and animal products increased the need to fight animal diseases at the global level and as a consequence led to the creation of the Office International des Epizooties in 1924. In 2003 the Office became the World Organisation for Animal Health but kept its acronym, OIE. In 2011 it had a total of 178 member countries and regional and sub-regional offices on every continent (OIE 2011a).

30. The most visible role of the OIE is as an international standards-setter. The OIE is the WTO reference organisation for standards relating to animal health and zoonoses and is recognized in this function by the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS). Two codes and two manuals (Terrestrial and Aquatic)[7] published by the OIE serve as the principle reference material for WTO members with respect to the "sanitary safety of international trade in terrestrial animals and aquatic animals, and their products". The codes have historically focused on animal health and zoonoses, but have recently expanded to address animal welfare, animal production, and food safety, in line with the OIE's expanded mandate 'to improve animal health worldwide' (2011c).

31. Standards developed by the OIE also constitute reference points for European Union animal health legislation and OIE member countries' livestock disease risk management policy frameworks. Since 1994, the OIE has maintained voluntary procedures for officially recognising countries' animal disease status (OIE, 2011b), initially through bestowment of 'foot-and-mouth disease-free' status and then similarly for bovine spongiform encephalopathy (BSE), contagious bovine pleuropneumonia, and, prior to its recent global eradication, rinderpest.[8]

32. The OIE also functions as an information gatherer and, thereby, as a source of transparency with respect to the global animal health situation. Member countries of the OIE are formally required to submit information on the presence of notifiable animal diseases, including zoonoses, within their borders. This data feeds into the World Animal Health Information System (WAHIS) and, in turn, is made publically available (following validation by the OIE) through the World Animal Health Information Database (WAHID). This online portal, as a result of the above procedures, allows for a survey of the animal health situation in 178 countries. The OIE also currently maintains specific information portals providing updates on avian influenza, BSE, foot-and-mouth disease, and rabies situations (OIE, 2011b).

33. One of the key mechanisms employed by the OIE is the PVS Pathway, a worldwide programme for improving the compliance of countries' Veterinary Services with relevant OIE international standards on quality of Veterinary Services. For a given country, the first step in the terrestrial PVS programme involves utilisation of the OIE Tool for the Evaluation of Performance of Veterinary Services (OIE PVS Tool) to assess the performance of national Veterinary Services against the international standards contained in the Terrestrial Code. Then, in a second step, a PVS Gap Analysis qualitatively and quantitatively evaluates the country's needs and priorities in veterinary services according to the qualitative outcome of the PVS Tool evaluation. This leads to joint (OIE and national-level) identification of 1)

7. The Terrestrial Animal Health Code first appeared in 1968. The Manual of Diagnostic Tests and Vaccines for Terrestrial Animals details internationally-agreed disease diagnostic techniques in order to provide a harmonised approach to diagnosis (OIE, 2011c).

8. The OIE's international mandate to recognise disease and pest-free areas with respect to the SPS Agreement was confirmed by the 1998 agreement with WTO (OIE, 2011).

relevant priorities, constraints, and expected results; 2) the actions required to achieve those results; and 3) the tasks and associated resources needed to implement those actions.[9]

34. Overall, the PVS programme functions mainly to build sustainable animal health systems, as well as to improve disease surveillance and prevention and control systems, allowing for early detection of and rapid response to animal disease outbreaks. Compensation for owners of livestock culled for disease control purposes is seen by the OIE as a key component of those systems; therefore, while compensation policy is not explicitly included in the relevant section of the Terrestrial Code on Veterinary Services, the concept is relevant in the context of the PVS Pathway: when a PVS Evaluation diagnoses a lack of or deficiencies in a compensation mechanism for livestock related disease losses in a specific country, one of the priority recommendations will be the establishment or improvement of such a mechanism in order to provide a basis for early reporting of outbreaks of relevant animal diseases and better cooperation on the part of farmers with control measures of Veterinary Services. More broadly, the OIE considers containment of transboundary livestock diseases a global public good and compensation mechanisms as an important tool in this context, because of the potential of compensation to increase the efficiency of reporting and outbreak control measures and, consequently, to reduce the impact of animal diseases on livestock populations, farmers, the broader society, and international trade.

World Trade Organization

35. Given its trade-centric mandate, the World Trade Organization (WTO) plays an indirect role in the animal health field. The organization does not develop standards linked to animal health. Instead, under the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), it identifies the animal health standards promulgated by the OIE as the framework on which member countries[10] should base their sanitary and phytosanitary measures.

36. The intent of the SPS Agreement (which entered into force in 1995) is to balance national governments' sovereign right to determine and ensure appropriate levels of food safety and animal and plant health against the potential development of unnecessary trade barriers. To that end, the Agreement permits countries to establish their own sanitary and phytosanitary standards, but where those exceed international standards (set by the OIE in the case of animal health) they must be scientifically justifiable and consistently applied. Thus, "if the national requirement results in a greater restriction of trade, a country may be asked to provide scientific justification, demonstrating that the relevant international standard would not result in the level of health protection the country considered appropriate" (WTO, 2011).

37. The SPS Committee, which comprises representatives from all WTO member countries (currently 153) participating in a given meeting, as well as observers from countries currently negotiating WTO membership and international governmental organisations, is the overseer of the Agreement. Additionally, the Committee develops non-legally-binding guidelines designed to aid in countries' implementations. The Committee is, however, not responsible for legal interpretations required by formal trade disputes, instead serving as a venue where countries can more informally discuss trade issues they think result from unjustified restrictions. In this setting, policy clarifications and justifications can be discussed, and countries can observe how others are adhering to Agreement obligations.

9. To-date more than 115 countries have participated in PVS evaluations.

10. Although the term 'countries' is used here, a separate customs territory possessing full autonomy in the conduct of its external commercial relations may also become a WTO member, such as the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu (Chinese Taipei).

38. The WTO secretariat does have a mandate to monitor all members' trade policies, including trade-affecting animal health regulations,[11] and when a member puts in place new requirements or modifies existing requirements, it must give advance notice to the WTO. Emergency actions taken following an animal disease outbreak must also be immediately notified. Initiation of a trade dispute, though, must come from a member country – the SPS Committee, or its chairperson, for example, does not have authority to lodge a complaint based on the contents of members' notifications. Notably, 'specific trade concerns' can be raised in the SPS Committee. These are of a distinctly different, i.e. less formal, nature than full WTO complaints which invoke the organization's quasi-judicial dispute resolution mechanism.

39. About 40 % of the issues raised in the SPS Committee to-date have been related to animal health or zoonoses, but formal disputes linked to animal health have been rare. With respect to the concerns discussed in the SPS Committee, bovine spongiform encephalopathy has featured consistently on meeting agendas since 1996, and member countries' policies related to avian influenza have recently been a focus.

40. Generally speaking, issues arise when a member's policies are seen by others as deviating from OIE standards in such a way that they impose a substantial trade restriction. So far, compensation for livestock owners' losses resulting from outbreak control measures such as culling has not featured in 'specific trade concerns' raised by member countries in the SPS Committee. Only if compensation policy arguably went beyond indemnification of losses to the subsidisation or incentivisation of production would it be likely to result in a formal or informal complaint at the WTO. In such a case it would be the Agriculture Agreement rather than the SPS Agreement which would be applicable.

41. Interestingly, in cases of emerging animal health developments, countries may, as a WTO official reported with respect to avian influenza, initially prefer to discuss management of and potential responses to the situation rather than lodge complaints based on early policy or regulatory responses. In this way, something of a tolerance or grace period with respect to new diseases or situations can develop.

42. Training and/or capacity-building efforts involving the WTO and aimed at fostering adherence to the SPS Agreement generally take two forms. First, the WTO administers some general training activities for developing countries on their rights and obligations under the SPS Agreement. When conducted on a regional or sub-regional basis, these training sessions comprise representatives from the OIE, as well as animal health officials from the involved countries. Essentially, the WTO, due in part to its lack of specific competence on the technical aspects of animal health, facilitates the provision of animal health training focused on the SPS Agreement and international standards by OIE officials. Second, the WTO is one of five partners, alongside the World Bank, the Food and Agriculture Organization of the United Nations, the World Health Organization, and the World Organisation for Animal Health, participating in the Standards and Trade Development Facility (STDF). Acting as both a coordinating and financing body, the STDF aims to raise awareness of the import of SPS issues, further coordination among cooperating providers of SPS-related assistance, and assist developing countries, through capacity building projects, in their efforts to meet SPS standards (Standards and Trade Development Facility, 2011). The WTO serves as the administering agency for the STDF, but the implementation of projects related to animal health is normally overseen by the OIE, FAO, or both organisations. To-date, according to a WTO official, projects implemented under the STDF have not specifically dealt with epidemic livestock diseases, though such projects would be possible.

11. This monitoring is primarily conducted through periodic reports submitted to the WTO between every two years (for the largest economies) and every six years (for smaller economies).

Food and Agriculture Organization of the United Nations

43. The Food and Agriculture Organization of the United Nations (FAO) addresses animal health primarily through its Animal Health Service, a body within the Animal Production and Health Division (AGA). The Animal Health Service comprises three large groupings: the Veterinary Public Health group, the Production Disease group, and EMPRES (Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases). EMPRES is the largest of these groupings. It deals predominantly with transboundary animal diseases such as foot-and-mouth disease (FMD), avian influenza, Rift Valley fever, *peste des petits ruminants*, contagious bovine pleuropneumonia, and African and classical swine fevers, among others. Some of these diseases also come under the remit of the Veterinary Public Health group or the Production Disease group. In such cases EMPRES cooperates with the other group(s) and other groups cooperate with it. The role of wildlife-livestock interactions and the emergence of potential pathogens are also addressed by these units.

44. The Animal Health Service also works with the Animal Production branch of the AGA on ensuring that the efforts in improving breeding or genetic stock are not crippled by livestock diseases. In addition, it cooperates with the FAO's legal service which works as a specialised group on veterinary and agricultural policy legislation, particularly on ensuring that a country's legislation is in line with applicable international agreement obligations. The Animal Health Service also cooperates with the OIE regarding standards and undertakes capacity-building at the local level. Additionally, AGAH/EMPRES and the OIE collaborate on a joint initiative called the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs), which incorporates a global early warning system for transboundary animal diseases (see the description of GLEWS below) and, as a result of collaboration with the WHO, the main zoonoses. Working directly with EMPRES, as well as the OIE and the WHO for technical assistance, is the Crisis Management Centre–Animal Health (CMC-AH), FAO's rapid response mechanism for transboundary animal disease emergencies (including aquatic and wildlife related). The Centre delivers technical and operational assistance to assist governments in developing and implementing immediate solutions to prevent or stop disease spread.

45. The Veterinary Public Health group is dedicated to the understanding, prevention, and control of zoonotic diseases and food safety issues, and the Production Disease group deals more with diseases originating from parasites, poor nutrition, or unsanitary conditions (i.e., poor water quality or feedstuffs) that are likely to negatively impact long-term production efficiency.

46. A major initiative involving the FAO, WHO, and the OIE is the Global Early Warning System for Major Animal Diseases, including Zoonoses (GLEWS). It is a joint system that builds on the advantages of combining and coordinating disease incident alert mechanisms, epidemiological analyses, and risk assessments from all three organisations, while linking international community networks and stakeholders, to contribute to early warning, prevention, and control of animal disease threats. The FAO contributes through its on-the-ground projects promoting local food security and smallholder production. The FAO also collaborates with the UN Environmental Program (UNEP), specifically on wildlife diseases, as well as with prominent regional organisations such as the Pan American Health Organization or the African Union Inter-African Bureau for Animal Resources.

47. Regarding compensation for livestock owners, the FAO works with governments to implement sound compensation strategies by explaining the significant overall cost reductions they may entail by ensuring more rapid disease containment. The main focus recently has been on compensation schemes for avian influenza, and the FAO has undertaken many related Compensation Strategy Missions to individual countries during the past few years. Classical swine fever and foot-and-mouth disease have also been addressed.

World Health Organization

48. The World Health Organization (WHO) is a stakeholder interested in safeguarding animal health with the aim of diminishing public health risks arising from animals, including zoonotic diseases (i.e. those with the potential to be naturally transmitted from animals to the humans). The WHO defines Veterinary Public Health as "the sum of all contributions to the physical, mental and social well-being of humans through an understanding and application of veterinary science", and sees the well-being of humans as "inextricably linked to animal health and production" (World Health Organization, 2011b).

49. The Department of Food Safety and Zoonoses is tasked with coordinating global activities to address health risks at the animal-human-ecosystems interface. For high impact zoonotic diseases, goals include improvements in governance and infrastructure, including increased national, regional, and global prevention and control capacity. Overall, this work aims to lower the disease burden from food and animals, concentrating on both industrialised and traditional production systems and integrating preventive practices along the product chain. These efforts are undertaken through definition and implementation of sustainable policies and programmes designed to ensure early disease detection, risk assessment, preparedness, and rapid emergency response (World Health Organization, 2011a).

50. A scientist from the Department of Food Safety and Zoonoses divided ongoing work on zoonotic disease risk management into three areas: 1) policy-level intervention and buy-in, sustainable programme development, and policy implementation undertaken with relevant governments (this entails sharing responsibilities and coordinating activities with major partners such as the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE)); 2) coordination of technical work – with governments and other international governmental organizations – on zoonoses in order to achieve national, regional, and global coherence in surveillance, early detection, emergency preparedness, and response;[12] 3) implementation of policies and technical interventions to ensure that (national, regional, and global) tools and mechanisms, knowledge, and partnerships are in place for the detection, assessment, and management of risks.

51. The WHO relies on its close partnership with other organisations, in particular the FAO and OIE, for advancing and coordinating activities at the human-animal-ecosystems interface. For example, in cases where a disease in animals (but no animal to human transmission) has been observed, the WHO, often in collaboration with its partners, assesses the potential for the disease to emerge from the animal population and cause a public health impact at the local or international level. In this way, the WHO keeps abreast of animal health issues even in cases where there may not initially be an identifiable public health dimension. An example of a disease that has prompted such risk assessments in recent years is avian influenza. Here, outbreaks may alert the WHO to a need to rapidly emphasise prevention and control efforts, because increased avian influenza circulation heightens the probability of transmission to humans, especially in low biosecurity conditions.

52. The increased cooperation with the OIE and FAO in the past decade – as exemplified by the tripartite concept note published in early 2010 (see FAO *et al*., 2010)[13] – has been one of the major developments in the WHO's work on zoonotic diseases. Currently, one primary mechanism of collaboration between the three organisations is the Global Early Warning System for Major Animal Diseases, including Zoonoses (GLEWS). The GLEWS framework allows for joint risk assessments and effectively combines the organisations' disease detection/alert capacities. Essentially, GLEWS allows for official verification and alert of a potential risk or disease event. Response to and management of risks are

12. In some cases this will merit joint activity among the animal health and food safety sectors.

13. The 2010 tripartite note is entitled, The FAO-OIE-WHO Collaboration: Sharing responsibilities and coordinating global activities to address health risks at the animal-human-ecosystems interfaces.

then implemented as needed through the Crisis Management Centre–Animal Health, a joint FAO-OIE effort, and WHO response mechanisms which may involve the Global Outbreak Alert and Response Network (GOARN).

53. While the WHO does not work on the promotion of schemes that compensate livestock owners for losses incurred as a result of disease outbreak control measures, it does promote public health through the development and implementation of best practices for the control, prevention and response to zoonotic disease. These practices can be tailored to individual country, regional, and global needs.

54. The WHO monitors member states' core capacities to detect, control, and prevent zoonotic disease threats through implementation of the International Health Regulations framework (see the WHO 'Protocol for Assessing National Surveillance and Response Capacities for the International Health Regulations', WHO/HSE/IHR/2010.7). The assessment of core capacities is based on country self-assessment, which may have inherent drawbacks. In a reverse notification process, the WHO reports back to its member states on progress it has made on established objectives and performance indicators.

55. The WHO still sees a need to increase disease alert and containment capacities to ensure that zoonotic diseases are controlled and contained within animal populations before they spill-over and become public health problems. Therefore, in the coming years, the organization will aim for a paradigm shift in prevention and preparedness so as to control and contain risks at the human-animal-ecosystems interface. This will be pursued with renewed commitment to strengthening coordination with the OIE and FAO.

Role of the European Union and selected regional trade agreements

European Union

56. The European Union (EU) is actively involved in the animal health field and is engaged both financially and at the regulatory level in the area of disease control and prevention. The current framework for these activities is the Animal Health Strategy (2007-2013) and associated action plan. Adopted in 2007, the Strategy outlines animal health and welfare measures for a six-year period ending in 2013. An increased focus on preventive measures, disease monitoring, controls, and research constitutes a key aspect of the strategy and it aims to limit disease incidence as well as the scale of those outbreaks which do occur (European Commission, 2011).

57. The Strategy's action plan comprises four pillars – defining priorities; a modern legal framework; prevention and controls;[14] and science, innovation, and research. One notable aim under Pillar 2, which broadly seeks to develop a clearer animal health regulatory structure in the EU, is the development of efficient cost and responsibility sharing schemes. Seeing existing schemes as sometimes narrowly focused on provision of a compensation mechanism, the Strategy proposes consideration of associated benefits /responsibilities and of how costs might be most appropriately shared. It is envisioned that resulting policy could help to close animal health gaps between various EU regions and "contribute to preventing major financial risks for Member States and the Community by providing incentives for prevention of animal related threats" (European Commission, 2007).[15]

14. Notable developments for disease surveillance under the new Animal Health Strategy included the Task Force on Animal Disease Surveillance (TFADS) and the implementation of an Animal Diseases Information System (ADIS) with OIE compatibility (European Commission, 2011).

15. A study ("Feasibility study on the revision of Council Decision 2009/470/EC (ex 90/424/EEC) on expenditure in the veterinary field with a view to develop a harmonized EU framework for cost and

58. While consideration of how best to achieve a harmonised cost and responsibility sharing framework is ongoing, the Community's co-financing commitment in the area of livestock disease control and prevention continues to be based on Council Decision 2009/470/EC (25 May 2009) on expenditure in the veterinary field (Official Journal L 155, 18/06/2009).[16] This decision sets out provisions for, among other items, emergency measures, a campaign against foot-and-mouth disease, an animal health information policy, and technical and scientific measures. With regard to outbreaks of several livestock diseases, the decision identifies the Community's co-financing responsibilities as 50 % of Member States' costs incurred through compensation of livestock owners for animal slaughter/destruction and destruction of animal products and contaminated items (e.g. feed products and equipment), as well as the cleaning/disinfection of holdings (Paragraph 6 of Article 3).[17] Additionally, under certain conditions the Community will contribute 100 % of the supply costs of a vaccine and 50 % of the costs of administering it.[18]

59. In order to be eligible for Community co-financing, Member States must, among other actions, immediately isolate livestock holding(s) suspected of being infected and then, following official confirmation of the disease, carry out the slaughter and destruction of susceptible animals ("affected or contaminated or suspected of being affected or contaminated"), destruction of contaminated feed products and equipment, cleaning/disinfection of the affected holdings, establishment of protection zones, measures to halt the infection's spread, a post-slaughter waiting period (prior to restocking), and, notably with respect to this report, the "swift and adequate compensation of the livestock farmers" (Council Decision 2009/470/EC).

60. In terms of reporting requirements, following a livestock disease outbreak affected Member States must notify the European Commission and other Member States of the applied control measures and their results.[19] Specific control measures have been adopted by the Council for several diseases, including avian influenza, foot-and-mouth disease, bluetongue, classical swine fever, and Newcastle disease (European Commission, 2011). As a result of these measures, regulations, and reporting requirements, the scale of EU monitoring of Member States' responses to disease outbreaks is significant.

61. In addition to prescribing minimum Member State responses to disease outbreaks, EU legislation and regulations act in several ways to limit the potentially negative external trade effects of livestock disease prevention and control measures. First, legislation is "largely based on OIE/Codex recommendations/standards and guidelines, respecting [the EU's] commitments within the framework of the WTO Agreement on the application of sanitary and phytosanitary measures (SPS Agreement)"

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responsibility sharing schemes for animal diseases") commissioned by the European Commission to assess policy modification in this area was recently published (see Bergevoet, 2011).

16. Previously the key act was Council Decision 90/424/EEC (1990), which had been clarified by Commission Regulation (EC) No 349/2005 setting out additional specific rules on EU co-financing.

17. Article 3 lists 22 diseases (including several aquatic diseases) for which the 50 % co-financing of compensation costs applies, including swine vesicular disease, bluetongue, Teschen disease, lumpy skin disease, classical swine fever, African swine fever, and contagious bovine pleuropneumonia. Similarly, 50 % co-financing of Member States' costs resulting from livestock owner compensation is specified for avian influenza in Article 4, while the EU co-financing level for livestock owner compensation for foot-and-mouth disease is set higher, at 60 %, by Article 14.

18. Reimbursements paid to Member States from the EU 'Veterinary Fund' between 1997 and 2009 totalled EUR 1.1 billion, according to current eligibility criteria. Fully 88 % of the payments were linked to classical swine fever, foot-and-mouth disease, and avian influenza (Bergevoet, 2011).

19. More generally, Member States forward information on each applicable disease outbreak to the European Commission through the Animal Disease Notification System (ADNS).

(European Commission, 2007). Second, while 'State Aids' can be granted by Member States for losses caused by livestock diseases, specific rules have been established at the EU level to ensure competitive practices and WTO compatibility (Community Guidelines for State Aid in the Agriculture and Forestry Sector 2007 to 2013, 2006/C 319/01). Finally, concern for trade effects can also be seen, for example, in the EU's non-vaccination policy with respect to foot-and-mouth disease which dates to 1991 and continues to secure EU producers access to national markets that only accept imports from non-vaccinating, foot-and-mouth free countries (European Commission, 2011).

62. Importantly, though certain of the EU policies described above, namely the co-financing mechanism, impact individual Member States' compensation schemes, there is currently no EU-wide compensation scheme or mechanism. Rather, as seen in the case studies in Part II of this report, the Member States currently maintain their own preferences with regard to compensation mechanisms for epidemic livestock disease-related losses while integrating EU co-financing into their national schemes, be they purely public compensation schemes or cost-sharing schemes involving other stakeholders.

North American Free Trade Agreement (NAFTA)

63. The North American Free Trade Agreement (NAFTA) was signed in 1993 by the governments of Canada, the United States, and Mexico. The agreement plays a role, albeit a small one, in the field of animal health in North America.

64. It is important to note that the NAFTA countries have bilateral arrangements regarding animal health and have developed some trilateral arrangements (such as the North American Animal Health Committee, which NAFTA countries established in 2002 to coordinate responses to particular threats, e.g. foot-and-mouth disease). The member nations also interact through the World Organisation for Animal Health (OIE) and are part of the larger trading framework of the World Trade Organization (WTO) and its Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement).

65. The main NAFTA coordination mechanism for animal health is the Committee on Sanitary and Phytosanitary Measures (SPS Committee). This Committee was created to oversee the application of the SPS measures in NAFTA, which are essentially identical to those in the WTO SPS Agreement (see the section on the World Trade Organization above). The Committee meets periodically and has a mandate under NAFTA to facilitate the enhancement of food safety and sanitary and phytosanitary conditions in the NAFTA countries. It also focuses on the adoption of international standards and the use of equivalence agreements; technical cooperation in the development and enforcement of sanitary and phytosanitary standards; and consultations on specific matters relating to sanitary and phytosanitary measures (NAFTA, 2011). NAFTA also dedicates one of its five technical working groups to animal health.

66. NAFTA SPS Committee meetings have contributed to improved policy coordination and better preparation for responses to crisis situations (Sparling and Caswell, 2006). A relevant example was the tripartite exercise in 2000 between Canada, Mexico, and the United States, titled Foreign Animal Disease Response Simulation Exercise. Following this activity, the countries expressed a commitment to the regular staging of similar exercises.

67. However, despite this effort towards coordinated policy and crisis response, substantial progress has not been made towards regulatory integration or coordination in animal health policy at the NAFTA level. NAFTA still does not have a relevant centralised office with regulatory powers or one that supervises its technical committees and working groups, nor does it have a specific research facility. Moreover, its budget in this area is particularly limited. Indeed there is little evidence to show that NAFTA technical committees and working groups were involved in recent key decisions related to the management of livestock diseases, such as the response to bovine spongiform encephalopathy (BSE) outbreaks in 2003

and 2005 that caused substantial market disintegration (Knutson and Ochoa, 2007). Similarly, strategies for detecting and preventing the spread of other well-known livestock diseases such as foot-and-month disease and avian influenza have largely remained on an individual country basis.

68. Finally, the NAFTA Secretariat holds the role of administering the dispute settlement provisions of the agreement; however, no animal health issues have so far prompted any of the parties to make use of the mechanism (NAFTA, 2011).

MERCOSUR (Southern Common Market)

69. Mercosur,[20] a free-trade agreement signed in 1991 by Argentina, Brazil, Paraguay, and Uruguay, is now a full customs union that deals with animal health through a number of distinct channels. The main bodies responsible for animal health in Mercosur are the *Comisión de Sanidad Animal* (Animal Health Commission) and the *Comité de Sanidad Animal y Vegetal del Mercosur* (Mercosur Animal and Plant Health Committee).

70. The Animal Health Commission is the primary element of Working Subgroup 8, "Agriculture", which is directly subordinated to the *Grupo Mercado Común* (Common Market Group), the executive body of Mercosur that is coordinated by the member states' Ministries of Foreign Affairs. Its main role is to establish import requirements – between member states and from third countries – according to sanitary criteria for different animal species, while also assigning tasks to the Animal and Plant Health Committee.

71. The Committee has a rotating chair and is mainly charged with administering the provisions of the *Acuerdo Sanitario y Fitosanitario entre los Estados Partes del Mercosur* (Sanitary and Phytosanitary Agreement between Mercosur Member States), which is broadly identical to the WTO SPS Agreement (see the section on the World Trade Organization above). In particular, the Committee is to harmonise the above agreement across member states and with international standards and agreements, facilitate consultations, resolve disputes between members and technical groups, and establish recommendations in relation to sanitary and phytosanitary norms in member states.

72. A third organ, the *Grupo Ad Hoc Sanitario y Fitosanitario* (Ad Hoc Sanitary and Phytosanitary Group), also exists to address sanitary and phytosanitary aspects in Mercosur's external relations with business partners and, with increasing relevance in recent years, with the European Union.

73. One body that works closely with Mercosur on animal health is the CVP (*Comité Veterinario Permanente del Cono Sur* or Permanent Veterinary Committee of the Southern Cone), created by the *Consejo Agropecuario del Sur* (Southern Agriculture Council) as an independent body to be administered by the national animal health agencies of all Mercosur members, as well as those from Chile and Bolivia. Within this body, the *Comisión de Salud Animal* (Animal Health Commission) makes decisions specific to animal health. It is chaired on a revolving basis by one of the animal health agencies of the Mercosur members, and also comprises representatives of FARM (*Federación de Asociaciones Rurales del Mercosur* or Federation of Rural Associations of Mercosur) and PANAFTOSA (*Centro Panamericano de Fiebre Aftosa* or Panamerican Center for foot-and-mouth disease). Three *ad hoc* groups advise the Commission on three specific diseases: foot-and-mouth disease, bovine spongiform encephalopathy (BSE), and avian influenza.

74. As an example of how Mercosur cooperates on animal health, in 2005, due to the presence of foot-and-mouth disease (FMD) in member states, Mercosur developed PAMA (*Programa de Acción*

20. Desk research for this section primarily relied on documentation found at the official MERCOSUR Web site (www.mercosur.int); therefore, unless otherwise noted, the applicable source is MERCOSUR (2011).

Mercosur libre de Fiebre Aftosa or Mercosur Free from FMD Action Program). PAMA is a regional programme coordinated by Mercosur, the CVP, and PANAFTOSA[21] that seeks to eradicate FMD in the Mercosur countries, as well as Bolivia, and contribute to the establishment of a solid system of integrated regional veterinary assistance. PAMA complements the countries' national programmes, and largely focuses on promoting integration of the official veterinary services in joint actions, especially those conducted in border zones.

21. PANAFTOSA also administers PHEFA (*Programa Hemisférico de Erradicación de Fiebre Aftosa* or Hemispheric Program for the Eradication of FMD).

Part II. Public compensation schemes and public-private cost-sharing schemes in five countries

75. This part of the report comprises case studies examining public and public-private cost-sharing compensation schemes in five countries: Australia, Canada, Germany, The Netherlands, and Vietnam.

76. On the following page, Table 2 provides an introductory comparison of the animal populations contained within the borders of the five countries. Thereafter, the case studies are presented, each containing five sections: country overview, institutional framework, scope of compensation and diseases covered, financial structure, and practical experience in scheme application. The drawing of cross-country comparisons relating the compensation schemes' characteristics and functioning is reserved for Part III.

Table 2. Countries' animal populations in comparison, by species*

Species	Country	Population in 2010 (in animals)	Density (units per square kilometre)	Establishments
Birds	Australia	89 000 000	11.58	n.a.
	Canada	650 000 000	65.10	10 000
	Germany	128 463 000	359.82	92 154
	The Netherlands	97 919 484	2 358.03	2 402
	Vietnam	218 200 000	662.09	n.a.
Cattle	Australia	27 000 000	3.51	n.a.
	Canada	12 460 000	1.25	96 430
	Germany	12 706 229	35.59	174 960
	The Netherlands	3 967 599	95.54	33 268
	Vietnam	5 916 250	17.95	n.a.
Buffaloes	Australia	73 500	0.01	n.a.
	Canada	195 728	0.02	1 898
	Germany	n.a.	n.a.	n.a.
	The Netherlands	n.a.	n.a.	n.a.
	Vietnam	2 910 000	8.83	n.a.
Equidae	Australia	n.a.	n.a.	n.a.
	Canada	453 965	0.05	54 169
	Germany	542 000	1.52	70 000
	The Netherlands	144 924	3.49	15 847
	Vietnam	93 120	0.28	n.a.
Sheep and goats	Australia**	67 700 000	8.81	n.a.
	Canada	991 298	0.10	n.a.
	Germany	2 590 000	7.25	n.a.
	The Netherlands	1 490 793	35.90	n.a.
	Vietnam	1 288 350	3.91	n.a.
Swine	Australia	2 300 000	0.30	n.a.
	Canada	11 910 000	1.19	11 497
	Germany	26 870 700	75.26	32 900
	The Netherlands	12 186 453	293.47	7 567
	Vietnam	2 737 315	8.31	n.a.
All (Animals)***	Australia	186 142 500	24.22	n.a.
	Canada	677 973 352	67.90	207 608
	Germany	174 446 070	488.62	509 439
	The Netherlands	117 578 546	2 831.44	82 955
	Vietnam	231 952 597	703.83	n.a.

Source: * Dark shading indicates the largest numbers for animal population, animal density, and the number of related establishments contained in each species row.** In the case of Australia data is available only for the sheep population.*** These totals may be greater than the sum of the preceding table rows because certain, less applicable animal categories, e.g. cervidae, camelidae, and hares/rabbits, are not presented individually in this abbreviated table.Source: Adapted by Civic Consulting from data provided by the OIE WAHID Interface (2011).

Australia

Country overview

77. Livestock species particularly relevant to Australian agriculture are cattle, sheep, pigs, and poultry. Australia has more than double the head of cattle than either Canada or Germany and its population of approximately 67 million sheep far exceeds that of any of the other four countries studied in this report (see Table 2). Cattle farmers constitute the single most economically important sector, with around 25 % of the approximately 130 000 Australian farming establishments securing their primary income from beef cattle (Australian Bureau of Statistics, 2005). For the period July 2007-June 2008, slaughtering of cattle and calves constituted a gross value of AUD 7.4 billion out of total agricultural production of AUD 43.3 billion (Australian Bureau of Statistics, 2010).

78. Australia's advantageous geographical setting for animal health (Neumann and Keogh, 2006) has evidently prevailed recently: during the past five years the country has experienced few outbreaks of OIE-notifiable livestock diseases. The equine influenza outbreak that began in August 2007 is the one significant exception (see text box below). Other epidemics which have occurred, such as near-yearly anthrax outbreaks, can be characterised as relatively minor. Per-year animal deaths from anthrax have ranged from two dozen in 2010 to a few hundred in 2009, with 2006, 2007, and 2008 accounting for around 360 aggregate deaths.[22] Additionally, there were 7 cases of Bluetongue in 2008 and 192 cattle deaths from Bovine anaplasmosis (10) and Bovine babesiosis (182) during 2005/2006. According to OIE notification records, no terrestrial livestock were destroyed or slaughtered as a result of disease control measures between 2005 and 2010. Most recently, a reoccurrence of Newcastle Disease in pigeons – not in poultry – was notified to the OIE in September 2011 (OIE WAHID Interface, 2011).

79. The Commonwealth Government, in partnership with state/territory governments and livestock industry organisations, approaches compensation for direct losses arising from disease outbreaks and control measures through the Emergency Animal Disease Response Agreement (EADRA).[23] The EADRA specifically disallows compensation for stakeholders' consequential losses. More broadly, compensation is directed by the principle that "no one person or organisation is made better or worse off as a result of reporting a disease incident…" The public-private cost-sharing nature of the EADRA is represented by a second framework principle, namely that the beneficiaries of disease control efforts pay "an appropriate and equitable" share of the response costs (Animal Health Australia, 2011a, p. 1).

80. Regarding private insurance for livestock disease risks, Neumann and Keogh (2006, pp. 156, 157) wrote several years ago that due to the low frequency of outbreaks, prohibitive costs, and the extent of expenses a holder would need to cover before receiving claim payment, "insuring livestock against the risks of animal diseases is not widely practiced [in Australia] and few major agricultural insurers have 'off-the-shelf' products for this type of risk."[24] These observations were supported by an Animal Health

22. Anthrax-associated ring vaccination campaigns carried out from 2005 through 2009 affected between 3 000 and 11 000 animals each year.

23. Full title: Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses.

24. It is noteworthy, though, that coinciding with the 2002 ratification of the EADRA, Animal Health Australia held discussions with the agricultural insurance industry centred principally on whether implementation of the EADRA framework might boost the feasibility of livestock disease insurance products. Two options were mainly covered during these discussions: 1) the possibility for private insurance to underwrite direct costs in excess of the industry cost-sharing contribution limit (i.e. 1 % – and 2 % for foot-and-mouth-disease – of the outbreak-affected livestock industry's gross value of production (GVP)); and 2) private insurance coverage for livestock holders' disease-derived consequential losses (Neumann and Keogh,

Australia official who suggested in August 2011 that if such insurance is available it is not widely held by livestock owners.

Institutional framework and stakeholder involvement

81. The EADRA rests on a public-private partnership both with respect to its governance and funding. It is a legally-binding agreement between the Commonwealth Government, Australian state and territory governments, 14 organisations representing the livestock industry, and the not-for-profit public company, Animal Health Australia (see Table 3 below for the full list of signatories). This public-private partnership in emergency animal disease risk management thus has a formal legal basis; it can also be seen in the *de facto* organisational compositions of the main stakeholders.

Table 3. Parties to the Emergency Animal Disease Response Agreement

Public company	Governments	Livestock industry sectors
Animal Health Australia	• Commonwealth of Australia • States of Queensland, New South Wales, Victoria, South Australia, Tasmania, and Western Australia • Northern Territory of Australia and the Australian Capital Territory	• Australian Chicken Meat Federation Inc. • Australian Egg Corporation Limited • Australian Dairy Farmers Limited • Cattle Council of Australia Inc. • Australian Pork Limited • Sheepmeat Council of Australia Inc. • Woolproducers Australia • Australian Lot Feeders' Association Inc. • Goat Industry Council of Australia • Australian Honey Bee Industry Council Inc. • Australian Racing Board Limited • Harness Racing Australia Inc. • Australian Horse Industry Council • Equestrian Australia Limited

Source: Animal Health Australia (2011a, pp. 2, 3).

82. The custodial organisation for the EADRA is Animal Health Australia (AHA),[25] which was established under Australian corporations law in 1996.[26] Though the EADRA was not ratified until 2002, its development was one of the factors underlying AHA's establishment. Custodianship of the EADRA

2006, p. 156). Neumann and Keogh reported in 2006, however, that "Little substantive progress [had] been made in developing such products…"

25. The company now has 31 members across five categories: the Commonwealth Government, state and territory governments (8), organisations representing the livestock industry (16; there are two livestock industry organisations that are full AHA members but not parties to the EADRA), service providers (3; e.g. the Australian Veterinary Association), and associate members (3) with rights – save for voting at general meetings – similar to full members.

26. Animal Health Australia was initially named the Australian Animal Health Council; it was established via the *Australian Animal Health Council (Live-stock Industries) Funding Act* of 1996.

entails, among other efforts, a continuous performance review process involving annual workshops attended by all the EADRA signatories[27] and a comprehensive review every five years (2007, 2012, etc.).

83. Following an outbreak-prompted invoking of the EADRA's cost-sharing mechanism, AHA moves from maintenance of the EADRA to an administrative role. It collects technical data on the emergency disease response, assesses and processes reimbursement claims made by the eligible stakeholders, determines the amounts owed by the applicable parties (the government parties and those industry sectors which benefited from the response effort), and conducts a final audit of the control costs (sharable and non-sharable).

84. The National Management Group (NMG) is the stakeholder authorised to actually invoke the EADRA – via consensus approval of a proposed Emergency Animal Disease Response Plan (EADRP; hereafter, 'disease response plan'). This approval activates the agreement's cost-sharing mechanism. The National Management Group is chaired by the Secretary of the Commonwealth Department of Agriculture, Fisheries and Forestry. Its membership includes the chief executive officers of the state and territory governments; the president or equivalent officer of each of the relevant industry parties; and, with observer status, Animal Health Australia. Under the principle that those who finance emergency animal disease response costs should be present when spending decisions are taken, the industry representation to the National Management Group varies according to which industry sectors are affected by a disease incident.[28]

85. The decision on whether to approve a disease response plan is informed by the concurrent work of the Consultative Committee on Emergency Animal Diseases (CCEAD). In comparison to the management-oriented NMG, the CCEAD is a more technical body. Its decision-making focuses on the technical feasibility of disease response plans rather than financial cost-benefit analyses and its members include the chief veterinary officers of the Commonwealth and the states/territories; representatives from the Australian Animal Health Laboratory, Australian Quarantine and Inspection Service, Biosecurity Australia, and (with observer status) Animal Health Australia; and members of relevant industry parties (normally, one member represents a non-affected industry). In the early stages of a disease incident, the CCEAD is responsible for reviewing the disease response plan put forward by the chief veterinary officer(s) of the affected state(s)/territory(s). An appraisal of whether the disease can be eradicated or controlled and a recommendation on the appropriateness of the disease response plan – essentially on whether the EADRA should be invoked – are forwarded to the NMG.

86. Though both the CCEAD and the NMG must arrive at their decisions through consensus, the process is fraught with significantly less tension than might be expected. This appears primarily a result of 1) the absence of much need or motivation to engage in last-minute financial negotiations, because all cost-sharing formulae, down to the percentages payable by different industry sectors simultaneously affected by one disease, are specified and consented to via the EADRA; and 2) the existence of AUSVETPLAN (Australian Veterinary Emergency Plan) which specifies pre-developed response strategies for the 65 EADRA-listed diseases. Since AUSVETPLAN documents were collaboratively developed in 'peace-time' with the industries potentially affected by the diseases, consensus on response measures has effectively

27. As reported by AHA, the EADRA updating process is as follows: each year suggestions for refinements of the EADRA are collected and then discussed among signatories at the annual workshop. Subsequently, any pending modifications are formally sent out to all the EADRA parties, representatives of which would need to sign each of the proposed variations and return a hard copy of the authorised text.

28. The EADRA defines 'Affected Parties' as "Those of the Commonwealth, State and Territory Governments and any Industry Parties who are affected by an Incident or an outbreak of an EAD" (EADRA, 2010, pp. 7, 10 of the Deed).

been established. The result is a limited likelihood that consensus cannot be reached within the CCEAD or the NMG.

87. The livestock industry parties also operate with EADRA-derived responsibilities. The EADRA specifies that industry parties must "take reasonable steps to advise their members and other participants … to notify the applicable authority within 24 hours of becoming aware of an incident…" Additionally, a state/territory may forfeit its claim to cost-sharing payments through failure to formally notify the CCEAD of an incident within 24 hours (EADRA, 2010, p. 14 of the Deed).[29] As a result of these clauses, livestock holders are likely pushed toward early reporting by both industry parties and states/territories. For this purpose, the latter group may use state/territory-level legislative reporting requirements.

88. Industry parties also commit to development of sector-specific biosecurity plans and an annual Animal Health Australia review of associated progress (EADRA, 2010, p. 14 of the Deed). The focus of this programme "is the development of individual [one-to-two page] on-farm biosecurity plans" to reduce the probability of disease outbreak and spread (Keogh and Neumann, 2006, p. 155).

Compensation

Scope

89. Cost-sharing under the EADRA applies to several types of expenses (EADRA, 2010, p. 19 of the Deed):

- Salaries and wages;
- Operating expenses;
- Capital costs; and
- (Livestock holder) compensation

90. Accordingly, in discussing EADRA-based cost-sharing and coverage of losses it is helpful to distinguish between compensation of livestock holders' direct losses (Point 4 above) as a distinct element of the EADRA cost-sharing mechanism and the three other expense types (Points 1 to 3 above) which mainly relate to payment of 'compensation-like' reimbursement for expenses incurred by stakeholders such as the Lead Agencies (i.e. the disease-response-plan-implementing department/agency of each affected state/territory) and Animal Health Australia during a disease response.[30]

91. First, with respect to the cost-sharing payments for salaries and wages, operating expenses, and capital costs,[31] the sharing-eligible expenses are those costs which result directly from disease response

29. Following the initial notification from industry to government (which could also be made by veterinarians or laboratories in the affected jurisdiction), the notified government party has an additional 24-hour window to provide formal notification of the incident to the Consultative Committee on Emergency Animal Diseases (EADRA, 2010, pp. 24, 25 of the Deed). The National Management Group has the final say on whether a party has appropriately reported an emergency animal disease incident (Animal Health Australia, 2011, p. 13).

30. Although AHA is not a government or industry party, "the principles of Cost Sharing will apply to costs incurred by it in respect of an EADRP [Emergency Animal Disease Response Plan] which are additional to its ordinary operating costs" (EADRA, 2010, p. 21 of the Deed).

31. Cost-sharing eligible salaries, wages and allowances include, among others, salaries of staff members or consultants who directly assist with disease eradication; salaries of staff members or consultants hired to

plan implementation and exceed the implementing agencies' "normal commitments", which serve as the baseline "above which other costs are to be shared" (Animal Health Australia, 2010, p. 2). Thus, neither routine biosecurity expenses nor consequential losses incurred by communities within affected states/territories are cost-shared.

92. Turning to compensation, the eligible stakeholders are owners of livestock or property destroyed in an effort to eradicate or stop the spread of an emergency animal disease, as well as owners of livestock that, had they not already died of the disease, would have been ordered slaughtered. Compensation for dead animals is conditioned on inspector certification of the cause of death and its timely reporting. Additionally, the applicable chief veterinary officer must indicate that the animals would have been among those compulsorily slaughtered (EADRA, 2010, p. 29 of the Deed). Compensation eligibility also generally requires that a livestock owner be represented by one of the 14 industry organisations that are EADRA signatories. Exception is made for industry sectors with gross value of production (GVP) less than AUD 20 million (EADRA, 2010, p. 21 of the Deed).

93. That livestock holders' outbreak-induced consequential losses are not eligible for compensation is made explicitly clear (EADRA, 2010, p. 30 of the Schedules): "no allowance shall be made for loss of profit, loss occasioned by breach of contract, loss of production or any other consequential loss whatsoever…"[32]

94. For destroyed property, the relevant value is that assessed immediately prior to destruction. Meanwhile, compensation payments to livestock holders, which are first made by state/territory governments and later claimed as cost-sharing expenses, comprise either a one- or two-step process. In the first step, the market value of the destroyed and dead-as-a-result-of-the-disease animal(s) is indemnified. This value is calculated on the basis of the farm-gate price, i.e. on a sale of the animal(s) at the location of destruction or death, on the earliest-occurring of three dates: 1) owner reportage of the relevant disease; 2) detection of the disease by an accredited inspector; or 3) imposition of quarantine measures. When applicable, a second, top-up payment compensates for the difference between the market value of the equivalent replacement livestock on the date the property becomes eligible for restocking and the compensation amount previously paid. In a sense, then, the maximum compensation level is the market value of a herd restocking. This attempts to adhere to the principle that no one should be made better or worse off as a result of reporting a disease incident.[33]

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backfill positions of seconded staff members; costs of meals and accommodation provided to response-involved staff members and consultants; and payments to private veterinarians solicited by the government party(s).

Operating expenses eligible for cost-sharing include, among others, expenses directly incurred by a party involved in a disease response plan; non-routine staff expenses and operating costs of internally provided (by a state/territory government agency) laboratory services; and the costs of external laboratory services provided to a state/territory (the marginal costs if a services contract already exists or a price comparable to that charged by a government laboratory).

Finally, sharing-eligible capital outlays include purchases of essential equipment required by the parties responding to an outbreak. However, "major" capital expenditures like motor vehicles and buildings are not eligible because of their lengthy lifespans and the resulting potential to utilise them for future work (EADRA, 2010, pp. 27-29 of the Deed).

32. Additionally, the non-coverage of consequential losses is expressed as a policy in 'EADRA Business Rules: Guidelines for Accounting and Cost Sharing under the EAD Response Agreement' (Animal Health Australia, 2010).

33. Theoretically, if the initial compensation payment to a livestock owner (based on the market value of animals dead or culled as a result of the disease in question) was higher than the market price at the

95. In addition to the aforementioned requirement that livestock holders rapidly report a disease incident, there are also timeframes within which claims for compensation must be made.[34] The initial claim must follow livestock destruction or death by not more than 90 days, a request for a valuation of restocking costs must be transmitted within 30 days of notification of restocking eligibility, and a claim for a second compensation payment must be made within 21 days of receipt of the second valuation's results.

96. The EADRA (2010) does not distinguish between compensation in cases of 'limited' and 'catastrophic' outbreaks. In theory, the possibility of *ad hoc* compensation, which would likely only be distributed in severe cases (see the example below), does entail potential differentiation between limited and large-scale epidemics. However, the EADRA's coverage of a high number of diseases and the now near-complete representation of the livestock industry sectors among the signatories significantly decreases this potential.

The 2007 equine influenza outbreak – *ad hoc* government funding of the industry's share of costs

Animal Health Australia has noted the possibility of "occasional exceptions" to the general provision on compensation eligibility which maintains that industries which account for GVP greater than AUD 20 million and are "not represented by an EADRA signatory are not eligible for compensation" (Animal Health Australia, 2011a, p. 11).[35] One such exception occurred following the August 2007 equine influenza outbreak, when the Australian government resorted to *ad hoc* response cost underwriting and compensation for direct and consequential losses.

Though equine influenza is among the 65 EADRA-listed diseases, at the time of the outbreak the affected equine industry sectors had not yet signed onto the EADRA. Accordingly, the cost-sharing mechanism was not officially invoked during the course of the response. Nonetheless, the cost-sharing procedures were essentially applied, with the key break in prescribed procedure being that the Commonwealth Government ultimately underwrote the industry's share of the response costs[36] and made substantial support payments to various affected stakeholders.[37] Since control measures did not involve the culling of animals,[38] the impetus for the support payments originated in the implementation of a national livestock standstill and subsequent movement restriction and control zones in infected

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restocking eligibility date then the livestock owner would be 'better off'. However, associated consequential losses related to the outbreak and its interruption of business would likely cancel out this potential result.

34. Compensation payments can also be nullified or limited as a result of any relevant illegal behaviour or false statements (EADRA, 2010, p. 30 of the Schedules).

35. The relevant clause of the EADRA is 10.8, which reads in full, "The Parties agree that it is their intent that, once appropriate legislative provisions are agreed, participants in Industries the representative bodies for which are not Parties to this Deed, and the GVP of which is greater than AUD 20 million, will not be eligible for compensation. It is the intention of the Parties that Industries the GVP of which is less than AUD 20 million may be eligible for compensation" (EADRA, 2010, p. 21 of the Deed).

36. Equine influenza is a Category 4 disease which means that had the industry already been a signatory to the EADRA its contribution would have been 80 % of the sharing-eligible response costs (EADRA, 2010, p. 21 of the Deed, pp. 8-10 of the Schedules). However, given the high cost of the control measures in this case, the industry's contribution would have been limited by the 1 % of industry GVP cap provided for in the EADRA. Indeed, during the course of the outbreak the EADRA parties agreed to raise the cap to 2 % of industry GVP (AUD 64 million) and once this limit was reached (January 2008) a final, upper limit of AUD 108 million was agreed (Callinan, 2008, p. 11).

37. The sum of these compensation-like payments committed to by the Commonwealth Government was AUD 268.8 million. They were provided "directly to individuals and businesses whose primary source of income had been affected by the outbreak and the subsequent movement restrictions" (Callinan, 2008, p. 12).

38. For a description of the control measures taken, see Callinan (2008, pp. 10, 11) or Cowled *et al*. (2009, pp. 60, 61).

states which caused large-scale income losses among, e.g. the horse racing industry and third-party stakeholders like equine dentists temporarily put out of work by the threat of disease transmission.
There are two notable characteristics of the equine influenza outbreak which may have affected the Commonwealth Government's decision to cover the industry's share of the response costs. First, the outbreak was 'abnormal' to some extent because it originated with imported horses and likely passed through import-associated quarantine measures on the body of a person or equipment that had been in contact with the sequestered animals (Callinan, 2008, pp. xvi, xvii). Second, the horse industry had expressed an intention to become an EADRA signatory prior to the outbreak but progress was delayed in part by the requisite development of an equitable, efficient, and regulation-meeting[39] levy system through which to fund the industry's potential cost-sharing responsibilities. Levy design has proven particularly challenging in the case of the equine industry, even after the influenza outbreak, since Australian horse owners do not deliver an easily/directly taxable 'product' in the same sense as, for example, pork or egg producers.[40]
One outcome of the 2007 equine influenza outbreak, which ultimately led to a reported 8 000 infected properties and saw per-day control costs reach AUD 560 000 (Callinan, 2008, pp. 10, 11),[41] was to provide clear motives for pursuing comprehensive representation of the livestock industry amongst the EADRA parties. To that end, Primary Industries Ministers from both the Commonwealth and the states and territories agreed to the need to establish by 1 December 2010 horse industry commitment to a national levy and to inclusion of the industry under the EADRA. In the absence of any funding agreement, Ministers agreed that there would be no nationally cost shared response to any exotic horse disease incursion. Should the horse industry come forward with the necessary agreements, the Commonwealth Government would commit to introduce legislation accordingly. Ministers agreed to work with horse industry organisations in all jurisdictions and members of the Australian Parliaments to ensure broad support for timely progression of the funding legislation.[42] The horse industry met the December 2010 deadline and submitted a comprehensive dossier to the Commonwealth Minister. By March 2011 the equine industry had formalised its commitment to the EADRA.

Diseases covered

97. The EADRA's predecessor, the Commonwealth/States Cost Sharing Agreement, applied to only 12 livestock diseases and did not provide for industry contributions (Neumann and Keogh, 2006, p. 150); therefore, with its portfolio of 65 emergency animal diseases,[43] the EADRA provides significantly more certainty for disease response planning and funding. As seen in Table 4 below, diseases listed in the EADRA are divided into four categories based on several factors, including their potential to cause national socio-economic losses, human or environmental health consequences, and adverse economic effects for the livestock industry. Perhaps the most easily traceable logic linking the categories and the percentage-based cost-sharing splits between government and industry parties is a given disease's ability to impact on human or environmental health.

39. That is, the Commonwealth Government's Levy Collection Guidelines.

40. The equine industry – represented by the Australian Racing Board, Harness Racing Australia, Australian Horse Industry Council, and Equestrian Australia Limited – signed onto the EADRA in March 2011. The industry-supported levy provisions are zero-based (i.e. only activated when necessary) levies on manufactured horse feed and anthelmintics (worm treatments). The *Horse Disease Response Levy Bills* were recently passed by the Senate in September 2011, this being the final step that establishes the necessary cost recovery mechanism that enables the horse industry to collect its share of the costs for a response as of now.

41. Per-day forgone income peaked at AUD 3.35 million (Callinan, 2008, p. 11).

42. http://www.mincos.gov.au/__data/assets/pdf_file/0005/1608971/pimc17.pdf

43. Most of the 65 diseases listed in the EADRA are also OIE Listed Diseases; however, there appear to be at least a dozen diseases listed in the EADRA that do not appear on the OIE list. Notably, all of the former OIE 'List A' diseases are incorporated in the EADRA.

98. In order for a livestock disease to be considered for inclusion in the EADRA it must meet one of the following conditions (EADRA, 2010, p. 8 of Deed):

- It is a known disease that does not occur in endemic form in Australia and it is felt to be in the national interest to keep the country free of the disease;

- It is a conclusively identifiable variant form of an endemic disease and would have a national impact if it became established in Australia;

- It is a serious infectious disease whose cause is unknown or uncertain – based on the evidence available at the time, it may be an entirely new disease or one not listed in the EADRA;

- It is a known endemic disease, but its form during the outbreak in question is so severe that an emergency response is required to prevent a large scale epidemic of national significance or large-scale loss of market access.

99. Since ratification of the EADRA in 2002, just two diseases have been added; additionally, bovine tuberculosis was recently moved from Category 3 to Category 4, increasing the industry contribution for this disease to 80 % of sharing-eligible expenses. A consensus has emerged among the EADRA parties that rather than conduct comprehensive list reviews they will examine potential changes on a case-by-case basis.

Table 4. Cost-sharing proportions by disease category

Disease category	Category characteristics	Government funding	Industry funding	Applicable emergency animal diseases		
				Total #	Indicative, abbreviated emergency animal disease lists	
Category 1	"Predominantly seriously" impact human health or the environment, with few direct consequences for livestock industries	100 %	0 %	5	Australian bat lyssavirus	Japanese encephalitis
					Nipah virus	Rabies
					Western, Eastern, and Venezuelan equine encephalomyelitis	
Category 2	May cause "slightly lower" national socio-economic losses than Cat. 1 but result in "very severe" production losses and still produce "significant" human or environmental consequences	80 %	20 %	16	Avian influenza (highly pathogenic, subtypes H5, H7)	Bovine spongiform encephalopathy
					Foot-and-mouth disease	*Peste des petits ruminants*
					Sheep pox	Vesicular stomatitis
Category 3	Lead to "generally moderate" national socio-economic losses, including severe production losses for the industry, with little to no effect on human or environmental health	50 %	50 %	16	Avian influenza (highly pathogenic, other than subtypes H5, H7; and low pathogenic, subtypes H5, H7)	Bluetongue (in sheep)
					Classical and African swine fever	Newcastle disease
					Scrapie	Swine vesicular disease
Category 4	Primarily prompt production losses for the livestock industries, which are in turn the main beneficiaries of the outbreak responses	20 %	80 %	28	Aujeszky's disease	Bovine tuberculosis
					Equine influenza	Heartwater
					Maedi-visna virus	PRRS
Uncategorised*	Treated, with respect to cost-sharing, as **Cat. 1** if a previously unknown disease and as **Cat. 3** if a previously known but not categorised disease*	100 %	0 %	n.a.	n.a.	
		Or				
		50 %	50 %			

* In order for the uncategorised emergency animal disease cost-sharing rules to take effect, the National Management Group must decide to implement a disease response plan) prior to the categorisation of a previously unknown or known-but-not-categorised emergency animal disease.
** With respect to 'uncategorised' diseases which would generally be classified as Category 3 for cost-sharing, if the National Management Group agrees that such a disease entails "significant" public health issues it will be dealt with as a Category 1 disease.
Source: Animal Health Australia (2011a); EADRA (2010, p. 19 of the Deed, pp. 8-10 of the Schedules).

Financial structure

100. Following the National Management Group's approval of a disease response plan, each participating Lead (state/territory) Agency initially pays its own response implementation costs. Then the cost-sharing formulae in the EADRA are utilised to calculate reimbursement payments which are made "on a monthly basis or such other time as agreed to by NMG [the National Management Group] on submission of claims to, and their verification by, AHA" (Animal Health Australia, 2010, p. 1).

101. As previously indicated (and shown in Table 4 above), the levels of government and industry cost-sharing burdens vary by disease category. Costs sustained by industry parties range from 0 % for Category 1 emergency animal diseases – those with the most potential to negatively affect human or environmental health – to 80 % for Category 4 emergency animal diseases. Government parties

cumulatively pay at least 20 % of disease response costs and cover the entirety of expenses resulting from Category 1 diseases. The Commonwealth Government always pays 50 % of the overall government share, with the rest subdivided among the states/territories according to – for Category 1 diseases – their relative human populations or, for the other diseases – their relative populations of the livestock species in question, their share (as a percentage of the national total) of the gross value or production (GVP) of the affected species and/or animal products, or a combination of the two (EADRA, 2010, pp. 20-23). These methods effectively distribute the government cost-sharing burden such that those states/territories which pay the most for a certain disease response benefit more than the others from it, i.e. they have relatively large shares of the potentially affected human population or of the GVP of the affected industries in their jurisdiction.

102. On the other side, cost-sharing among the industry parties (relevant for Category 2, 3, and 4 diseases) needs to be calculated when an emergency animal disease affects more than one species or concerns more than one industry party. If a disease affects more than one species the cost-sharing contributions of the affected industry parties are based on their comparative GVP and a weighting which reflects the emergency animal disease's impact on each of them. For example, the weighting factor for foot-and-mouth disease is 50 % cattle, 30 % sheep and goats, and 20 % pigs. In the other instance – multiple industry parties representing a single affected species (e.g. Beef Grazing, Beef Feedlot, and Dairy) – the cost-sharing is determined among the affected parties, but should take into account the GVP of the respective individual sectors (EADRA, 2010, pp. 26, 27). If such industry parties do not notify their preferred division of costs to AHA, each will be equally financially responsible.

103. Also of prime significance is a GVP-based cap on the total cost-sharable response costs to assure parties that the cost of a disease response plan will be finite. Relevant for larger-scale incidents, this cap initially limits the total of the response costs that are to be shared to 1 % of the GVP of the industry(s) affected (2 % in the case of foot-and-mouth disease). When there is reason to believe that the disease response plan's cost may exceed the agreed limit, the National Management Group reviews the disease response plan to address several questions (EADRA, 2010, p. 20 of Deed):

- Should the agreed limit be increased?
- Should the disease response plan be continued or substituted by a long-term control plan?
- Should the proportional shares of the affected parties be altered?
- Or, should any other appropriate alterations be made to the disease response plan?

104. To achieve the ability to meet their potential cost-sharing obligations, the industry EADRA parties are required to develop fundraising mechanisms. Overwhelmingly, they have elected to implement statutory levies that are zero-based, i.e. only activated following a relevant emergency animal disease incident (EADRA, 2010, p. 33 of the Schedules).[44] When necessary, the Commonwealth Government will initially absorb the industry share of costs and allow the affected industry(s) up to ten years to finalise reimbursement at an interest rate based on the Australian Consumer Price Index.

105. Given the industry parties' preference for zero-based levies, cost-sharing contributions are primarily *ex post* in nature. Nonetheless, there are several 'peace-time' undertakings related to the EADRA, including the aforementioned annual workshops, as well as mandated training programmes,

44. Levies are developed by the livestock industry organisations participating in the EADRA and approved by the government. Thus, the units (e.g. animal or animal product) on which they are assessed vary by industry sector.

which necessitate *ex ante* financing. These 'peace-time' costs related to maintenance of the EADRA are – in a distinct cost-sharing scheme – distributed equally among the Commonwealth Government, the state/territory governments, and the livestock industry's full AHA members (even if those members are not signatories to the EADRA).

Practical experience in scheme application

106. In assessing how the compensation component, and more broadly the EADRA cost-sharing mechanism, has functioned since ratification in 2002, it is worth considering that though the EADRA has been updated almost annually, it has undergone no fundamental changes. Indeed, the minor, clarification-type modifications adopted have resulted from the realisation, through actual application of the EADRA, that some of the agreement's clauses could be more clearly structured.[45] This absence of a push for wholesale change, an AHA official suggested, is linked to stakeholders' general sense that the EADRA is a solid, well-functioning agreement which reflects a high level of consensus among all the signatories.

107. Alongside the relatively minor changes made to the EADRA during the decade it has been in operation, there have been few major, compensation-triggering outbreaks. Therefore, Table 5 below highlights just the 2002 Newcastle disease outbreak, one of the first for which the EADRA-based cost-sharing was invoked, and the 2007 outbreak of equine influenza due to its status as the most substantial disease eradication effort since the development of the EADRA.

Table 5. Recent major outbreaks that prompted compensation payments

Disease	Time period	Scope of outbreak and compensation	Subsequent modifications to scheme (if any)
Newcastle Disease	2002	Two outbreaks, 10 000 cases, 1 000 deaths; 265 619 birds destroyed, 47 000 slaughtered, and 230 000 vaccinated. Total shared costs: AUD 1.91 million in the Victoria incident and AUD 432 000 in the New South Wales incident.	No known significant post-incident modifications to the EADRA (the disease was successfully eradicated according to AUSVETPLAN strategies)
Equine influenza	2007	Large-scale: this was the "first major cross-jurisdiction incident since [EADRA's] inception" (Animal Health Australia, 2008, p. 5), and the most serious livestock disease experienced in recent Australian history. Approximately 47 000 horses on 5 943 properties were infected in New South Wales alone. Costs during the initial response reached AUD 560 000 per day for disease control and total sharing-eligible costs for equine influenza in New South Wales and Queensland were just over AUD 100 million.	Led to heightened efforts to increase industry participation in the EADRA and ultimately to the finalisation of arrangements which will allow the horse industry to pay their share of disease response costs in future events.

Source: Animal Health Australia (2008, p. 5); Callinan (2008, pp. 11-12); New South Wales Government (2008); OIE HandiSTATUS Interface (2011); OIE WAHID Interface (2011).

45. The generally insubstantial nature of modifications made to-date can be seen in the results of the first five-year review of the agreement, which was conducted in 2007. Recommendations included: 1) fine-tuning of the definition of an emergency animal disease; 2) clarification/simplification of the disease categorisation process; 3) specification that the EADRA should not apply to indeterminate, long-term disease containment – if despite initial response efforts a disease is deemed ineradicable then procedures exist to terminate use of the EADRA; 4) improved definition of parties' 'normal' commitments (cost-sharing applies only for expenses exceeding this financial baseline); and 5) increased participation of industry sectors, i.e. the need for non-signatories within the livestock industry to formalise their commitment to the EADRA and guarantee their ability to pay their share of relevant disease responses.

108. The motivations and duties that the EADRA imposes on livestock holders with respect to 1) biosecurity; 2) notification of outbreaks; and 3) cooperation with disease response plans suggest that all the main potential incentives related to livestock holder compensation have been taken into account.

109. First, with respect to the development of robust biosecurity, rather than promote it through direct financial means, e.g. by decreasing individual livestock holders' levies in exchange for their agreement to adhere to heightened preventive measures,[46] the EADRA requires it through risk-mitigation regulations contained in Clause 14. In this way, any moral hazard issues that might otherwise emerge from the 100 % and 80 % government coverage of the sharing-eligible response costs for Category 1 and Category 2 diseases, respectively, are counteracted through regulation. Additionally, Category 3 and Category 4 diseases do call for a substantial proportion of their costs to be borne by the livestock industry.

110. The largely *ex post* nature of the EADRA-related levy systems employed by the livestock industries may eliminate some potential for awareness-raising with respect to the animal health responsibilities of livestock holders.[47] But, since ratification of the EADRA, Animal Health Australia has engaged in a substantial and still ongoing communication campaign to increase awareness and understanding of the EADRA and its risk mitigation regulations among stakeholders (Bernoth, 2011; Neumann and Keogh, 2006, p. 155).

111. Second, the EADRA forgoes a potential direct financial incentive for early notification in that it does not reduce compensation levels for animals dead or visibly sick at the time a disease incident is reported – compensation for animals dead from the applicable disease is set at the same level as compensation for culled animals. However, the incentive for early reporting is provided in another manner: to receive this full compensation for dead animals, livestock holders must notify authorities of the death(s) within 24 hours.

112. Third, in terms of incentivising the full cooperation of livestock holders, and more broadly the livestock industry, with disease response plans, there are a couple of particularly relevant aspects of the EADRA: The top-up compensation payment which adjusts for the difference between the initial market value-based compensation of livestock holders' dead or culled animals and the subsequently assessed market value of equivalent livestock restocking goes a long distance toward ensuring business continuity, and thus likely provides a strong incentive for holders' general cooperation with the EADRA. More broadly, this top-up compensation payment embodies the general principle that no individual or organisation should be made worse off as a result of reporting a disease-incident, which seems an important incentive for stakeholders' participation in and cooperation with disease response plans. Similarly, the fact that all stakeholders, including industry organisations, take part in decision-making when they are affected by a disease incident also works to ensure general involvement and cooperation in response efforts.

113. If there is a potentially adverse compensation-related incentive not comprehensively addressed in the EADRA it is the comparative loss experienced by a livestock owner whose farm is in a movement restriction zone. This owner, unlike another whose nearby farm is inside the infected or culling zone, would not receive compensation for business interruption losses experienced as a result of the movement restriction – because those constitute consequential losses – yet would still bear the financial burden of

46. Due to the almost entirely *ex post* nature of the utilised levy systems, such a mechanism would be difficult to implement in Australia.

47. The timing of the payment of premiums/levies by farmers has been identified as impacting their risk awareness and incentives to take preventive action, and it has been suggested that a mix of *ex ante* and additional payments (or levies) to one scheme is likely to produce the strongest preventive effect (Melyukhina, 2011, p. 57).

feeding and caring for alive livestock. Thus, through cooperation with the movement restriction regulations, the first owner is put at a financial disadvantage relative to the second (who is cooperating with the culling measures). The EADRA does, however, attempt to greatly limit the extent of this issue by ensuring rapid outbreak responses which can decrease the duration and scope of control measures like restriction zones. Also, AUSVETPLAN disease strategies take into account business continuity and require that restricted areas (RAs) should be no larger than required for epidemiological reasons to prevent spread of infection. RAs should not be extended merely to include processing establishments (e.g. abattoirs, dairy factories) or disposal sites, or to accommodate simple boundary definitions (e.g. local government areas). Minimising the size of the RA reduces the number of farms under the most stringent controls. This enables resources to be allocated to the highest priorities and minimise impediments, including social impacts, to farming and regional communities.

114. With respect to the discussion of potentially adverse incentives, it is quite noteworthy that an Animal Health Australia official reported that the company has not experienced any associated poor behaviour, e.g. a failure to report a disease incident. The livestock industry's adherence to the agreement has reportedly been firm. This positive experience is likely in part an outcome of the collaborative nature of the EADRA: through involvement of all relevant stakeholders in not just the funding but also administration of the cost-sharing scheme, a strong and cross-sector commitment to its proper functioning may be established.

115. In conclusion, the EADRA is seen by Animal Health Australia as both a risk reduction (though not risk eliminating) mechanism – in the sense that by putting in place all the tools and sub-agreements necessary for rapid disease response it can eliminate uncertainty, speed up implementation of disease response plans, and thereby limit negative consequences for Australia and its livestock industry – and as a mechanism for equitably distributing stakeholders' financial risk according to the 'beneficiary pays' principle.

Table 6. Key features of Australia's cost-sharing/compensation scheme

<table>
<tr><td>Name of scheme</td><td colspan="3">Emergency Animal Disease Response Agreement (EADRA)</td></tr>
<tr><td>Legal basis</td><td colspan="3">Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (ratified March 2002)</td></tr>
<tr><td colspan="4">Institutional framework</td></tr>
<tr><td>Scheme governance</td><td colspan="3">Animal Health Australia (AHA) acts as custodian of the EADRA through ensuring a near-continuous performance review process. Following an outbreak, AHA moves to an administrative role, collecting data on the disease response and processing claims made by cost-sharing partners.
The National Management Group invokes the EADRA through approval of a post-incident Emergency Animal Disease Response Plan.
The technically-oriented Consultative Committee on Emergency Animal Diseases informs the National Management group by reviewing the disease response plan put forward by the affected state(s)/territory(s) and forwarding its recommendation on the plan's appropriateness.</td></tr>
<tr><td rowspan="4">Main stakeholders</td><td>Animal Health Australia</td><td rowspan="4">➔ (Represented on)</td><td rowspan="2">National Management Group</td></tr>
<tr><td>Commonwealth Government of Australia</td></tr>
<tr><td>All Australian state and territory governments</td><td rowspan="2">Consultative Committee on Emergency Animal Diseases</td></tr>
<tr><td>14 organisations representing the livestock industry</td></tr>
<tr><td rowspan="2">Is private insurance coverage available?</td><td>Yes</td><td>Limited availability</td><td>No</td></tr>
<tr><td colspan="3">Evidence suggests that private insurance for risks resulting from livestock diseases is not widely held by Australian livestock owners, in part because there are few 'off-the-shelf' products available.</td></tr>
</table>

Compensation			
Overview of the scope of compensation	Cost-sharing under the EADRA applies to several types of expenses: 1. Salaries and wages; 2. Operating expenses; 3. Capital costs; and 4. (Livestock holder) compensation For salaries and wages, operating expenses, and capital costs, the cost-sharing-eligible expenses are those which result directly from disease response plan implementation and exceed the implementing agencies' normal commitments. Thus, neither routine biosecurity expenses nor consequential losses incurred by communities within affected states/territories are cost-shared. Compensation is payable for livestock or property destroyed to control an emergency animal disease, as well as for dead animals that, had they not died of the disease, would have been ordered slaughtered.		
Are consequential losses covered?	Yes	**No**	Other
	No allowance shall be made for loss of profit, loss occasioned by breach of contract, loss of production or any other consequential loss whatsoever.		
Stakeholders' eligibility for compensation	Commercial livestock holders	Are compensated for animals and property destroyed during a disease response and for dead animals which would have been culled	
	Small industries/smallholders	Are eligible for compensation, even if not represented by an EADRA signatory, if their industry gross value of production (GVP) is less than AUD 20 million	
	Animal Health Australia (cost-sharing of expenses)	Can be reimbursed for non-normal costs incurred during a disease response	
	Commonwealth and state/territory governments (cost-sharing of expenses)	Are eligible for cost-sharing of non-normal costs of salaries and wages; operating expenses; capital costs; and compensation payments	
Rules for valuation	For destroyed property, the value is assessed immediately prior to destruction. For livestock compensation, the market value of the destroyed and dead-as-a-result-of-the-disease animal(s) is indemnified on the basis of the farm-gate price. When applicable, a second, top-up payment compensates for the difference between the market value of the equivalent livestock on the date restocking eligibility is granted and the previous compensation.		
Conditionality	Unless in a sector with GVP less than AUD 20 million, a livestock owner must be represented by one of the industry organisations that are EADRA signatories to be compensation eligible. Industry parties must advise their members to notify authorities within 24 hours of an incident. Also, a state/territory may lose its claim to cost-sharing through failure to notify the Consultative Committee on Emergency Animal Diseases of an incident within 24 hours. Livestock holders must notify the appropriate authority of dead animals within 24 hours. Industry parties have also committed to development of biosecurity plans.		
Timeframe for compensation	A holder's initial compensation claim must not follow livestock death/destruction by more than 90 days; a request for a valuation of restocking cost needs to be made within 30 days of notification of restocking eligibility; and a claim for a second compensation payment has to be made within 21 days of receipt of the second valuation's results. Compensation payments are made in short order by the states/territories.		
Diseases covered	The EADRA cost-sharing mechanism covers 65 emergency animal diseases, providing significant certainty for disease response planning and funding. The list of diseases is divided into four categories.		
Differentiated treatment of diseases (yes/no/other)	**Yes**	No	Other
	The division of diseases is based on several factors, including potential to cause socio-economic losses, human/environmental health consequences, and adverse economic effects for the livestock industry. *Category 1*: funded 100 % by the government → very high public benefits *Category 2*: funded 80 % by the government and 20 % by the industry → high public benefits *Category 3*: funded 50 % by the government and 50 % by the industry → moderate public benefits *Category 4*: funded 20 % by the government and 50 % by the industry → low public benefits		
Financial structure			
Funding sources and mechanisms	Each participating Lead (state/territory) Agency initially pays its own costs, then the cost-sharing formulae in the EADRA are utilised to calculate reimbursement transfers. Livestock industries use zero-based, i.e. only activated when necessary, statutory levies to raise funds. When necessary, the Commonwealth Government will initially pay the industry share of the costs following an outbreak, and the affected industry(s) then have 10 years to reimburse the government.		

Cost-sharing (yes/no)	Yes	No
	Distribution of cost-sharing contributions among the states/territories is based, for Category 1 diseases, on their respective human populations. For other disease categories, the shares are based on their relative populations of the concerned livestock species, their shares of the GVP of the affected industry, or a combination of the two. These methods distribute the government cost-sharing burden such that those states/territories benefitting most from control of a disease pay more. When an emergency animal disease affects more than one species, the cost-sharing contributions of the affect industries are based on the GVP of each industry and a weighting which reflects the disease's impact on each industry. When multiple industry parties represent a single affected species the cost-sharing is determined by the parties, but should take into account the GVP of the individual sectors. There is a GVP-based cap on total shared response costs of 1 % of the GVP of the industry(s) affected (2 % for foot-and-mouth disease). The EADRA parties' cost-sharing contributions are primarily *ex post* in nature. Nonetheless, there are several 'peace-time' undertakings funded through a distinct *ex ante* cost-sharing – these costs are equally divided among the Commonwealth Government, the state/territory governments, and the industry's full AHA members (even if those members are not signatories to the EADRA).	
Practical experience		
Incentives provided (for prevention/biosecurity practices and early notification)	Development of robust biosecurity is required through risk-mitigation regulations in the EADRA. The EADRA does not provide proportionally lower compensation for dead or visibly sick animals, but it does essentially require 24-hour notification of diseases for compensation eligibility. Strong incentives for cooperation with eradication efforts are provided to livestock holders via the top-up compensation payments which ensure holders' ability to equivalently restock culled or dead animals. All relevant EADRA parties take part in decision-making when affected by a disease outbreak. This involves them in the response and likely also creates a sense of responsibility for EADRA-related efforts.	
Efforts to mitigate potentially adverse incentives	Moral hazard issues related to compensation are addressed in several ways: • The requirement to develop biosecurity plans; • Industry contributions to cost-sharing in cases of Category 2, 3, or 4 outbreaks; • Conditionality attached to compensation: no illegal behaviour or failure to adhere to standards; • No coverage for consequential losses means livestock holders have an incentive to report and cooperate in order to limit the duration and extent of an outbreak. Animal Health Australia reports no negative experiences associated with adverse compensation-linked incentives. Livestock industry adherence to the agreement has reportedly been solid.	

Canada

Country overview

116. At nearly 680 million, Canada's total (agricultural) animal population far surpasses those of Australia, Germany, The Netherlands, and Vietnam (see Table 2). Among the other countries, only Vietnam's aggregate number of birds, cattle, buffaloes, horses, sheep and goats, pigs, etc., constitutes at least one third of the number found in Canada. This mismatch results from the size of a single sector of the Canadian livestock industry: poultry. Though Canada's borders contain the second lowest average bird density of the five countries ($1/36^{th}$ that of The Netherlands), they are so expansive that in 2010 the low density figure was linked to holdings of more than 641 million chickens and 20 million turkeys (Statistics Canada, 2011a).[48]

117. Also of noteworthy, if less striking, sizes are the Canadian cattle and swine sectors. Canada is home to a similar number of cattle as Germany, though Australia's herd is more than twice as large, and it supports about the same number of pigs as the Netherlands, though, again, this is only half as many as Germany (OIE WAHID Interface, 2011). Of the 229 373 Canadian farms that existed in 2006, 6.4 % were engaged in Dairy cattle and milk production, while 26.6 % – by far the largest share of any Canadian crop

48. Statistics Canada's data on the poultry sector differs slightly from the OIE's figures: whereas the OIE lists the total number of birds at 650 million, Statistics Canada identified just over 662 million chickens and turkeys in 2010.

or livestock sector – were dedicated to Beef cattle ranching and farming, including feedlots (Statistics Canada, 2011a).

118. The Canadian livestock industry has experienced multiple epidemic livestock disease outbreaks in recent years. Two diseases have proven most problematic, one of those being avian influenza. In early 2004, there were over 50 outbreaks of highly pathogenic avian influenza (HPAI) in British Columbia, and control measures included the destruction of nearly 14 million birds. Another HPAI outbreak in fall 2007 resulted in 540 cases and deaths, as well as the destruction of 48 560 susceptible birds. In subsequent years only low pathogenic avian influenza (LPAI) has appeared. Control measures for 2009 and 2010 outbreaks included more than 80 000 destructions (OIE HandiSTATUS Interface, 2011; OIE WAHID Interface, 2011).

119. The second particularly impactful disease, bovine spongiform encephalopathy (BSE), has frequently plagued the Canadian cattle industry during the past decade. The first outbreak occurred in 2003 and involved a single cow in Alberta. This was sufficient to trigger substantial trade interruptions which have led to industry losses near CAD 6.3 billion (Antón *et al*., 2011, p. 49). In 2003, 2 700 animals were destroyed. The next case occurred late the following year and led to the slaughtering of nine animals (OIE HandiSTATUS Interface, 2011). The six-year period from 2005 to 2010 saw at least one BSE case annually and 15 cases, nearly 400 destructions, and almost 300 slaughterings in total (OIE WAHID Interface, 2011).

120. When disease control measures such as those listed above are ordered in response to an outbreak, Canada compensates livestock holders for their destroyed/slaughtered animals and related products, as well as for incurred disposal costs, through a compensation scheme administered by the Canadian Food Inspection Agency (CFIA). Additional financial transfers to affected livestock holders can be made through several programmes administered by Agriculture and Agri-Food Canada (AAFC). Whereas the CFIA-administered scheme only compensates holders for direct losses, the AAFC programmes (see text box below for details) may partially reimburse business interruption and other extraordinary losses (CFIA, 2011; Ritz, 2011).

121. The ability of livestock holders to privately insure risks associated with epidemic diseases appears minimal. In 2006, Stephen and Epps (pp. 160, 161) described a sector "unlikely to get involved with such [drought or disease epidemic] risks", and an August 2011 interview with several CFIA and AAFC officials confirmed the continued scarcity of private insurance products. While the Canadian government has made efforts to engage the private sector and incentivise product development (e.g. through the Private Sector Risk Management Partnerships programme), farmers still rely on the public risk management programmes.

Institutional framework and stakeholder involvement

122. The compensation scheme administered by the Canadian Food Inspection Agency (CFIA) is purely public in nature – its funding does not entail cost-sharing with the livestock industry. The scheme is authorised by the *Health of Animals Act* (S.C. 1990, c. 21), Section 51 of which permits the minister of Agriculture and Agri-Food Canada (AAFC) to compensate the market value of compulsorily destroyed animals.[49] In turn, Section 55 authorises the minister to set out maximum compensation amounts for

49. Section 51 also permits compensation for animal disposal costs. It is Section 52 which specifies the availability of compensation for destroyed products (*Health of Animals Act*, S.C. 1990, c. 21). The authority to actually order animal and product destruction is also derived from the *Health of Animals Act* (Section 48).

destroyed animals and products. These have been established through attachment of a schedule to the *Compensation for Destroyed Animals Regulations* (Ritz, 2011).[50]

123. Established in 1997 by the Canadian Food Inspection Agency Act, the CFIA is the agency responsible for the administration and enforcement of, among several other pieces of agricultural legislation, the *Health of Animals Act*, including its compensation provisions (*Canadian Food Inspection Agency Act*, S.C. 1997, c. 6). With over 7 000 employees and 160 field offices, the CFIA is a sizeable organisation tasked with ensuring safety in the food production chain – from primary production to retail level – and the livestock population. It manages animal inspection and quarantine programs across Canada and its president reports to the minister of AAFC who "is responsible for and has the overall direction of the [Canadian Food Inspection] Agency" (*Canadian Food Inspection Agency Act*, S.C. 1997, c. 6).

124. With regard to the compensation scheme operated by the CFIA, notable stakeholders include CFIA veterinarians and livestock holders. Acting early in the process, CFIA district veterinarians are authorised to issue destruction orders once they have determined the presence or suspected presence of a disease at a holding. These orders specify the animals and/or products to be destroyed. The district veterinarians then either – depending on the context, e.g. the number of animals involved – identify a single compensation evaluator or assemble an assessment team, which generally comprises a CFIA veterinarian as well as one evaluator chosen by the owner and another by the CFIA. The evaluators derive the market value of the animal(s) in question and generate a compensation evaluation form which is then sent to livestock holders for their acceptance or appeal (CFIA, 2011).

125. Livestock holders are involved at several points in the compensation scheme. Not only might they assist, through representative organisations, in development of the market value assessment tools (see below for details on the assessment rules),[51] but they are also assigned reporting responsibilities by the *Health of Animals Act*. Specifically, "immediately" after becoming aware of the presence of a reportable disease, livestock holders need to report its existence to the closest veterinary inspector (*Health of Animals Act*, S.C. 1990, c. 21, Section 5). And, when visited by compensation evaluators, holders must present evidence supporting animal value claims (CFIA, 2011).

Compensation

Scope

126. The compensation scheme aims to help "…control the spread of animal diseases, including those that would have a significant economic impact, by encouraging early reporting" (Ritz, 2011). To that end, the CFIA-administered scheme is authorised to compensate livestock/property holders for three categories of losses: animals ordered destroyed; destroyed items such as contaminated feed and animal products; and the disposal costs of destroyed animals. Below, Table 7 offers an overview of the scope of compensation available under the compensation scheme. As has been mentioned and is suggested by the table, the scheme only indemnifies direct losses imposed by disease control measures; it does not compensate for consequential or business interruption losses.

50. The current *Compensation for Destroyed Animals Regulations* originated in 2000 (SOR/2000-233), though the maximum compensation amounts available for schedule-listed animals were updated in July 2007 (SOR/2007-169) and amended later that same year (SOR/2007-269). In March 2011, publication of the *Regulations Amending the Compensation for Destroyed Animals Regulations* (SOR/2011-73) increased maximum poultry values (Ritz, 2011).

51. See, for example, Ritz (2011) on the poultry industry's participation in the recent development of new market value regulations for their sector (more detail on this collaboration is provided in the 'practical experience' section below).

Table 7. Scope of compensation available through the CFIA scheme

Loss category	Eligibility	Overview of the scope of compensation and assessment methods
Destroyed animals	1) The animal is destroyed under the *Health of Animals Act* or dies after its destruction has been ordered; or 2) The animal dies or must be destroyed due to injury caused by an inspector/officer during testing, treatment, or identification; or 3) The animal is reserved by authorities for experimentation.	Compensation is based on the assessed market value (the value the animal would have had at the time of its evaluation by the Minister if it had not been required to be destroyed) of the animals destroyed, up to the maximum amounts set in the *Compensation for Destroyed Animals Regulations*, minus any value received through carcass salvage. The market value is derived by a compensation assessment team or, sometimes, a single evaluator. The livestock holder can appeal the evaluation. The compensation "amounts are intended to reflect the reasonable depreciated value that an owner could expect to receive for the animal or thing on the current Canadian market" (CFIA, 2011).
Other destroyed items	Eligible items include, *inter alia*: 1) Contaminated feed ordered destroyed; and 2) Animal products ordered destroyed.	Compensation for a given item is based on that item's assessed market value at the time of its destruction, up to a prescribed amount.
Animal disposal costs	Compensation-eligible costs are those which are: 1) Linked to the disposal of animals; and 2) Permitted by the *Compensation for Destroyed Animals Regulations*.	If an animal is ordered to be destroyed or slaughtered and all procedures are appropriately followed by its owner, compensation is payable for reasonable costs incurred by the owner for: 1) Transporting the animal to the destruction facility; and 2) The animal's destruction or slaughter. If the carcass must also be disposed of, compensation is additionally payable for reasonable costs incurred by the owner for: 1) Transportation to the place of disposal; 2) The cleaning/disinfection of the transport vehicle; and 3) (In addition to destruction costs), disposal expenses or services.

Source: CFIA (2011); *Compensation for Destroyed Animals Regulations* (SOR/2000-233); *Health of Animals Act* (S.C. 1990, c. 21).

127. To build on the summary provided by Table 7, the market value assessment can be performed via either of two methods. The first is employed for commonly traded animals such as cows and sheep. Since a market exists for these animals the value assessment is based on a determination of how much an equivalent replacement would cost on that market. It takes into account a given animal's age, genetic background and production records, among other factors. The second method is utilised in the effective absence of a functioning market for the animal in question. Examples provided by the CFIA (2011, p. 2) include egg-laying and hatching-egg birds. Here, the replacement value is still the sought after figure, but it is determined based on an economic formula that accounts for the production or life cycle phase the animal had achieved at the time of its destruction and the associated 'grow-out' costs.[52]

128. The maximum values listed in the *Compensation for Destroyed Animals Regulations* schedule, indicative examples of which are provided in Table 8 below, do constitute concrete limits on compensation. Thus, an evaluation that would otherwise place an animal's market value above the relevant limit yields that animal's owner no more than the maximum value. Generally though, compensation payments fall below the maximum values, as they reflect reasonable depreciation levels. If a holder feels that a compensation evaluation has produced a figure too far below the maximum level, an appeal (federal

52. So, for example, "an important part of the [poultry] model is that costs are reflected when they are incurred during the grow-out cycle, so that the appropriate compensation amount would be paid based on the date of the CFIA order" (Chicken Farmer, 2011, p. 2).

court-based) must be made within three months of receipt of the evaluation form.[53] In cases where an appeal is not pursued, it normally takes six to ten weeks for payment to reach the livestock holder.

129. Notably, smallholders and non-commercial holders/hobby farmers are compensated in precisely the same manner as commercial holders because compensation is payable for any animal – from production livestock to zoo animals and other exotics, as well as family pets[54] – ordered destroyed for disease control purposes under the *Health of Animals Act*.

Table 8. Maximum compensation amounts for certain livestock species

Livestock species	Maximum compensation amount (CAD)	Prior (i.e. pre-March 2011*) maximum values for poultry
Cattle (*Bos Taurus* and *Bos indicus*) Registered	8 000	n.a.
Sheep (*Ovis aires*) Registered	1 200	n.a.
Goat (*Capra hircus*) Registered	1 000	n.a.
Swine (*Sus Scrofa*) Registered	5 000	n.a.
Horse (*Equus equus*) All horses except those ordered destroyed due to Equine Infectious Anaemia	8 000	n.a.
Chicken (*Gallus gallus*) For egg production	30	8
Chicken (*Gallus gallus*) Parent breeder – For egg production	60	18
Chicken (*Gallus gallus*) Parent breeder – For meat production	60	24
Turkey (*Meleagris gallopavo*) For meat production	70	35
Turkey (*Meleagris gallopavo*) Parent breeder	250	90

* The *Regulations Amending the Compensation for Destroyed Animals Regulations*, which increase the maximum compensation amounts for poultry, took effect in March 2011 (Ritz, 2011).
Source: Chicken Farmer (2011); *Compensation for Destroyed Animals Regulations* (SOR/2000-233).

130. As introduced above, the legislation underlying the compensation scheme does not specify an hour- or day-based time limit in which livestock owners or caretakers must notify reportable disease incidents to veterinary inspectors. Rather, transmission of notification "immediately after" such an incident is required (*Health of Animals Act*, S.C. 1990, c. 21, Section 5). Given that the AAFC minister can partially or fully withhold compensation for violations or offences committed under the *Health of Animals Act* (S.C. 1990, c. 21, Section 54), this legal reporting requirement is backed by potential financial penalisation.[55] Additionally, there is effectively a de facto encouragement of early notification because animals which die from a disease prior to the issuance of an applicable destruction order are not indemnified.[56]

131. The CFIA compensation scheme does not differentiate its procedures between 'limited' and 'catastrophic' outbreaks, using the same methodological approach in both instances. Nonetheless, the CFIA (2011, p.1) has noted the possibility that emergency situations might result in a "slightly different"

53. Compensation claimants can also appeal if they feel that compensation has unreasonably not been awarded (*Health of Animals Act*, S.C. 1990, c.21). The time limit is three months after receipt of notification of the minister's decision.

54. Indeed, the *Compensation for Destroyed Animals Regulations* (SOR/2000-233) lists maximum compensation values for over 200 animals, only about 50 of which are categorised as 'farm' animals.

55. The interview with Canadian officials from the CFIA and AAFC confirmed that gross negligence relating to reporting of a disease outbreak could give the AAFC minister flexibility with respect to not issuing compensation under the Health of Animals Act.

56. Animals that are sick at the time of reporting are compensated if they are still alive when their destruction is ordered.

compensation process designed to speed up disease response efforts. This slight possibility aside, the main potential for differentiation between small- and large-scale livestock epidemics rests on Canada's somewhat frequent implementation of temporary or *ad hoc* financial support programmes in the agricultural sector (Antón *et al.*, 2010, p. 13). At least with respect to costs imposed by livestock diseases, these programmes tend to address producers' consequential rather than direct losses. A livestock-industry-specific example of such an *ad hoc* programme is the substantial distribution of funds at the federal and provincial levels which followed the 2003 BSE outbreak (Antón *et al*., 2011; Statistics Canada, 2011b). Large-scale outbreaks might also be differentiated by increased financial transfers provided through the Business Risk Management (BRM) suite of programmes managed by AAFC (see the text box below).

The Business Risk Management suite of programmes

As discussed above in the 'country overview' section, in addition to the compensation provided through the CFIA for direct losses resulting from livestock or product destruction, the AAFC has the potential to provide financial assistance to disease-affected livestock holders through the Business Risk Management (BRM) programs. The BRM suite comprises four main programmes – AgriInvest, AgriStability, AgriRecovery, and AgriInsurance – as well as an Advance Payments Programme. With the exceptions noted below, the general funding rule for the BRM programmes is that their costs are shared on a 60/40 basis between the federal and provincial/territorial governments.

AgriInvest effectively comprises contribution-matching savings accounts (funded entirely by the federal government). Though AgriInvest accounts are generally intended to assist with small income declines, since withdrawal of the funds is flexible they could be used to counteract a portion of the costs incurred as a result of a livestock disease outbreak.

AgriStability serves as an income stabilisation programme applicable when farm income more substantially declines relative to the average income of previous years. AgriStability takes into account the impact of, e.g. a livestock disease incident, on the whole-farm operation. Thus, a disease event would need to cause a farm's programme margin to fall 15 % below the reference margin to trigger an AgriStability payment (Agriculture and Agri-Food Canada, 2008).

AgriRecovery provides a framework for the coordination and tailoring of federal and provincial/territorial responses to individual agricultural disasters, including diseases. The programme's goal is to fill gaps left by other BRM and Growing Forward programmes with targeted, case-specific programming. Following a disaster-type event, an affected province or territory can ask for an AgriRecovery assessment, which will then be jointly conducted by the federal and the relevant provincial/territorial government(s). An assessment explores the following questions: 1) Does the event meet federal-provincial-territorial disaster criteria under the AgriRecovery framework? 2) What level of assistance do agricultural producers need to recover from the event's impact? And 3) How have and will existing programmes assist recovering producers – what have CFIA-administered compensation pay-outs already done in terms of indemnifying producers' losses and what will the other BRM programmes (e.g. AgriInvest and AgriStability) contribute in financial assistance? The evaluation of these questions leads toward the governments' determination of whether additional assistance through AgriRecovery is justified (Agriculture and Agri-Food Canada, 2011). If it is deemed warranted, case-specific initiatives are developed. The funding of these programmes is shared between the federal government and the affected province(s)/territory(s) on the customary 60/40 basis. AgriRecovery is allotted a specific annual budget, currently CAD 125 million. Exceeding that budget requires federal cabinet approval.

The AgriInsurance programme is currently mainly used to insure crop-related production and asset losses caused by natural perils. The majority of premiums on plans under AgriInsurance are cost-shared 60/40 between government and producer, and the government portion is divided 60/40 between the federal and provincial governments. Notably, an extension of coverage to livestock-related production losses is ongoing.

The Advance Payments Programme allows for government-guaranteed cash advances of up to CAD 400 000 per production period to agricultural producers. As no specific use of the advance is mandated, this programme could be used by outbreak-affected livestock holders. Collateral, in the form of animals, is required to secure an advance.

To summarise the relations between the BRM programmes with the most relevance to livestock disease outbreaks, AgriInvest and AgriStability are designed to help counter general farm net income declines – AgriInvest for marginal declines of less than 15 % and AgriStability for more severe marginal impacts. Meanwhile, AgriRecovery is a framework allowing for case-by-case development of gap-filling initiatives aimed at promoting business continuity.

Diseases covered

132. The CFIA-administered compensation scheme does not maintain a strict list of compensation-eligible diseases. As long as the animal in question has been ordered destroyed under the *Health of Animals Act* compensation is payable – no matter the disease. So, if a CFIA district veterinarian issues an order of destruction those animals that are destroyed as a result of it or die between issuance of the order and the actual destruction are compensated. However, the diseases that typically prompt destruction orders are indeed those listed as 'reportable' or 'immediately notifiable' on the CFIA's Web site. The 'reportable' category, which requires livestock owners, as well as veterinarians and laboratories, to immediately notify the presence or suspected presence of a contaminated animal to a CFIA district veterinarian, comprises 32 livestock diseases, including: African swine fever, anthrax, bluetongue (certain types), BSE, bovine tuberculosis, equine infectious anaemia, FMD, HPAI, lumpy skin disease, Newcastle disease, *peste des petits ruminants*, Aujeszky's disease, scrapie, and swine vesicular disease.[57] Meanwhile, the 'immediately notifiable' diseases (a lengthier list), e.g. other types of bluetongue, Hendra virus, and Nipah virus, are generally exotic to Canada and therefore not covered by established control/eradication programmes.[58] Notification of these diseases to the CFIA is only required of laboratories.

133. In the same way that the compensation scheme does not distinguish between 'limited' and 'catastrophic outbreaks, neither does it differentiate between types of livestock diseases – e.g. between zoonoses and diseases that purely impact animal production. As just discussed, the compensation procedures are effectively the same in all cases involving destruction orders issued by CFIA district veterinarians and, as detailed immediately below, the funds for the compensation payments come from the same source regardless the type of disease: the federal government always pays 100 % of the compensation costs.

Financial structure

134. Compensation payments made under the CFIA scheme are funded directly through the federal budget. When the AAFC minister – via the CFIA's procedures – orders compensation for a livestock holder, payment comes from the Consolidated Revenue Fund, which is the general account into which Canadian taxes and other revenue are deposited (*Health of Animals Act*, S.C 1990, c.21). Of course, this funding arrangement means there is no cost-sharing with the livestock industry, levy-based or otherwise.

135. The compensation scheme is *ex post* and loss-dependent in the sense that it is only utilised to compensate owners of destroyed animals or products following an outbreak. Though the CFIA does administer other preventive activities, including product and facility inspections and surveillance of animal importation, during 'peace-time', the compensation scheme is a distinct and entirely *ex post* programme.

136. As suggested, private sector risk management tools such as insurance and mutual funds do not significantly impact the functioning of the public compensation scheme. Evidence supporting this claim is displayed in Table 9 which allows for comparison between annual public compensation payments for animal losses and payments from private livestock and private dairy livestock insurance.[59] With respect to the amounts of annual public compensation payments, 2004 stands out due to the nearly CAD 71 million

57. The listing of these 'reportable' diseases is made official through the *Reportable Diseases Regulations* (SOR/91-2) under the *Health of Animals Act*.

58. The 'immediately notifiable' diseases are officially listed in the *Health of Animals Regulations* (C.R.C., c. 296).

59. Notably, the private payouts data in Table 9 may include a wide range of products, i.e. it is not limited to private insurance indemnification of risks from livestock diseases.

paid in compensation for animal losses that year, a large portion of which compensated the nearly 14 million birds destroyed to control a highly pathogenic avian influenza outbreak. The other annual totals between 2002 and 2010 top out at around one tenth of the 2004 sum, with several years seeing cumulative public compensation payments in a lower range of CAD 1 million to CAD 3 million.

Table 9. Public compensation paid for animal losses and private indemnification payments

Year	Total public compensation paid for animal losses (in thousands CAD)	Diseases prompting livestock destructions or slaughters	Number of destructions and slaughters notified to OIE	Notable *ad hoc* programmes involving payments from government to livestock producers (in thousands CAD)	Gross (net) payments from private livestock and private dairy livestock insurance (in thousands CAD)
2010	1 322	Bovine anaplasmosis	176 (bovine); 1 (buffalo)		52 (13)
		BSE	1 (bovine)		
		Scrapie	1 663 (sheep); 88 (goats)		
		Equine infectious anaemia	23 (equine)		
		LPAI	8 200 (birds)		
2009	7 387	Equine encephalomyelitis	3 (equine)		50 (18)
		Bovine anaplasmosis	555 (bovine)*		
		BSE	12 (bovine)		
		Scrapie	453 (sheep)		
		Equine infectious anaemia	78 (equine)		
		LPAI	69 339 (birds)		
2008	8 722	Bovine anaplasmosis	1 (bovine)		103 (60)
		Bovine tuberculosis	250 (bovine)		
		BSE	123 (bovine)		
		Scrapie	1 876 (sheep); 5 (goats)		
2007	2 907	Bovine tuberculosis	515 (bovine)		110 (80)
		BSE	112 (bovine)		
		Scrapie	14 (sheep); 24 (goats)		
		HPAI	48 560 (birds)		
2006	1 969	BSE	101 (bovine)	-181 (BSE recovery programme)	7 (-27)
		Scrapie	219 (sheep)		
		Equine infectious anaemia	53 (equine)		
2005	6 981	BSE	320 (bovine)	-35 (BSE recovery programme)	7 (-26)
		Scrapie	1 217 (sheep)		
2004	70 651	HPAI**	13 700 000 (birds)	33 893 (BSE recovery programme)	41 (12)
		Bovine tuberculosis	9 (bovine)		
		BSE	10 (bovine)		
		Scrapie	441 (sheep)		
		Equine encephalomyelitis	1 (equine)		
2003	7 572	BSE	2 700 (bovine)	429 858 (BSE recovery programme)***	36 (-3)
		Scrapie	5 360 (sheep)		
2002	7 010	Bovine tuberculosis	158 (bovine)		30 (0)
		Scrapie	3 331 (sheep)		

* This figure includes an unknown number of wild animals.
** The total amount of compensation paid through the CFIA compensation scheme in 2004 as a result of Avian influenza has been estimated at CAD 50-60 million (Antón *et al*., 2011).
*** The BSE recovery programme was begun in mid-2003 to financially aid Canadian cattle producers affected by the closure of all major beef and cattle export markets following the detection of a cow in Alberta with BSE. The programme's budget was CAD 460 million, and this amount was cost-shared on a 60-40 basis between the federal government (CAD 276 million) and the participating provincial/territorial governments (CAD 184 million). The payments partially compensated for the difference between the price received for cattle sold for slaughter in Canada after the outbreak and a reference price based on market value in the United States (Agriculture and Agri-Food Canada, 2011).
Source: Compiled by Civic Consulting based on data from Agriculture and Agri-Food Canada (2011); Antón *et al*. (2011); OIE HandiSTATUS Interface (2011); OIE WAHID Interface (2011); Statistics Canada (2011b).

Practical experience in scheme application

137. In terms of the basic workings of the compensation scheme, the aforementioned August 2011 multi-party interview suggested that from the CFIA's perspective the programme generally functions well – compensation claims and subsequent payments are processed efficiently, and livestock owners understand and are reasonably satisfied with the scheme's operation. During the interview it was noted that if there is an aspect of the compensation procedures which can lead to minor discord in interactions between livestock holders and CFIA employees it is the dual nature of the CFIA's work: on the one hand, CFIA officials' immediate duty following a disease incident is to implement the measures necessary for outbreak control (e.g. destruction or slaughter of livestock); on the other hand, the agency must also evaluate and process associated compensation claims. Livestock holders, understandably concerned with the economic impact of control measures on their businesses, may prefer to discuss compensation initially, whereas CFIA personnel may in some cases see it as more of a secondary matter.

138. Narrowing Table 9's broader focus on annual compensation pay-outs during the past decade, Table 10 presents details on a few of the most significant Canadian livestock disease incidents and their impact, if any, on the CFIA-administered compensation scheme.

Table 10. Recent major outbreaks that prompted compensation payments

Disease	Time period	Scope of outbreak and compensation	Subsequent modifications to scheme (if any)
BSE	2003-2010	The initial May 2003 outbreak of BSE was in one sense small-scale because the disease was detected in only one cow; however, the trade implications of that detection, as well as the need to slaughter 2 700 animals during the control phase rendered this a highly significant outbreak. Subsequently, at least one BSE case occurred per year from 2004 to 2010 and that period saw a total of almost 700 destructions/slaughters. All told, BSE-derived industry losses have been estimated at CAD 6.3 billion.	Though not directly affecting the CFIA-administered compensation scheme, the BSE outbreak did prompt the development of the 2003 to 2006 BSE recovery programme, which utilised its CAD 460 million budget to partially compensate cattle producers for lower post-outbreak product prices.
HPAI	2004, 2007	Large-scale: 53 outbreaks led to the destruction of 13.7 million birds in 2004 (over 400 commercial poultry farms were depopulated), and the outbreak in 2007 necessitated the destruction of 48 560 birds. The 2004 outbreak significantly impacted that year's public compensation payments for animal losses – the total reached above CAD 70 million. For comparison, the second highest annual sum between 2002 and 2010 was below CAD 9 million.	According to a poultry industry source, the 2004 avian influenza outbreak led to discussions among the national poultry organisations on potential revision of the maximum compensation amounts for poultry (Chicken Farmer, 2011).
LPAI	2009, 2010	In 2009, two outbreaks of low pathogenic avian influenza led to 1 300 cases and nearly 70 000 bird destructions. A single outbreak in 2010 yielded 8 200 susceptible birds which were all destroyed. The number of birds destroyed in these incidents was seemingly insufficient to greatly alter the annual public compensation payment totals – the 2009 and 2010 sums were CAD 7.4 million and CAD 1.3 million, respectively. For comparison purposes, excluding the outlying case of 2004, the 8-year (2002 through 2010) average annual sum was CAD 5.5 million.	There was an "increased government focus to more adequately reflect the market value of the birds being destroyed … after the more recent case of avian influenza in British Columbia in 2009" (Chicken Farmer, 2011). This timeline is supported by the "Regulatory Impact Analysis Statement" attached to the 2011 regulations that amended maximum poultry compensation. It states that "Subsequent to two incidents of avian influenza in British Columbia's Fraser Valley in the winter of 2009, it was deemed necessary to review the method of determining market value for poultry" (Ritz, 2011). One goal of this review was to develop models that would allow for rapid assessment of certain birds' market value in the absence of a normal market for them. In parallel, it led to the determination of a need to increase maximum poultry compensation amounts.

Source: Compiled by Civic Consulting based on data from Chicken Farmer (2011); OIE HandiSTATUS Interface (2011); OIE WAHID Interface (2011); Sparling (2010) in Antón *et al*. (2011); Ritz (2011); and Statistics Canada (2011b).

139. With respect to the manner in which the compensation scheme encourages good practices such as early notification of disease incidents and cooperation with subsequent control measures, two main factors incentivise early reporting: 1) the *Health of Animals Act's* requirement of immediate notification of reportable diseases and the authority it grants the AAFC minister to withhold compensation where violations or offences under the Act have occurred; and 2) the non-compensation of animals which die prior to the issuance of a destruction order. Additionally, general cooperation with disease control measures is arguably encouraged through the knowledge that the federal government will efficiently compensate the full market value of any animal(s) and/or product(s) ordered destroyed.

140. The emphasis that the scheme places on ensuring proper incentives for early reporting and cooperation with control efforts is clearly revealed in the "Regulatory Impact Analysis Statement" attached to the 2011 regulations which increased the maximum compensation amounts for poultry (*Regulations Amending the Compensation for Destroyed Animals Regulations*, SOR/2011-73). That text identifies the objective of the amending regulations as the establishment of maximum compensation rates in line with contemporary market realities "in order to continue promoting early reporting of diseases controlled under the *Health of Animals Act*, and encourage producer cooperation and participation during control/eradication efforts meant to prevent or reduce the spread of disease" (Ritz, 2011).

141. Looking at the dialogue which preceded the 2011 poultry compensation amendments reveals another aspect of recent experience with compensation scheme administration, namely successful cooperation between government and industry parties. During the run-up to the 2011 modifications, five national supply-managed associations[60] collaborated with the CFIA via a Steering Committee on which they were represented. In addition, a technical working group supported the Steering Committee. These stakeholders worked together – the Steering Committee met three times across 2009 and 2010 – to examine potential revisions to the economic model utilised to calculate market value in the absence of a traditional market and, as a corollary to that work, the maximum compensation amounts themselves. Ultimately, and partly as a result of the industry's "extensive involvement in the process", consensus emerged among the CFIA and industry representatives on the amending regulations (Ritz, 2011).

142. The involvement of industry representatives in scheme-related decision-making represents one method through which to promote stakeholder participation and thereby limit potentially adverse motivations. The Canadian compensation scheme also arguably guards against overcompensation through its reliance on market value-based evaluations of destroyed livestock and products which are capped at the maximum amounts listed in the *Compensation for Destroyed Animals Regulations*.

143. Additionally, the potential financial penalisation of livestock holders who fully comply with movement restriction zones relative to neighbouring farmers whose property and animals lie within a destruction or slaughter zone might be resolved to an extent through the Business Risk Management programmes. While the CFIA compensation scheme would not cover such consequential losses, AgriInvest, AgriStability, and AgriRecovery could help to ensure the maintenance of positive cooperation incentives by preventing large-scale (in a severe case) net income decreases among restriction-zone-bound livestock holders. According to the August 2011 interview, the CFIA's experience to-date has shown that overwhelmingly stakeholders are cooperative and make use of the compensation scheme as intended. Nonetheless, there may be a theoretical risk of moral hazard issues arising from government assumption of such a large share of the relevant financial risks.

144. Finally, while the interviewed officials did not suggest that the CFIA scheme has contributed to decreasing the risk of livestock disease outbreaks, it has been noted elsewhere that by incentivising early

60. The five associations are Egg Farmers of Canada, Turkey Farmers of Canada, Chicken Farmers of Canada, Canadian Hatching Egg Producers, and Canadian Poultry and Egg Processors' Council.

reporting and cooperation with control measures, and thereby increasing the efficiency of disease responses, the scheme has the potential to reduce the human health and economic impact of large-scale outbreaks (Ritz, 2011).

Table 11. Key features of Canada's compensation scheme*

Name of scheme	Canadian Food Inspection Agency compensation		
Legal basis	Payment of compensation is authorised by the *Health of Animals Act* (S.C. 1990, c. 21), which also authorises the AAFC minister to set out maximum compensation amounts. These have been established through the *Compensation for Destroyed Animals Regulations* (SOR/2000-233).		
Institutional framework			
Scheme governance	The compensation scheme is administered by the Canadian Food Inspection Agency (CFIA) and is purely public in nature – its funding does not entail cost-sharing with the livestock industry. The CFIA (est. 1997), which reports to the minister of Agriculture and Agri-Food Canada (AAFC) is tasked with administration of several pieces of agricultural legislation and, more generally, with ensuring food chain and livestock population safety. CFIA district veterinarians can issue destruction orders specifying the animals/products to be destroyed once they determine a disease's presence at a livestock holding. Either a compensation evaluator or a team of evaluators is then charged with calculating the market value of the destroyed things, and a compensation evaluation form is forwarded to the livestock holder who has the right to appeal its figures.		
Main stakeholders	Minister of Agriculture and Agri-Food Canada		
	Canadian Food Inspection Agency; CFIA district veterinarians		
	Livestock holders (and national supply-managed industry associations)		
Is private insurance coverage available?	Yes	Limited availability	No
	The availability of private insurance for risks linked to epidemic livestock diseases is minimal. Recently, the Canadian government has made efforts to collaborate with the private sector on insurance product development, but farmers still overwhelmingly rely on public risk management programmes, especially in the field of catastrophic disease risks.		
Compensation			
Overview of the scope of compensation	The CFIA scheme compensates livestock holders for three categories of losses: animals ordered destroyed; destroyed items such as contaminated feed and animal products; and the disposal costs of destroyed animals.		
Are consequential losses covered?	Yes	No	Other
	The CFIA-administered scheme only indemnifies direct losses imposed by disease control measures; it does not compensate for consequential or business interruption losses.		
Stakeholders' eligibility for compensation	Commercial livestock holders	With respect to the primary category of compensated losses, namely animal losses, owners are compensated when: 1) The animal is destroyed under the *Health of Animals Act* or dies after its destruction has been ordered; or 2) The animal dies or must be destroyed due to injury caused by an inspector/officer during testing, treatment, or identification; or 3) The animal is reserved by authorities for experimentation.	
	Smallholders and non-commercial/hobby farmers	Are compensated in the same manner as larger commercial holders, because compensation is payable for any animal – from production livestock to zoo animals and family pets – ordered destroyed for disease control purposes.	

Rules for valuation	Compensation is based on the assessed market value (the value the animal would have had at the time of its evaluation by the Minister if it had not been required to be destroyed) of the animals destroyed, up to the maximum amounts set in the *Compensation for Destroyed Animals Regulations*, minus any value received through carcass salvage. The compensation "amounts are intended to reflect the reasonable depreciated value that an owner could expect to receive for the animal or thing on the current Canadian market" (CFIA, 2011) and thus generally fall below the established maximum amounts. Market value assessments can be performed in two ways: 1) Since a market exists for commonly traded animals like cows and sheep, assessments for these animals are based on their replacement cost on the relevant market – an animal's age, genetic background, and production factors, among other factors, are analysed; 2) When there is no real market for an animal (e.g. hatching-egg birds) the replacement or market value is calculated through an economic formula that accounts for the production or life cycle phase the animal had achieved at the time of its destruction and the associated 'grow-out' costs.
Conditionality	Though the scheme does not specify an hour- or day-based time limit for reporting, livestock owners or caretakers must notify reportable disease incidents to veterinary inspectors "immediately after". The AAFC minister can partially or fully withhold compensation for violations or offences of the *Health of Animals Act*, so late reporting or any other act of gross negligence could result in loss of compensation.
Time frame for payment	Six to ten weeks (assuming the livestock holder does not appeal the initial compensation evaluation).
Diseases covered	The CFIA-administered compensation scheme does not maintain a strict list of compensation-eligible diseases. As long as the animal in question has been ordered destroyed under the *Health of Animals Act* compensation is payable – no matter the disease. Yet, the diseases that typically prompt destruction orders are indeed those listed as 'reportable' or 'immediately notifiable' on the CFIA's Web site. The 'reportable' category, which requires livestock owners, as well as veterinarians and laboratories, to immediately notify the presence or suspected presence of a contaminated animal to a CFIA district veterinarian, comprises 32 livestock diseases. Meanwhile, the 'immediately notifiable' diseases (a lengthier list), are generally exotic to Canada and therefore not covered by established control/eradication programmes. Notification of these diseases is only required of laboratories.
Differentiated treatment of diseases (yes/no/other)	Yes / **No** / Other The compensation scheme does not differentiate between types of livestock diseases – e.g. between zoonoses and diseases that purely impact animal production. The compensation procedures are effectively the same in all cases involving destruction orders issued by CFIA district veterinarians, and the compensation funds always come from the same federal source regardless the disease.
Financial structure	
Funding sources and mechanisms	Compensation payments made under the CFIA scheme are funded directly through the federal budget, with payment coming from the Consolidated Revenue Fund, which is the general account into which Canadian taxes and other revenue are deposited.
Cost-sharing (yes/no)	Yes / **No** The public contribution is *ex post* and loss-dependent in the sense that it is utilised to compensate owners of destroyed animals or products following an outbreak. Though the CFIA does administer other preventive activities, including product and facility inspections and surveillance of animal importation, during 'peace-time', the compensation scheme is a distinct, *ex post* programme.
Practical experience	
Incentives provided (for prevention/biosecurity practices and early notification)	From the CFIA's perspective the programme generally functions well – compensation claims and subsequent payments are processed efficiently, and livestock owners understand and are reasonably satisfied with the scheme's operation. If there is a potentially complicating aspect of the compensation procedures it derives from the dual role played by CFIA officials who must both implement control measures and evaluate/process compensation. The compensation scheme encourages early notification of disease incidents through: 1) the *Health of Animals Act's* requirement of immediate notification of reportable diseases and the authority it grants the AAFC minister to withhold compensation where violations or offences under the Act have occurred; and 2) the non-compensation of animals which die prior to the issuance of a destruction order. Additionally, general cooperation with disease control measures is arguably strongly encouraged through the knowledge that the federal government will efficiently compensate the full market value of any animal(s) and/or product(s) ordered destroyed.
Efforts to mitigate potentially adverse incentives	The scheme arguably guards against overcompensation through its reliance on capped (through the schedule of maximum animal values) market value-based assessments of destroyed livestock. The CFIA's experience to-date has shown that overwhelmingly stakeholders are cooperative and make use of the compensation scheme as intended. Nonetheless, there may be a theoretical risk of moral hazard issues arising from government assumption of such a substantial share of the financial risks that arise from epidemic livestock diseases.

* This table refers only to the CFIA-administered compensation scheme – the AAFC-managed Business Risk Management suite of programmes is not taken into account here.

Germany

Country overview

145. Germany has a sizeable livestock industry, ranking as the largest pork producer and second-largest beef producer in Europe, behind France. It has 27 million pigs (about one sixth of the EU total); 12.7 million head of cattle (3.8 million slaughtered per year); and 72 million hens (Eurostat).

146. Germany has approximately 180 000 cattle operations (about half of which are focused on milk cows), 65 000 pig operations and 75 000 chicken operations (German Ministry of Food, Agriculture and Consumer Protection, 2011b). About 60 % of the pigs and cattle are kept in herds of more than 1 000 and 100 animals, respectively (German Meat GmbH). Germany's leading beef-producing states are Bavaria, Baden-Wuerttemberg, Lower Saxony, and Schleswig-Holstein, which collectively account for about three-fourths of Germany's cattle. About half of the country's pigs are raised in northwest Germany near the Dutch border (Franz and Theuvsen, 2007).

147. Several cases of infectious animal diseases in Germany have been reported to the OIE in recent years. In 2006 a case of highly pathogenic avian influenza (H5N1) was detected at a farm in the state of Saxony (*Sachsen*). A total of 800 laying hens, geese, and turkeys died and 13 500 were destroyed (OIE, 2006). In 2008 a case of H5N1 was detected at another farm in Saxony. A total of 1 434 birds (laying hens, geese, ducks, and turkeys) were destroyed. In 2009 Germany declared its domestic poultry industry to be free of the virus (OIE, 2009). In 2010 a case of enzootic bovine leucosis was detected at a farm in Bavaria (*Bayern*). One hundred cattle were susceptible to the virus and one was slaughtered (OIE, 2010).

148. In Germany, the main institutional system that compensates livestock holders for losses caused by epidemic diseases are the animal disease funds called *Tierseuchenkassen*. These publicly administered funds are supported by mandatory levies paid by livestock operators, as well as by funding from state governments and co-financing from the European Union.

149. In addition to compensation provided by Tierseuchenkassen, private insurance is available for farmers to cover interruptions in livestock production. This private insurance covers consequential losses (production problems) and some direct losses, as well as the value of animals that exceeds the maximum amount paid by the Tierseuchenkassen.[61] Production insurance (*Ertragsschadenversicherung*) covers losses that stem from interruptions to and decreases in production, lower product quality, restrictions on sales (i.e. movement standstills), communicable diseases such as mastitis and foot diseases, accidents such as contaminated feed and ventilation breakdowns, theft, fire, and bans on selling certain potentially contaminated products such as milk. It also covers direct losses related to veterinary costs. According to the German Insurance Association (GDV), about ten insurance firms offer such coverage.[62] More than half of farmers in Germany have insurance policies that cover consequential losses; about half of all cows and 30 % of all sows are insured in this manner (World Bank, 2010). Only farmers who generate income mainly from livestock production can buy such coverage.

61. Private insurance is not publicly subsidised and purchasing such insurance is not a pre-requisite to receiving compensation through the Tierseuchenkassen.

62. The market leader, *Vereinigte Tierversicherung*, is a subsidiary of the insurance group R+V Insurance, one of the largest insurance groups in Germany. In 2009, Vereinigte Tierversicherung reported EUR 37 million in gross revenue and 47 000 contracts. These figures include transport insurance for horses and insurance for the recovery of high-value animals. A pool of other regional companies including *Uelzener Allgemeine* and VKB collect premiums of about EUR 5 million per year for production insurance coverage (Food Chain Evaluation Consortium, 2006; Web site of Vereinigte Tierversicherung, 2011).

Institutional framework and stakeholder involvement

150. The legal foundation for Tierseuchenkassen is the Animal Disease Act (*Tierseuchengesetz*) in the revised version of 2004.[63] This federal legislation, however, only constitutes a legal framework. Laws in federal states (*Bundesland*) are also applicable.

151. Fifteen of Germany's sixteen federal states (*Bundesland*) have their own Tierseuchenkasse controlled by a Governing Board (*Verwaltungsrat*) whose members are chosen by state agricultural ministries, county veterinary authorities and agricultural organizations (the Tierseuchenkasse of Bremen is covered by the Tierseuchenkasse of Lower Saxony). By way of example, the Governing Board of Lower Saxony's Tierseuchenkasse has thirteen members: nine farmers, two local government representatives, and two representatives of the state agriculture ministry (two veterinarians).

152. The Tierseuchenkassen compensate livestock owners who suffer financial losses due to epidemic disease outbreaks. Compensation amounts are based on prevailing market values and capped by federal law. The veterinary practitioners who conduct these assessments at the behest of the veterinary authority, as well as other stakeholders who perform needed duties during and following an outbreak, are also compensated. A number of variables can affect compensation amounts; see "Compensation" below.

153. As explained in "Financial structure" below, costs are shared by livestock holders and federal states. In case of disease outbreaks certain costs are co-financed by the European Union (EU). The EU reimburses a substantial portion of compensation payments to livestock holders.

154. Livestock holders have many responsibilities that are essential for the efficient and equitable operation of the Tierseuchenkassen. They must report as soon as possible any disease outbreak to an official veterinarian, cooperate in efforts to fight the disease, comply with all official instructions, and pay levies and report livestock figures correctly. Farmers who do not comply with these rules may have their compensation reduced or denied. Failure to quickly report an outbreak is also a criminal offence. Reducing compensation sends a strong signal to farmers regarding the importance of complying with regulations, according to an official with Lower Saxony's Tierseuchenkasse. Such reductions are evaluated on a case-by-case basis and determined according to the degree to which the farmer failed to comply with regulations.

155. In addition to compensating livestock holders for direct disease-related losses, Tierseuchenkassen also take important roles in improving animal health, by working to prevent and fight epidemics. Tierseuchenkassen also establish and finance actions designed to eradicate non-epidemic diseases such as Infectious Bovine Rhinotracheitis (IBR) in cattle.

156. Generally, state governments consult with the Tierseuchenkassen to coordinate their respective expertise, experience and financial resources regarding livestock epidemics. Certain tasks, such as monitoring and other prevention measures for non-epidemic diseases, are voluntarily implemented by some Tierseuchenkassen. Tasks such as compensation for rendering and disposing of animal by-products are mandatory for some Tierseuchenkassen under state law.

63. Germany's first legislation related to *Tierseuchenkassen* dates to 1880.

Compensation

Scope

157. The Tierseuchenkassen compensate livestock owners for direct losses caused by officially ordered culling of animals, for animals that die after destruction is ordered, and when a disease is detected after the death of an animal. Tierseuchenkassen cover the actual market value of animals, as well as costs for culling and disposing of the animals. Additionally, some Tierseuchenkassen (co-)finance associated disinfection costs. In Lower Saxony, for example, levies paid by livestock holders cover voluntary cleaning and disinfection services. Costs for losses incurred by healthy farms located within restriction zones are not covered.

158. For determining the amount of compensation payable, market value is assessed by district veterinary officers and capped by the Animal Disease Act, which serves to guarantee equal treatment for all livestock holders. Maximum compensation payments are EUR 3 068 per cow and EUR 1 278 per pig. In practice, assessed values are considerably lower than these maximums. There is no deductible or co-insurance. Animals that have died or been culled before notification of the disease are only indemnified by 50 %.

159. The assessed value takes into account the market value on the day when the culling was ordered, based on factors such as the value of milk that a cow could have produced, whether it was a breeding animal, and the age of the animal (i.e. a 10-year-old cow is only compensated for the value of its meat). If the market value drops as an outbreak unfolds, the assessed value is lowered accordingly. A farmer who disputes an estimate can ask for a second assessment. "The goal is to compensate livestock holders in a way that they would be compensated in their normal business," according to the official from Lower Saxony's Tierseuchenkasse. If regional markets have collapsed during an epidemic, the estimate is based on EU figures for buying animals out of the market. Payments for latter infections therefore may be smaller than for farms that were infected first, due to changes in market prices. This prevents adverse incentives for farmers to infect their own herd if market prices plummet after the initial outbreak.

160. Payments to veterinary practitioners and other stakeholders involved with responses to outbreaks (such as companies involved in disinfection or destruction of animal carcasses) are based on estimates from the governing board of the Tierseuchenkasse in Lower Saxony. For farmers with bank credits, compensation is paid to the appropriate financial institution.

161. The government has not made any *ad hoc* compensation payments to livestock holders during the past ten years. The following table provides an overview of compensation payments to livestock holders from Lower Saxony's Tierseuchenkasse, one of the largest in Germany, in the period 2005 to 2010:

Table 12. Compensation to livestock holders from Lower Saxony's Tierseuchenkasse, 2005-2010

Year	Compensation (in EUR)
2005	417 336
2006	284 898
2007	951 345
2008*	3 041 298
2009**	11 961 099
2010	286 944

* Compensation for bluetongue disease in cattle, sheep and goats, and for low pathogenic avian influenza.
** Compensation largely for low pathogenic avian influenza.
Source: Provided by an official from the Tierseuchenkasse of Lower Saxony.

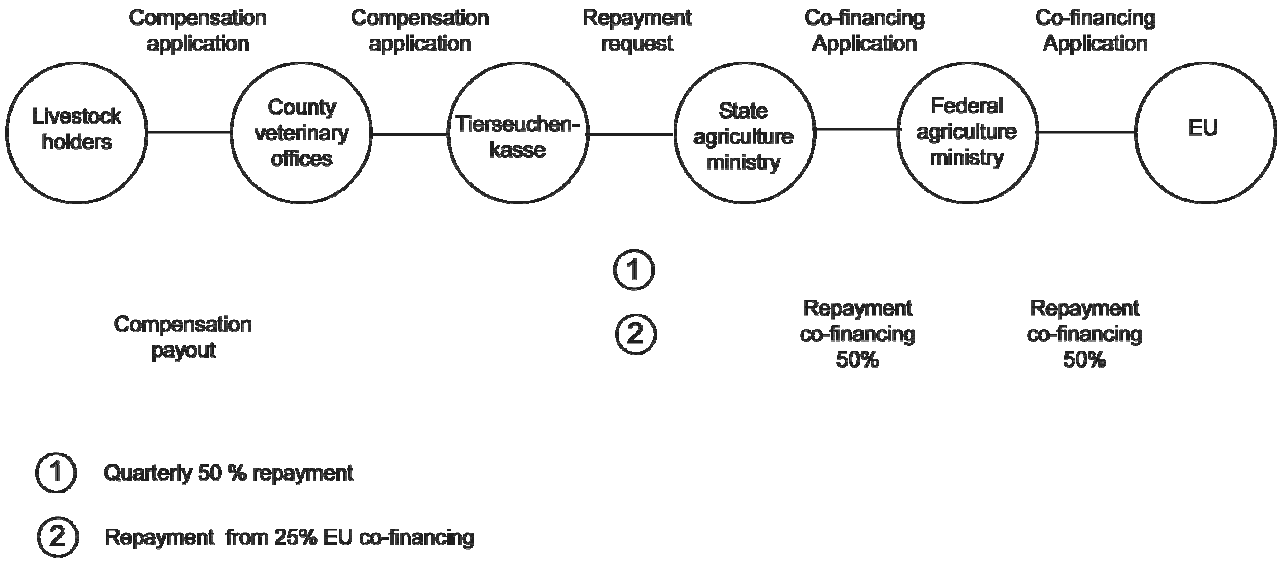
Diseases covered

162. The Tierseuchenkassen generally cover diseases defined as notifiable epidemic livestock diseases, such as BSE, classical swine fever (CSF), avian influenza, bovine tuberculosis, foot-and-mouth disease (FMD), Aujeszky's disease, scrapie, and anthrax.

Financial structure

163. The financial responsibility for the Tierseuchenkassen lies with the federal states, which, in addition to partially funding the Tierseuchenkassen, are also responsible for deciding when to initiate disease control measures. The funding, cost-sharing, and reimbursement mechanism involves multiple players: livestock holders, the Tierseuchenkassen, federal state governments, and the EC. Livestock owners have to pay mandatory levies above a very small, minimum cession amount (*Bagatellgrenze*) to the Funds. In addition to levies, compensation payments to livestock holders are also supported by state governments and the EC. This mechanism is illustrated in the figure below:

Figure 4. Flow of Tierseuchenkasse compensation and repayment funding



Source: Provided by an official from the Tierseuchenkasse of Lower Saxony.

164. By way of example, for a livestock holder who incurs a disease-related loss of EUR 3 000, an approved compensation claim is paid by the relevant Tierseuchenkasse – half of this amount comes from the affected state government and half from industry levies, with the EU reimbursing up to 50% of the total claim. These reimbursement funds are channelled through the federal ministry to the applicable state government. The state then forwards half of the EU co-financing to the Tierseuchenkasse. In sum, this means that if the Tierseuchenkasse approves the aforementioned EUR 3 000 claim, the livestock owner receives this amount from the Tierseuchenkasse while the Tierseuchenkasse receives EUR 1 500 from the federal state and the overall amount of EUR 3 000 is submitted as a co-financing-eligible claim to the EU. If the EU approves the full 50 % co-financing, EUR 1 500 are transferred to the state government (by way of the federal government). The Tierseuchenkasse then receives half of this amount (EUR 750) which leaves the same amount to be covered by levies. German livestock farmers therefore, through their levy payments, contribute 25 % of the compensation costs, with 25 % paid by the state and 50 % paid by the EU. In practice, EU co-financing may ultimately be below 50% (because not all expenses are necessarily accepted as eligible costs), which increases the amounts contributed by livestock holders and states.

165. In terms of the timeframe for these transfers, the initial compensation claim is paid by the Tierseuchenkasse within 90 days. The government payment of 50 % of the total claim is transferred from the state government to the Tierseuchenkasse with the next regular quarterly payment, and the EU co-financing payment is made after some time to the state government (via the federal government).

166. Co-financing payments from the European Union to the German Government (which are ultimately partly forwarded to the Tierseuchenkassen) are shown in the table below. Because of the significant time delay for the reimbursement process, co-financing payments from the EU are often not reimbursed in the year of a disease outbreak, but at a later stage.

Table 13. Annual European Union co-financing payments received by German government (EUR)

Disease	2005	2006	2007	2008
BSE		135 035	30 180	16 437
Scrapie	519 287	247 115	145 036	69 644
Avian influenza		306 573	320 000	*

* In 2008, the Tierseuchenkassen made EUR 2 million in advance payments to livestock holders, much of which has yet to be reimbursed by the EU.
Source: Data provided by an official from the German Federal Ministry of Food, Agriculture and Consumer Protection.

167. The Lower Saxony Tierseuchenkasse aims to maintain reserves totalling 5 to 7 % of the market value of the insured livestock, accumulated from levies on farmers in periods without outbreaks. For large outbreaks, the Tierseuchenkasse would pay compensation, even if the reserves for the affected species are not sufficient to cover all expenses. The Tierseuchenkasse would then draw on funds accumulated for other species (on a loan basis)[64] and would in the worst case be able to draw on funding from the federal state's budget to cover all compensation claims. Farmers repay their share of these payments through increased levies in the following years. Farmers' financial responsibilities therefore are the same for small and large outbreaks.

168. Levies paid by livestock holders are based on the particular species, the number of animals, and possibly other criteria, such as the weight and age of animals, herd size, the commercial use of animals, the risk of disease, and the absence of infectious diseases. They also depend on the expected costs for the general operation of each Tierseuchenkasse for each species; these costs can include prevention measures, the building of reserves or repaying debts stemming from previous reimbursements. Each farmer must annually report data on his/her livestock to the Tierseuchenkasse. Levies are determined by each Tierseuchenkasse's Governing Board and then authorised by the state government.

169. In practice, the main types of levy differentiation used include regional risk, the absence of infectious diseases and, in some cases, the implementation of specific hygiene standards. A number of Tierseuchenkassen only significantly differentiate levies based on species.

170. Species-by-species levies for Lower Saxony (*Niedersachsen*) and Bavaria (*Bayern*) are shown in the table below.

64. This occurred at the Lower Saxony Tierseuchenkasse in 1994, when money from the reserve for cows was loaned to the reserve for pigs. With the exception of such loans, there is no cross-financing among different species.

Table 14. Per-animal levies of Tierseuchenkassen in Lower Saxony and Bavaria, 2011 (EUR)

Species	Levies Lower Saxony	Levies Bavaria
Cattle	13.00*	4.80
Horse	2.00	1.60
Pig	0.35	0.80
Sheep	1.35	1.25**
Chicken	0.0326 - 0.0673	0.025
Turkey	0.1560 - 0.4214	0.12
Goat	1.35	n.a.

* EUR 6 for cattle on BHV1-free farms
** Sheep over ten months old
Source: Tierseuchenkasse websites of Lower Saxony and Bavaria.

171. A Tierseuchenkasse can co-finance prevention measures, according to state law. Prevention measures include surveillance and monitoring for diseases including classical swine fever, bluetongue disease, avian influenza and various cattle diseases, as well as vaccination programmes.[65] Lower Saxony's Tierseuchenkasse also pays for required ear tags for animal identification. These programmes are financed by levies from livestock holders, who have a role (through the Tierseuchenkasse's Governing Board) in determining how their contributions are spent. The scope and type of prevention programmes financed through the Tierseuchenkasse system varies between federal states.

Practical experience in scheme application

172. Germany's Tierseuchenkassen system operates effectively and efficiently, both during crises and in 'peace-time', according to an official with the Federal Ministry of Food, Agriculture and Consumer Protection. Farmers generally receive their compensation in a timely, orderly fashion so they are able to restock their herds. Several other positive features of the system have been highlighted, according to this official and a representative of Lower Saxony Tierseuchenkasse.

173. First, the financial risks associated with livestock disease outbreaks, as well as the responsibility for covering the direct losses they provoke, are shared equally among each federal state and livestock farmers. This avoids mixing up financial responsibilities among regions which largely have separate epidemic risk profiles. Each major livestock sector finances only its own losses, which may lead to the development of a sense of responsibility. Because compensation payments are funded in part by their levies (at least 25 %), livestock owners are likely incentivised – to some extent – to avoid risky behaviour.

174. Second, the same stakeholders who are required to participate and thereby are "embedded" in the system – livestock holders, various associations, different levels of government, and others – also work

65. Germany's BSE testing programme is separate from the Tierseuchenkassen system. Fees that have to be paid to the slaughterhouses generally cover the costs for BSE-testing. But these costs are decreased in accordance with the costs of the BSE-test which were reimbursed by the European Union.

closely together during animal disease outbreaks. Tierseuchenkassen design the logistics of these responses to be quick, goal-oriented and efficient.

175. Third, equal treatment and transparent operating procedures were reported by the official from the Lower Saxony Tierseuchenkasse as strengths of the system. Livestock owners, with the exception of the limited number of states in which heightened hygiene standards result in lower levies, pay the same rate (assuming they are owners of the same species and reside in the same state). And, with respect to transparency, livestock owners are informed of the reasoning behind reductions or denials of their compensation claims.

176. Additionally, Lower Saxony's Tierseuchenkasse pays fees for services provided by veterinarians (e.g. in the framework of surveillance/vaccination programmes) to livestock holders, who then pass on the payments to veterinarians. This is another layer of transparency – livestock holders directly see the monetary benefit of being a contributor to the Tierseuchenkasse. Administrative costs of Tierseuchenkassen are reportedly held to less than 5 % of their total expenditures.

177. Membership in the system itself has a material effect on livestock holders, said the official from the Tierseuchenkasse of Lower Saxony: "Livestock holders know what is going to happen in case of a disease and how much money they will get if they act quickly and help in stopping the disease from spreading." The official said risks can be reduced if livestock holders accept the system and identify with it, because they will feel they are operating "on the safe side." Still, the official said, misuse can never be ruled out.

178. A variety of other advantages of the system have been noted.

- Levies collected, as well as compensation paid for each livestock type, are held and accounted for separately, and different Tierseuchenkassen are not co-mingled. The responsibilities of specific livestock sectors and regions are therefore separated and ensure farmers are appropriately incentivised to invest in prevention measures and self-monitoring within their region.

- Indemnification is based on the principle that overcompensation must be avoided for all stakeholders. Animal values are therefore not based on *ex ante* market prices, and the costs for personnel (e.g. assessors, additional staff for eradication) are based on their prevailing wages.

179. A number of rules and policies have been put in place, nationally and at the state level, to encourage more accountability among livestock holders.

- Farmers must immediately report an outbreak or suspicion of an outbreak to veterinary officials. Farmers who fail to do this, or who do not comply with other legislative requirements, can have their compensation reduced or even completely withheld by the Tierseuchenkasse. "Cases of reduced compensation send a signal – they show the importance of conforming with the regulations," said the official from Lower Saxony. Dead animals are only indemnified by 50 % of their assessed value, which also provides an incentive for quick reporting of infections.

- Lower Saxony's Tierseuchenkasse charges lower levies for livestock holders whose farms are free from bovine herpes virus Type 1 (BHV1), creating a "high" level of pressure on farmers to continue to institute animal health measures. As of 2011, BHV1-free farms paid EUR 6 per animal; farms not declared free of the virus paid EUR 13 per animal, with the difference being equal to the cost of vaccines and medical examinations. From 1996-2000, Lower Saxony collected lower levies from farms that met specific hygiene standards, but this was discontinued following an analysis showing that losses were not significantly lower for these farms.

- In the state of Mecklenburg-Vorpommern, levies for pigs are 50 % lower for farms participating in a programme with special hygiene standards that are checked twice a year by veterinary authorities.

180. According to the official with the German Federal Ministry of Food, Agriculture and Consumer Protection, the primary goal of the Tierseuchenkassen system is not to reduce the risk or number of disease outbreaks, but rather to equitably compensate farmers for losses from livestock diseases (thereby reducing individual economic risk). The official added, however, that because all livestock holders are required to pay into the system, they have an incentive to comply with regulations – "because it's their money."

181. While the Tierseuchenkassen system and the laws and regulations that govern it have not undergone notable changes in recent years, efforts to address certain issues and concerns are under consideration. For example, to reduce the need to declare restriction zones, measures to increase the level of preparedness during 'peace-time' are under discussion and relevant measures have been taken to improve logistics for responding immediately to a disease outbreak. For example, the Lower Saxony Tierseuchenkasse has stand-by agreements for technical and personnel resources with private companies, e.g. for disinfection and carcass destruction purposes. Since 2007, Lower Saxony's response system has been improved in order to carry out culling with a 1-kilometre radius within 24 hours, while following proper animal welfare procedures. According to the official with Lower Saxony's Tierseuchenkasse, "Our Tierseuchenkasse is like a fire department: we have to act quickly. We cannot prevent an epizootic disease outbreak, but we are able to cut the losses. The mechanism does not decrease the risk of an outbreak, but the outbreak can be kept within bounds."

Table 15. Key features of Germany's compensation scheme

Name of scheme	Tierseuchenkassen (Animal Disease Funds)		
Legal basis	Tierseuchengesetz (Animal Disease Act) and applicable federal state (Bundesland) laws.		
Institutional framework			
Scheme governance	The federal Tierseuchengesetz (Animal Disease Act) provides the legal framework for the Tierseuchenkassen, which are then administered by each state which has established its own Fund. State governments supervise the Tierseuchenkassen and set out eradication and prevention measures, which are jointly implemented by the Tierseuchenkassen through financing and supervising by the local veterinary authorities. Each Tierseuchenkasse has a Governing Board, whose members are chosen by state agriculture ministries, county veterinary authorities, and agriculture organisations. Levies are determined by the Tierseuchenkassen and authorised by state governments. State governments consult with the Tierseuchenkassen on matters related to expertise, experience, and finances.		
Main stakeholders	Federal states; state agriculture ministries		
	Veterinary officials		
	Agriculture organisations		
	Farmers' representatives.		
Is private insurance coverage available?	Yes	Limited availability	No
	Some private companies insure against losses caused by epidemic livestock diseases as well as consequential losses related to interruptions and decreases in production, lower product quality, restrictions on sales, communicable diseases, accidents such as contaminated feed and ventilation breakdowns, theft, fire, and bans on selling products.		

Compensation			
Overview of the scope of compensation	Livestock holders are compensated for direct losses caused by officially ordered culling, losses from animals that die after destruction was ordered, and when a disease is detected after the death of the animal. Compensation includes the actual value of the animals, and culling and disposing costs.		
Are consequential losses covered?	Yes	No	Other
	Only direct losses are indemnified by the Tierseuchenkassen.		
Stakeholders eligible for compensation	Livestock holders	Compensated for the actual value of animals, and culling and disposing costs.	
	Assessors	Paid according to guidelines of agriculture ministries.	
	Private companies/contractors that are involved in culling, destruction of carcasses, disinfection, etc.	Paid according to arrangements between Tierseuchenkassen and the companies/contractors	
Rules for valuation	The assessed value of animals is based on the market value on the day when the culling was ordered. A farmer who disputes an estimate can ask for a second assessment.		
Conditionality	Farmers must report outbreaks as soon as possible, comply with all relevant laws and regulations, collaborate in efforts to fight the disease, follow all official instructions, pay their levies, and report livestock figures correctly.		
Time frame for payment	Compensation is to be made within 90 days of slaughtering of livestock.		
Diseases covered	Notifiable epidemic livestock diseases are covered, such as classical swine fever, BSE, avian influenza, bovine tuberculosis, African horse flu, foot-and-mouth disease, Aujeszky's disease, scrapie, and anthrax.		
Differentiated treatment of diseases (yes/no)	Yes	No	
	Compensation payments do not depend on the type or extent of a livestock disease.		
Financial structure			
Funding sources and mechanisms	Following a series of payments and repayments involving livestock holders, Tierseuchenkassen, state governments and the European Union, 25 % of claims is eventually covered by livestock holder levies, 25 % is covered by state governments, and up to 50 % is refunded by the European Union. If the EU's refund is less, then the livestock holders and federal states share the difference.		
Cost-sharing (yes/no)	Yes	No	
	In addition to mandatory levies paid by livestock owners, compensation payments are also supported by state governments and the EU. The EU reimburses the Tierseuchenkassen and state governments for up to half of the compensation payments to livestock owners. Some Tierseuchenkassen finance or co-finance prevention measures in 'peace-time', such as disease surveillance, monitoring, or vaccination programmes.		
Practical experience			
Incentives provided (for prevention/biosecurity practices and early notification)	Compensation can be reduced or denied if livestock holders do not quickly report disease outbreaks, or do not comply with rules, laws, and instructions. Dead animals are indemnified by 50 % of their assessed value, providing an incentive for quick reporting of infections. Some Tierseuchenkassen charge lower levies for farms that are free of certain diseases or that have higher hygiene standards.		
Efforts to mitigate potentially adverse incentives	The responsibilities of specific livestock sectors and regions are kept separate, incentivising farmers to invest in prevention and monitor each other in case of an outbreak. Animal value is based on market value at the reporting date. Costs for personnel are based on what the officials would have earned in their regular occupations.		

The Netherlands

Country overview

182. Most notable about The Netherlands' animal populations are their relative densities. Though Table 2 above clearly shows that neighbouring Germany is home to substantially more birds, cattle, sheep

and goats, and pigs than The Netherlands,[66] the table also sharply depicts the density which characterizes The Netherlands' livestock industry. At an average of 2 358 birds per square kilometre, Dutch bird holdings, for example, outpace Vietnam's – 662 per square kilometre – by a ratio of over 3.5 to 1. Similarly, the number of sheep and goats per square kilometre in The Netherlands is approximately five times higher than in Germany, while the ratio relating the two countries' pig densities is only slightly lower at just under four to one (OIE WAHID Interface, 2011). Overall, Dutch agriculture utilises more than half The Netherland's surface area to generate a production value of EUR 24 billion (2008), with EUR 9.7 billion derived from livestock products (Dutch Ministry of Agriculture, Nature and Food Quality, 2010a, pp. 35, 51).

183. The densely populated Dutch livestock industry has experienced a series of OIE-notifiable epidemic disease outbreaks during the past five years. Bluetongue outbreaks occurred in 2006, 2007, and 2008. The year 2010 saw an outbreak of low pathogenic avian influenza (H7) in poultry which prompted the destruction of 28 000 birds, and three similar 2011 outbreaks involving the H7N1 and H7N7 low pathogenic serotypes of avian influenza have resulted in the destruction of an additional 190 000 birds. Finally, between October 2009 and 21 July 2011 there were 101 outbreaks of Q fever notified to the OIE involving 95 dairy goat farms and 3 dairy sheep farms (OIE WAHID Interface, 2011).

184. The Dutch approach to compensation of livestock holders' direct losses resulting from epidemic livestock disease outbreaks is through the Animal Health Fund, a public-private partnership based on a cost-sharing agreement with the private sector. The government's basic operating principle is to employ compensation "where a control measure involves the culling of animals or the destruction of products" (Dutch Ministry of Agriculture, Nature and Food Quality, 2008, p. 39). Meanwhile, consequential losses have historically been viewed as a business risk which should be borne by the private sector. Notably though, the Ministry of Economic Affairs, Agriculture and Innovation[67] has recently undertaken a sustained effort to aid in the development of a consequential losses compensation scheme which would, once operationalised, likely be managed by the private sector (for details, see the consequential losses text box below).

185. Private insurance coverage for risks from epidemic livestock diseases is available in The Netherlands, but its uptake among livestock holders is too limited to impact the functioning of the compensation scheme operated through the Animal Health Fund. Indeed, prior documents and research[68] (Dutch Ministry of Agriculture, Nature and Food Quality, 2008, p. 39; Melyukhina, 2011, pp. 32, 56; van Asseldonk *et al*., 2006, p. 121; World Bank *et al*., 2006, p. 16), have suggested that livestock holder participation in private insurance schemes in The Netherlands is below 10 %, and that the scope of available coverage is comparatively limited: unlike in neighbouring Germany, losses resulting from movement restriction zones have not generally been covered by private insurance schemes (World Bank, 2006, p. 16).

66. Germany currently has approximately 128 million birds compared to The Netherlands' 98 million, 12.7 million cattle to 4 million, 2.6 million sheep and goats to 1.5 million, and 26.9 million pigs to 12.1 million.

67. Prior to restructuring in October 2010, it was the Ministry of Agriculture, Nature and Food Quality (LNV) which was working to develop a consequential losses compensation scheme and administering the Animal Health Fund.

68 The 2011 report on The Netherlands' agricultural risk management practices written for the OECD by O. Melyukhina lists a mutual insurance product – Porcopol – covering consequential losses from swine epidemics and identifies its penetration rate in 2008 as 6.5 % of the total number of sows. Similarly, van Asseldonk *et al*. describe a consequential losses insurance product for cattle with less than 10 % participation. Lastly, the 2006 report published by the World Bank just states that "…farmer participation [in private insurance schemes] is less than 10 percent".

Institutional framework and stakeholder involvement

186. The public-private cost-sharing compensation scheme utilised in The Netherlands functions through the Animal Health Fund which also finances the control costs of livestock disease outbreaks (e.g. costs resulting from general response mobilisation, stamping-out measures, emergency – suppressive or protective – vaccination, or maintenance of standstill zones) as well as 'peace-time' disease monitoring and structural costs. The Animal Health Fund was established in early 1998 partly as a result of the extensive 1997 Classical Swine Fever epidemic (Horst *et al*., 1999, p. 34), and the current five-year agreement framing its administration runs from the beginning of 2010 through December 2014. Previously, a national stamping-out fund, first operationalised in 1988, had existed (Horst *et al*., 1999, p. 32).

187. The Animal Health Fund's legitimacy is derived both from legislation – the Animal Health and Welfare Act (*Gezondheids- en welzijnswet voor dieren*) – and the agreements (*Convenant financiering bestrijding besmettelijke dierziekten LNV – PVV – PPE – PZ*) between the former Ministry of Agriculture, Nature and Food Quality[69] and three Product Boards: Livestock and Meat (PVV), Poultry and Eggs (PPE), and Dairy Products (PZ). The Animal Health and Welfare Act established the Fund and set out which measures it can implement, but it is the agreements which prescribe the Product Boards' financial contribution ceilings and the five-year renegotiation periods.

188. As defined by the OECD (2011, p. 183), the Product Boards which negotiate on behalf of the different sectors of the livestock industry are "…vertical industrial organisations unifying businesses involved in the same product, but which represent different levels of the product value chain." The Product Boards incorporate product chain members from farmers to retailers, including trade and production activities within their respective sectors. The Boards of Governors of the three Product Boards which are parties to the Animal Health Fund negotiations include representatives of livestock holders.

189. The Ministry is the government representative to the cost-sharing negotiations, is also the agent responsible for developing – in cooperation with other organisations potentially affected by a disease outbreak – the prevention and control policies for the various applicable livestock diseases, and provides day-to-day administration of the Animal Health Fund.

190. Livestock owners are also key stakeholders with respect to compensation transfers made via the Animal Health Fund, and they as well bear responsibilities, including the legal obligation to notify a disease outbreak as soon as possible and maintenance of established hygiene/sanitary standards on their farms.

Compensation

Scope

191. As previously stated, direct losses incurred as a result of disease control measures are the only type eligible for compensation through the Animal Health Fund. Notably though, the conceptualisation of direct losses exceeds the value of destroyed or pre-emptively culled animals to include such items as laboratory expenses, fees for the transportation of animals, and disinfection costs. Moreover, the destruction of animal products like eggs, milk, and feed also figures into the sum of direct losses.

192. Compensation is payable to livestock owners, both commercial and non-commercial, and veterinarians. The latter group can receive compensation for losses incurred when their work at an infected

69 As noted above, this former Ministry is now part of the Ministry of Economic Affairs, Agriculture and Innovation.

area during the course of an epidemic bars them from visiting other livestock holdings in the subsequent 72-hour period. The distinction between commercial and non-commercial livestock owners is notable because, while the non-commercial sector is not represented on the Product Boards and does not contribute financially to the Animal Health Fund, its members are compensation-eligible. These payments, covered in full by the central government, aim to incentivise early notification and full cooperation with disease control measures on the part of private individuals and hobby farmers.

193. Market value serves as the basis for calculating compensation payments for livestock. After suspicion of a disease outbreak has been reported, a government veterinarian performs an initial inspection of the holding and notes the health status – dead, visibly sick, or healthy – of the animals. Then, it is the date of the Ministry's decision to implement control measures that serves as the reference point for assessing market value.[70] This procedure is undertaken by independent evaluators who, relying on market value tables maintained for the Ministry by the LEI Institute at Wageningen University and Research Centre as guidelines, take into account such factors as animal category, age, purchasing price, feed/housing costs, and the date on which the ministerial decision to respond with control measures was taken. Culled healthy animals are indemnified at 100 % of their determined market value, visibly sick animals at 50 %, and livestock holders receive no compensation for animals dead at the time of the initial inspection.

194. A type of appeals process is built into the value assessment procedure: if either the government or the livestock holder is unsatisfied with the initial market value calculation, they can ask for a re-evaluation, to be conducted by a team of three experts. In its compensation-related practices, the Animal Health Fund does not distinguish between cases of 'limited' outbreaks and 'catastrophic' outbreaks – the same procedures are followed in both scenarios. Generally, compensation is paid within one month after the valuation, and the government aims "to ensure that payments are made no later than 60 days after depopulation/destruction" (Dutch Ministry of Agriculture, Nature and Food Quality, 2003).

195. As indicated above, when livestock holders suspect an outbreak they must notify the government of their discovery as quickly as feasible. Failure to do so could lead to a reduction in compensation if conclusive proof of an abnormally long delay emerged. However, such late notification cases have not been frequent. This is likely in part a result of the legal requirement to notify as well as the halved compensation payments for visibly sick animals and the non-existence of compensation for animals dead at the time of veterinary inspection. Similarly, well-evidenced failure to meet or maintain established hygiene/sanitary standards could also provide the basis for economic sanctions if it were found to be the cause of an outbreak.

196. With respect to government issuance of *ad hoc* payments to livestock holders (i.e. compensation unrelated to the provisions of the Animal Health and Welfare Act), the recent Q fever epidemic did prompt such a payment. Significant numbers of pregnant female goats were culled beginning in December 2009 and a breeding ban was subsequently introduced because the disease can spread quickly through the birthing process. Female goats without young were not culled, thus remaining a financial responsibility for their holders. These holders were later compensated – with payments per animal – for the disadvantage they experienced as a result of the breeding ban and their inability to use the female goats for milk production. The decision to compensate in this case was made at the ministerial level.

70. This means that if, for example, one week passes between the suspicion of a disease and the decision to initiate control measures, the latter date becomes the relevant one for consideration of market value.

Developing a compensation scheme for consequential losses – a summary of current efforts

As noted in a recent OECD report (Melyukhina, 2011, pp. 54, 56), discussions are ongoing in The Netherlands regarding a potential compensation scheme for livestock holders' consequential losses. Though informal discussions on the matter have been taking place since at least 2004 (following the 1997/98 CSF, 2001 FMD, and 2003 Avian Influenza outbreaks), an agreement with the sector to work toward a solution was formalised near the end of 2009.

These developments have partly resulted from the use of widespread culling, including of healthy animals, to control the previous CSF and FMD outbreaks. Those experiences increased resistance to traditional stamping-out as a disease eradication method, while prompting a move toward emergency vaccination-based control measures (where feasible) and discussion on how to approach related consequential losses.

Framework and stakeholders

While the principal stakeholders involved in the current consequential losses discussions are the same organisations that participate in the Animal Health Fund negotiations, namely the Product Boards and the Ministry, any scheme that might emerge from the discussions would likely be a separate entity with no formal relationship to the Fund. Due to the government's long-standing principle that consequential losses are the responsibility of the private sector, it is envisioned that such a scheme would be managed by the sector, potentially with limited assistance from the Ministry. Accordingly, the involvement of private insurance companies is being explored.

Scope of compensation

With respect to the scope of consequential losses covered by the scheme, the emphasis is on developing compensation procedures just for livestock holders. Thus, the scheme would not be relevant to third-party stakeholders, such as feed producers, who also might incur business interruption losses during an epidemic disease outbreak.

There are two guiding principles on the types of losses to be covered: 1) to avoid potentially adverse incentives related to illegal animal movement, there should be no financial distinction between the livestock holder whose farm lies in a restriction zone and his neighbour whose farm is inside a culling zone; and 2) in order to incentivise full cooperation in outbreak responses involving emergency vaccination, there should, in the final accounting, be no financial disparity between vaccinated farms and culled farms. It follows from these principles that the preparatory work for the consequential losses scheme has been focused on two somewhat specific outbreak response types differentiated by whether or not widespread emergency vaccination is to be used.

The levels at which compensation payments would be set are being explored primarily by the LEI Institute, which also maintains the aforementioned market value tables for the Ministry. As an example, a recent report (van Horne *et al*., 2011) investigated the establishment of compensation levels for a stamping-out response to Avian Influenza (i.e. a response involving a culling zone and a restriction zone). Looking specifically at the hatching eggs sector (as opposed to table eggs or chicken-for-meat broiler farms), the report team attempted to determine a compensation amount per egg which would take into account the price difference between the market value of a hatching egg and the value of that same egg in a restriction zone where it cannot be hatched and must instead be used in the processing industry – for instance, to produce shampoo. In addition, the compensation amount per egg would potentially take into account continuous costs, such as labour, utilities, and animal feed, borne by restriction zone farms during an outbreak. The Ministry has also looked into determining appropriate compensation amounts for vaccination-related consequential losses in the swine, veal, and dairy sectors. One difficulty here lies in determining the price difference between an optimally slaughtered animal, whose various parts go to their individual profit-maximizing markets, and a vaccinated animal that must be slaughtered in a different, profit-decreasing manner.

In sum, the Dutch experience suggests that developing equitable and effective compensation levels for consequential losses involves relatively complex, sector-specific calculations of the multi-layered business interruption losses faced by holders of restriction zone-bound or vaccinated animals. That the just-described work has so far primarily focused only on Avian Influenza, Classical Swine Fever, and FMD suggests the extent of the effort required to establish a consequential losses scheme covering several additional diseases and sectors.

Financial structure

Currently, the Dutch Government is maintaining its principle that the private sector should wholly fund any compensation scheme for consequential losses. If implemented as an entirely sector-financed programme, the consequential losses scheme would differ in a significant way from the financing arrangement employed by the Animal Health Fund. Another potentiality is also being explored: whether "art. 68, 69, 70 and 71 of Council Regulation (EC) No 73/2009 of 19 January 2009 … can be used to allow premium subsidy of farmers by [Member States]" (Bergevoet *et al*., 2011, p. 68). If such premium subsidization were determined to be feasible, the

consequential losses scheme might gain a public-money component. Notably, current Ministry thinking is that a sector-financed scheme would be privately managed, whereas the latter scenario, involving public money, would likely result in public governance of at least the scheme's subsidy component.

Experience to-date

The Ministry reports a general sense of urgency among the discussion partners resulting from the knowledge that despite the prevalence of preventive and monitoring measures in The Netherlands, a disease outbreak leading to sizeable consequential losses could occur at any time.

There is also stakeholder consensus on the goal of gaining maximum livestock holder participation in any operationalised scheme, according to the Ministry. Widespread participation is seen as key to ensuring full cooperation with government-implemented control measures, especially emergency vaccination programmes.

One area in which progress has proven slower is private insurer participation. Obstacles in the continuing discussions have included the novelty of the instrument for some insurance companies and associated questions on the types of premiums to set.

Additionally, there is the previously mentioned obstacle of determining appropriate compensation levels which neither overcompensate nor fail to incentivise complete compliance with control measures that inherently lead to consequential losses, i.e. adherence to restriction zone rules and cooperation in emergency vaccination programmes.

The sought after outcome of the ongoing discussions is a consequential losses scheme that, through incentivising full cooperation with control measures, aids in successful disease eradication and promotes business continuity.

Diseases covered

197. Compensation for direct losses under the Animal Health Fund is covered by the government-industry agreement for the following diseases: avian influenza, African swine fever, classical swine fever, Q fever, bluetongue, bovine spongiform encephalopathy (BSE), bovine tuberculosis, brucellosis, foot-and-mouth disease, Newcastle disease, scrapie, brucella melitensis, swine vesicular disease, and bovine leucosis.

198. From one perspective The Netherlands' compensation scheme does not differentiate between types of livestock diseases (e.g. between human-health-threatening zoonoses and diseases that merely affect animal production), because the procedures followed for assessing and transferring compensation payments are the same. Nonetheless, there is to some extent financial differentiation between disease types because the financial ceilings that the Product Boards agree to meet if necessary are in part informed by the past control costs of diseases relevant to each sector, i.e. Livestock and Meat, Poultry and Eggs, and Dairy Products. Additionally, the procedure for determining the contribution ceilings for three particularly significant diseases – avian influenza, classical swine Fever, and foot-and-mouth disease – is primarily based on a risk assessment and estimation of control costs (though the contribution ceilings are still subject to negotiation).

Financial structure

199. Funding of expenses incurred by the Animal Health Fund during an outbreak can come from three sources: the Product Boards, the Dutch Government, and the European Union.

200. The livestock industry's contribution ceilings in the event of an outbreak, which vary by sector and disease (see Table 16 below), are set during the formal negotiations held every five years between the Product Boards and the Ministry. When an outbreak occurs and the Ministry implements control measures, the government initially covers the costs of those measures, including compensation payments, before invoicing the Product Board liable for the infected livestock species up to the applicable contribution ceiling. The Product Board then responds financially with its reserves. Any assumed cost is subsequently passed on to livestock owners within the Product Board's sector in the form of increased levies.

Table 16. Producer contribution ceilings to the Animal Health Fund, 2010-2014

Livestock type	Responsible Product Board	Maximum contribution*	Specified earmarks
Cattle	Dairy Board	EUR 19.5 million	n.a.
Pigs	Livestock and Meat	EUR 68 million	EUR 42 million solely for the monitoring and control of African Swine Fever and Swine Vesicular Disease
Poultry	Poultry and Eggs	EUR 26 million	EUR 2 million solely for the monitoring and control of Newcastle Disease
Sheep and goats	Livestock and Meat	EUR 4.52 million	EUR 1.35 million solely for the monitoring and control of Scrapie

* The 2010-2014 covenant specifies that the Product Boards' maximum contributions can be adjusted annually based on changes in the size of the animal herd (with the 2009 agricultural census as the point of reference) and the consumer price index (with January 2009 price levels as the point of reference).
Source: Dutch Ministry of Agriculture, Nature and Food Quality (2010b).

201. For costly outbreaks which exceed a Product Board's contribution ceiling for the species involved, the Dutch Government pays the overrun costs and is, in turn, partially reimbursed by the European Union, which co-finances losses resulting from substantial disease outbreaks. As described above, the central government also pays the full outbreak control costs of the non-commercial sector, including compensation payments for direct losses.

202. In sum, the Product Boards fully cover outbreak control costs up to the negotiated contribution ceilings, with the Dutch Government – and some EU co-financing (see European Union section in Part I for details) – absorbing all costs above those limits.

203. Notably, 'peace-time' disease monitoring and related structural costs are distinguished from post-outbreak control costs in the five-year agreements and the former are subject to true, two-way cost-sharing: these expenses are split on a 50/50 basis between the central government and the livestock industry. Accordingly, the levies through which the Product Boards raise their sectors' contributions can be seen as both *ex ante* and *ex post* cost-sharing mechanisms. On the one hand, the levies contemporaneously finance the industry's 50 % share of 'peace-time' disease monitoring costs and are used to build up some reserve levels for future outbreaks; on the other hand, their level is adjusted by the Product Boards in an *ex post* manner to enable the Product Boards to meet their financial commitments resulting from previous outbreaks. Generally speaking, however, the bulk of a given Product Board's liability resulting from a disease outbreak will be financed through an *ex post* levy increase.

204. Due to the sharing of 'peace-time' costs, public financial contributions are also both *ex ante* and *ex post*, though they assume the latter form only when the cost of an outbreak exceeds the industry's relevant contribution ceiling.

205. The levy system is not differentiated by the risk profiles of regions or individual livestock holdings, though some of the latter may adhere to self-elevated biosecurity standards. Rather, livestock holders contribute to monitoring and control costs more straightforwardly – their levies are based either on the size of their farm, size of their herd, or the quantity of products produced, depending on the sector. Arguably, opting for such non-differentiation foregoes the opportunity to incentivise increased biosecurity or risk reduction efforts (Dutch Ministry of Agriculture, Nature and Food Quality, 2008, p. 40), though this potential outcome is likely balanced to a certain extent by livestock holders' collective knowledge that they

will pay – up to the contribution ceiling – the entirety of an outbreak's direct control costs through increased levies and additionally be burdened with consequential losses.

Practical experience in scheme application

206. The 2010-2014 agreement between the Product Boards and Ministry of Economic Affairs, Agriculture and Innovation marks the third such agreement on the Animal Health Fund's financing. Following on approximately a decade of operations, the latest round of negotiations was, from the Ministry's perspective, marked by stakeholders' general contentedness with the cost-sharing scheme. Only a few relatively minor modifications were made to the agreement, including costs for a new crisis facility at a slaughtering house and additional monitoring of Bluetongue. The main pillars of the agreement, as well as the compensation-related practises of the Animal Health Fund, remain intact. Below, Table 17 presents a record of the major epidemics that have triggered compensation transfers from the Animal Health Fund since it was established, as well as the impact, if any, the cases had on the functioning of the compensation scheme.

Table 17. Recent major outbreaks that prompted compensation payments

Disease	Time period	Scope of outbreak and compensation	Subsequent modifications to scheme (if any)
Classical Swine Fever	1997/98	Large-scale: over 11 million pigs destroyed, with total cost, including direct control costs and consequential losses, near EUR 2.5 billion	Contributed to development and operationalisation of the Animal Health Fund, which initially covered just the swine sector
FMD	2001	Large-scale: approximately 41 000 goats and sheep, as well as 121 000 pigs, destroyed, with total cost, including direct control costs and consequential losses, over EUR 750 million	Similar to the 1997/98 CSF outbreak, the widespread use of culling (including of healthy animals) prompted societal resistance toward stamping-out as a control measure and in turn led to initial thinking on consequential losses associated with other potential control methods such as emergency vaccination
Avian Influenza	2003	Large-scale: 30 million animals destroyed, with direct control costs of EUR 270 million	Also promoted discussion on moving away from stamping-out control measures and what types of consequential losses might result from different eradication strategies – the previously mentioned report on compensating for hatching egg consequential losses focuses on an Avian Influenza outbreak
Q Fever	2009-2011	Around 100 farms affected, with 11 600 animals destroyed; *ad hoc* compensation payments made as a result of a breeding ban and inability of affected holders to sell milk products	None known
Low Pathogenic Avian Influenza	2010/2011	Approximately 28 000 birds destroyed in 2010 and 190 000 birds destroyed in 2011	None known

Source: Horst *et al*., (1999); Huirne *et al*. (2002) and Mourits *et al*. (2008) in Melyukhina (2011); OIE WAHID Interface (2011).

207. The cost-sharing-based compensation scheme is viewed by the Ministry more as an effective tool for balancing stakeholders' financial liabilities than as an incentivising mechanism through which to encourage biosecurity and risk reduction. As the Ministry reported, the conclusion cannot be drawn that the Animal Health Fund has helped to prevent disease outbreaks. Nonetheless, the Ministry feels that the scheme adds to overall awareness of livestock holders' animal health responsibilities, not least because the

holders have to pay levies annually and are knowledgeable about the contribution ceilings and prospective levy increases in the event of an outbreak.[71]

208. Also of note is that the compensation scheme administered through the Animal Health Fund has not completely eliminated the government's sense of urgency to provide *ad hoc* compensation during intense cases, as shown by the extraordinary compensation payments made during the recent Q fever outbreak.

209. With regard to the potentially adverse incentives associated with compensation, the Fund has aimed to avoid overcompensation through the guideline of only compensating for the market value of holders' losses. To-date this compensation has been limited to the market value of direct losses, which raises the issue of potentially adverse incentives linked to the scheme's non-compensation of consequential losses. Livestock holders in movement restriction zones are arguably financially disadvantaged (relative to holders in culling zones) by their cooperation with the restriction measures, because while the economic value of their livestock has fallen post-outbreak, they still experience livestock care and general operating costs. Moreover, when considering diseases for which protective emergency vaccination is now the preferred control measure, such as CSF and FMD in The Netherlands,[72] the associated (and uncompensated) consequential losses, namely the decreased value of vaccinated animals and their products, also put fully cooperating livestock holders in the emergency vaccination zone at a financial disadvantage. That the now-formalised discussions on developing coverage for consequential losses are targeted at specifically these types of losses – those related to restriction zones and emergency vaccination – suggests that these potential issues are well known and that solutions are being sought.

71. As the OECD has noted, "…the moment premiums are to be paid influences farmers' risk awareness and incentives for risk prevention." It is thought that a mix of *ex ante* and additional payments (or levies) to one scheme will likely produce the strongest preventive effect (Melyukhina, 2011, p. 57). As has been shown above, this is nearly precisely the levy system employed by the three Product Boards participating in the Animal Health Fund, so the Ministry's contention that the scheme has increased animal health awareness on the part of livestock holders is supported.

72. As reported by an official from the Dutch Ministry of Economic Affairs, Agriculture and Innovation, the widespread use of culling in response to CSF in 1997/98 and FMD in 2001 increased societal resistance to stamping-out (i.e. potentially large-scale culling) as a disease control mechanism (see also Melyukhina, 2011, p. 52). The increased use of emergency vaccination in relation to culling – in applicable outbreaks – also appears to be a general trend in animal disease control.

Table 18. Key features of The Netherlands' compensation scheme

Name of scheme	Animal Health Fund		
Legal basis	The Animal Health and Welfare Act (*Gezondheids- en welzijnswet voor dieren*)		
Institutional framework			
Scheme governance	The compensation scheme functions through the Animal Health Fund, a public-private partnership whose funding is based on five-year agreements between the Ministry of Economic Affairs, Agriculture and Innovation and three Product Boards. The Ministry is responsible for daily administration of the Fund and for preparing prevention and control policies for the relevant epidemic livestock diseases.		
Main stakeholders	Ministry of Economic Affairs, Agriculture and Innovation (before organisational restructuring in 2010, the Ministry of Agriculture, Nature and Food Quality (LNV))		
	Product Boards for Livestock and Meat, Poultry and Eggs, and Dairy, which represent an array of product chain members from their respective sectors		
	Livestock holders		
Is private insurance coverage available?	Yes	Limited availability	No
	Private insurance for certain risks related to epidemic livestock diseases is available, but its uptake rate among livestock holders is below 10 % and the scope of coverage is more limited than in neighbouring Germany.		
Compensation			
Overview of the scope of compensation	Compensation is to-date only available for direct losses that result from government-ordered disease control measures. These losses include the culling of animals and the destruction of products (e.g. eggs, milk, and feed), as well as items such as laboratory fees, animal transportation costs, and disinfection expenses. Both commercial and non-commercial holders are compensation-eligible, as are veterinarians under certain circumstances.		
Are consequential losses covered?	Yes	No	Other
	The Animal Health Fund does not compensate for consequential losses and the Dutch Government maintains the principle that such losses are a private sector responsibility. Nonetheless, the Ministry is currently assisting in development of a potential compensation scheme for consequential losses which, once operationalised, would likely be administered by the private sector and involve private insurance.		
Stakeholders' eligibility for compensation	Commercial livestock holders	Receive compensation for direct losses: culled animals, destroyed animal products, and associated expenses. Consequential losses are not currently compensated.	
	Non-commercial smallholders	Are compensated for direct losses in the same manner as commercial holders (cost paid entirely by the central government).	
	Veterinarians	Can be compensated for financial losses resulting from a 72-hour ban on farm visitations following a Ministry-ordered visit to an infected area.	
	Dutch Government (coverage of expenses)	Until the applicable contribution ceiling is reached, the private sector (via the Product Boards' levies) reimburses the government for expenses from outbreak control measures (e.g. culling, vaccination, maintenance of restriction zones).	
Rules for valuation	Valuation of compensation payments is based on market value. Animal/product value tables produced by the LEI Institute are used as guides by independent evaluators who assess market value (based on the date that control measures were ordered by the Ministry). The calculation includes such factors as animal category, age, and purchasing price. Animals healthy at the time of veterinary inspection are indemnified at 100 % market value, visibly sick animals at 50 %, and dead animals at 0 %. Initial valuations can be appealed by either the holder or the government. This prompts a re-evaluation by a team of three experts.		
Conditionality	Compensation paid to livestock holders can be reduced if they do not notify suspicion of a disease outbreak to the government as soon as possible or fail to meet/maintain established sanitary standards. According to the Ministry, such cases have been rare.		
Time frame for payment	Generally, compensation is paid within one month after the valuation, and the government tries to guarantee that payments follow depopulation/destruction by no more than 60 days.		

Diseases covered	Compensation for direct losses under the Animal Health Fund is covered by the government-industry agreement for the following diseases: avian influenza, African swine fever, classical swine fever, Q fever, bluetongue, bovine spongiform encephalopathy (BSE), bovine tuberculosis, brucellosis, foot-and-mouth disease, Newcastle disease, scrapie, brucella melitensis, swine vesicular disease, and bovine leucosis.		
Differentiated treatment of diseases (yes/no/other)	Yes	No	Other
	The scheme's compensation procedures do not change for different types of livestock diseases (e.g. zoonoses and diseases only affecting animal production). However, there is differentiation between disease types in the sense that the Product Boards are liable for different contribution ceilings based on the various relevant species/diseases. The manner in which the contribution ceilings function makes it difficult to determine if the government attempts to assume, for example, a larger share of the costs for zoonotic disease control.		
Financial structure			
Funding sources and mechanisms	Negotiations held every five years between the Ministry and the three Product Boards determine the livestock industry's contribution ceilings in the event of an outbreak, which vary by sector and disease. In the event of an outbreak the government initially covers compensation and disease control costs before invoicing the relevant Product Board up to its contribution ceiling. The Product Boards raise funds through levies paid by livestock holders. After an outbreak, the levies on the affected sector are increased – assuming the relevant Product Board's reserves were insufficient – in order to meet the sector's financial responsibility to the Animal Health Fund. When an epidemic's cost exceeds the applicable contribution ceiling the government pays the additional costs and is partially reimbursed by European Union co-financing. 'Peace-time' disease monitoring and structural costs are shared on a 50/50 basis between the sector and the government.		
Cost-sharing (yes/no)	Yes	No	
	Cost-sharing is arguably both *ex ante* (because of the continuous nature of the levies and the sharing of 'peace-time' disease monitoring and structural costs) and *ex post* in nature, but the *ex post* aspect is more significant in monetary terms because the majority of industry contributions to an epidemic's control costs will be raised after the outbreak through increased levies.		
Practical experience			
Incentives provided (for prevention/biosecurity practices and early notification)	The Ministry reports that the scheme adds to the overall awareness of livestock holders' animal health responsibilities (but does not claim that the scheme has prevented disease outbreaks) and, arguably, the reduced, 50 % compensation for visibly sick animals and 0 % compensation for animals dead at the time of inspection incentivise early notification.		
Efforts to mitigate potentially adverse incentives	Overcompensation is guarded against by only compensating the market value of holders' losses. Ongoing work on development of a compensation scheme for consequential losses seeks to nullify potentially adverse incentives linked to restriction zones and vaccination programmes by ensuring that no financial disparity arises between either restricted and culled farms or vaccinated and culled farms. Plus, the Animal Health Fund largely avoids the issue of moral hazard through the contribution ceilings – only for an epidemic whose cost substantially exceeded a contribution ceiling would moral hazard be an issue (since in other cases ultimate financial responsibility rests with the private sector).		

Vietnam

Country overview

210. The total land area of Vietnam is 329 566 km^2. Among the total population of just over 86 million people, 80 % are involved in agriculture. The sector accounted for 20.6 % of Vietnam's gross domestic product (GDP) in 2010, with livestock comprising 24.5 % of total agricultural GDP. According to OIE data, the total populations of buffalo, cattle, pig, and birds in Vietnam are 2.9 million, 5.9 million, 2.7 million, and 218 million, respectively (Table 2).

211. Recently, three outbreaks of major epidemic livestock diseases were notified to the OIE: avian influenza, foot-and-mouth disease, and Porcine Reproductive and Respiratory Syndrome (PRRS). Due to avian influenza, a total of over 49 million birds were culled between 2003 and 2010. In 2010, 36 272 birds were culled as a result of avian influenza, 371 animals were culled due to foot-and-mouth disease, and 77 158 pigs were culled in response to PRRS.

212. When an outbreak occurs, the central government regulates the compensation scheme with a circular issued by a decision of the prime minister upon the request of the Ministry of Finance in collaboration with the Ministry of Agriculture and Rural Development. Provincial departments of finance are charged with management of compensation funds within their respective provinces.

Institutional framework and stakeholder involvement

213. In Vietnam the National Prevention/Emergency Fund has been established to control and prevent risks such as natural damage, epidemic livestock disease, and human disease outbreaks. The first highly pathogenic avian influenza outbreak occurred in December 2003, while the first PRRS outbreak occurred in March 2007. After three years, in March 2010, PRRS reappeared. These outbreaks pose a threat to Vietnam in two important areas: 1) public health due to the zoonotic nature of avian influenza; and 2) production, given the importance of the poultry and livestock sectors to the domestic economy. In addition, the outbreaks have decreased the poverty reduction potential of small-scale poultry and livestock production for rural smallholders.

214. Aiming to control and eradicate these outbreaks, the Government of Vietnam established emergency support policies. Following the initial relevant government decisions in 2004 and 2005, several decisions – No 132/2007/QD-TTG (15 August 2007), No 1037/QD-TTG (15 August 2007), No 738/QD-TTG (18 May 2006), No 719/QD-TTg (5 June 2008), No 80/2008/TT-BTC (18 September 2008), No 142/2009/QD-TTg (31 December 2009), and, most recently, No 1442/QD-TTg (23 August 2011) – on compensation have been approved. The resulting policies aim at preventing the public health threat inherent in avian influenza, as well as reducing the national economic losses associated with outbreaks of avian influenza, foot-and-mouth disease, and PRRS. The policy rationale is to encourage farmers to declare disease outbreaks at an early stage in order that the disease can be contained among the livestock population. A key component of the support policy is a compensation level that encourages farmers to cull animals rather than sell them illegally on the market.

215. There is an ongoing discussion between the central government and livestock producers with regard to adequate risk-sharing patterns. These patterns, and therefore the discussions, are closely linked to the restructuring of the poultry production sector in Vietnam. The Ministry of Agriculture and Rural Development (MARD) is the government agency participating in these negotiations. It is also responsible for designing the control and prevention programmes in the event of a livestock disease outbreak.

216. The National Committee for Disease Control and Prevention advises the Government of Vietnam on the support policies, as well as disease control and prevention strategies. The funding of control and prevention efforts, including financial support for outbreak containment and the payment of direct compensation, restocking subsidies, and other expenses to those affected by culling, has been achieved in part through the aforementioned National Prevention/Emergency Fund, as well as provincial Prevention/Emergency budgets.

217. Livestock holders' responsibilities in the event of an epidemic disease outbreak include timely declaration of the disease's presence and strict implementation of the control and prevention programmes recommended by the government. Compliance with control and prevention programmes implies adherence to government containment regulations such as bans on moving or selling disease-susceptible animals.

Compensation

Scope

218. Only livestock holders' direct losses are covered under the compensation scheme. Following the recommendation made by a study on compensation and associated financial support for farmers, the

government's compensation rate for birds culled during stamping-out procedures was raised from 10-15 % of the market value of the destroyed/slaughtered livestock in 2004, to 50 % in June 2005, and 70 % in June 2008. Market value is assessed on the basis of cost per kilogram. Increasing the compensation level has reportedly led to greater livestock holder satisfaction with the scheme. Notably, compensation policy differs between private poultry producers and State Owned Enterprises (decisions No 719/QD-TTg, No 142/2009/QD-TTG and No 1442/QD-TTG).

219. In terms of its procedures, the compensation scheme does not distinguish between 'limited' and 'catastrophic' disease outbreaks. The main central government guidelines that prescribe compensation payments to private livestock producers were updated in August 2011 to the following:

- Direct indemnification of animals ordered culled at the rates of USD 1.75 per head for poultry (previously USD 1.15); USD 1.90 per live weight kilogram for pigs (previously USD 1.25); and USD 2.25 per live weight kilogram for cattle (previously USD 1.50);

- Other direct expenditures:

  - Since 2008, staff for vaccination has been financed by the central government budget at a rate of USD .005 for poultry; USD .05 per head of pig; and USD .1 per head of cattle. These rates also increased on 23 August 2011.

  - The maximum subsidy for an official to cull an animal had – since 2008 – been USD 2.50 per working day and USD 5.00 per holiday. This amount also increased in August 2011.

220. State Owned Enterprises receive compensation in a different form. These enterprises receive the total amount of funds needed to feed the foundation stock, to restock, and to ensure proper veterinary/sanitary services, including disinfections, labour costs, and equipment, from the central government. The funds are first given to the sub-departments of animal health at the provincial level for veterinary activities, and a second allocation is made to farms based on their needs, with a part of the fund specifically allocated for disinfection.

221. No recent cases in which the government has resorted to *ad hoc* payments, i.e. payments unrelated to the public compensation scheme, in order to indemnify livestock holders for losses incurred as a result of disease outbreaks were reported by stakeholders.

222. At the provincial and district levels, the Committees for Epidemic Disease Control and Prevention comprise representatives of the sub-departments of Agriculture, Health, Animal Health, Finance, Trade, Police, Transport, Natural Resources and Environment, and Culture and Information. At commune and village level, the commune disease control committees supervise the control of animal movement, culling, and disposal. The commune committees consist of a commune leader, a lawyer, an animal health worker, a sample of affected farmers, and a police officer, as well as other personnel.

223. Evaluation of losses is done at the local level. As an outbreak occurs, farmers should inform the head of the village. In turn, the head of the village should report to the communal committee disease control and prevention. In turn, the communal committee informs the Committees for Epidemic Disease Control and Prevention at the provincial and district levels. These committees visit livestock holdings and carry out tests to confirm the disease infection of the stock. In case the disease test result is positive, all of the poultry and livestock in the infected area are culled. A culling document/appraisal form, which includes information on the date the livestock owner reports the disease, the date of detection of the disease by an inspector, the date of culling, and the number of poultry and livestock culled, is then composed and signed by farmers and the other stakeholders. Compensation to farmers is subsequently based on this document,

and it is paid through the commune institution. The financial procedure is as follows: funds from the central government are allocated to the provincial financial department, which then allocates the central government funds, together with the provincial funds, to the district financial department. This district-level body then allocates the total compensation payment to the communes, which in turn distribute the money to farmers in accordance with the previously specified number of animals culled. All compensation payments are made in cash.

Diseases covered

224. Currently, three epidemic livestock diseases represent particularly severe threats to Vietnam and its livestock owners: avian influenza, foot-and-mouth disease (FMD), and Porcine Reproductive & Respiratory Syndrome (PRRA). These three diseases are all covered by the compensation scheme, and the scheme does not differentiate its procedures between these different types of diseases.

Financial structure

225. The National Prevention/Emergency Fund, which is generated through national taxes, is used in the case of national emergencies. The main principles guiding compensation for poultry and livestock producers affected by culling used as a response to avian influenza, FMD, and PRRS are the following (decision No 719/QD-TTg, and No 1442/QD-TTg):

- (i) The government contributes between 60 % and 80 % of the costs for controlling outbreaks of the diseases. The remaining amount is contributed from the provincial Prevention/Emergency budgets.

- (ii) Ha Noi and Ho Chi Minh City do not receive any contribution from the central government, their outbreak control funds will come from their local Prevention/Emergency budgets.

- (iii) In cities and provinces where the financial contribution towards avian influenza, FMD, and PRRS outbreak control exceeds 50 % of the local Prevention/Emergency budget, the central government contributes the remainder from the National Prevention/Emergency Fund.

- (iv) In cities and provinces where the cost of controlling the diseases is lower than USD 50 000, the local Prevention/Emergency budgets covers all of the costs.

226. In the case of avian influenza, the Vietnamese Government reacted with considerable effort to contain the outbreak once the scope and ferocity of the epidemic became apparent. The government established a multi-ministerial avian influenza steering committee (AIST), which is chaired by the Ministry of Agriculture and Rural Development and comprises representatives of the ministries of Agriculture and Rural Development, Health, Finance, and Planning and Investment, as well as other departments. A national action plan for the control of avian influenza was drafted to provide guidelines for containing the epidemic. The Vietnam Integrated National Operational Program for Avian and Human Influenza (OPI) was also established. The Program was to be implemented by the avian influenza working group, comprising the various technical animal husbandry and animal health institutes.

227. Since late 2005 there has been increasing concern from both the Government of Vietnam and international partners on the dangerous status of avian and human influenza in Vietnam. The Government of Vietnam and donors have shown their strong commitment for financing the implementation of the Vietnam Integrated National Operational Program for Avian and Human Influenza (OPI) during the period of 2006 to 2010. Commitment levels (as of October 2008) from the government and international donors for implementation of the OPI were estimated at USD 202 million, almost triple what had been committed

during 2004 to 2005 (USD 77.7 million). The commitments were financed at 35 % by the Government of Vietnam, with the rest from ODA. It was hoped to finance the OPI such that it would be possible to undertake necessary risk management actions set out in the Green Book in different various agriculture and health sectors. Proposals originated with the Ministry of Agriculture and Rural Development and Ministry of Health (MOH) during dialogue processes with the international donor community.

228. International donors applied various funding modalities, including bilateral aid, and even committed to in-kind contributions, including transfers of expertise, equipment, and chemicals for laboratories and tests. The World Bank applied a global multi-donor financing mechanism, and also proposed a credit line. Several donors channelled support through the UN System for a Government of Vietnam-United Nations Joint Programme.

229. The resulting commitment levels (in December 2009) from the Government of Vietnam and international donors for implementation of the three components of the Integrated National Operational Program for Avian and Human Influenza are shown in the table below.

Table 19: OPI for the Green Book cost estimate, pledged commitment, actual commitment in projects, and delivery as of December 2009 (USD)

OPI Code	Green Book Component	Green Book Cost estimate	Budget as pledged commitment	Budget as actual commitment in projects	Actual expenditure as of Dec 2009
I.	**Enhanced Coordination Activities**	**31,220,000**	**24,951,700**	**16,404,156**	**9,244,929**
I.A	National Preparedness	602,000	646,300	2,324,609	1,159,657
I.B	Policy and Strategy Development	137,000	219,000	319,500	164,114
I.C	Program Coordination and Management	5,798,000	4,352,300	3,363,300	2,138,638
I.D	Public Awareness & Information Sharing	4,366,000	11,966,300	7,987,147	4,425,263
I.E	Program M & E	2,010,000	1,733,000	334,183	142,585
I.F	Support Regional Coordination / International Agencies	18,307,000	6,034,800	2,075,417	1,214,672
II.	**HPAI Control & Eradication in the Agricultural Sector***	**116,421,000**	**65,127,000**	**46,518,657**	**46,444,907**
II.A	Strengthening Veterinary Services	17,822,000	7,712,200	3,349,700	4,409,905
II.B	Disease Control	84,481,000	48,070,900	35,922,243	37,919,412
II.C	Surveillance and Epidemiological Investigation	4,771,000	6,350,100	5,484,950	3,116,950
II.D	Poultry Sector Restructuring	9,347,000	2,993,800	1,761,764	998,640
III.	**HPAI Prevention and Pandemic Preparedness in the Health Sector****	**102,407,000**	**85,687,200**	**159,798,528**	**84,505,739**
III.A	Strengthening Surveillance and Response	40,810,000	39,721,100	66,624,480	21,988,567
III.B	Strengthening Diagnostic Capacity	15,486,000	7,388,600	33,660,148	24,048,610
III.C	Strengthening Curative Medicine System	36,200,000	31,526,000	57,868,100	37,054,467
III.D	Improving Research	9,911,000	7,051,500	1,645,800	1,414,094
	TOTAL ALLOCATED FUND	**250,048,000**	**175,765,900**	**222,721,341**	**140,195,575**
	Adjustment: GoV co-financing for ODA projects		3,000,000		
	Adjustment: funding gap against planned project budget		870,100		
	Adjustment: committed funds without detailed allocation		26,786,900		
	REVISED TOTAL	**250,048,000**	**206,422,900**	**222,721,341**	**140,195,575**

* GoV disbursement is based on MARD report 86/TY-TC 14 January 2010 and cross-checked with MOF report 1406/BTC-HCSN 1 February 2010.
** GoV disbursement is based on MOH report 67/BYT-KHTC 6 January 2010 and cross-checked with MOF report 1406/BTC-HCSN 1 February 2010.
Source: Tran Nam Binh, Mid-Term Review: Vietnam Integrated National Operational Program for Avian and Human Influenza (OPI) 2006-2010.

230. In the above table, the third column shows Green Book cost estimates; the fourth column reflects financial commitments from both the Government of Vietnam and international donors during discussion and negotiation processes, with coordination support from the PAHI Secretariat; the fifth column consists of consolidated figures for project budget designs which are related to the OPI; and the sixth column provides a consolidated view of real disbursement made under those projects.

231. During these years, the Government of Vietnam financed more than USD 85.7 million, 23 % higher than its original commitment for the whole period of 2006 to 2010. In order to respond to the emergency situation at both central and provincial levels, the government drew these funds from its annual contingency budget lines for Strengthening Surveillance and Response and Strengthening Curative Medicine System (H1N1, Health sector) and Disease Control (H5N1, Agriculture Sector).

232. In the same period (2006-2010), which constituted approximately two-thirds of the total expected implementation timeframe for the Green Book, international donors delivered a little less than half (41 %) of their commitments. The difference between commitment and delivery can be explained by three factors: (i) key projects were ongoing until the end of 2010; (ii) some of the larger projects encountered delays leading to a low rate of disbursement; and (iii) some new projects commenced toward the end of the period with committed funds but no expenditures.

233. For the 2011 to 2012 period, a proposal by the central government has estimated a budget for the control and eradication of avian influenza of USD 15.5 million. It is foreseen that the National Prevention/Emergency Fund will finance about USD 8.8 million of this total. The remaining portion will be fund by the provincial Prevention/Emergency budgets (decision No 305/QD-BNN-TY, 25 February 2011).

234. In the case of FMD, on 27 December 2005, the prime minister signed decision number 3660/QD-BNN-TY to allocate a budget for prevention and control of USD 26.4 million for 2006 to 2010. In this case, the budget of the National Prevention/Emergency Fund financed USD 12.4 million and the remaining amount was paid by the provincial Prevention/Emergency budgets. At the end of the program, the actual expenditure of the National Prevention/Emergency Fund was USD 10.5 million.

235. For the 2010 to 2015 period, the central government planned to provide a budget for the control of FMD of USD 33.4 million (decision number 975/QD-BNN-TY, 16 May 2011). For this budget, the National Prevention/Emergency Fund will finance about USD 15.5 million. Again, the remaining cost will be funded by the provincial Prevention/Emergency budgets.

236. The key aspects of the central government's emergency policy guidelines on epidemic livestock diseases and associated fund/subsidy allocation can be grouped into two categories: (i) funding for poultry and livestock producers (i.e. households, farmers, cooperatives, etc.); and (ii) funding for State Owned Enterprises (SOE). Compensation funding from the National Prevention/Emergency Fund for poultry and livestock producers is dependent on the budget department of the Ministry of Finance, while compensation for State Owned Enterprises depends on the Department of National Enterprises of the Ministry.

237. The allocation of funds in the provinces follows a different pattern. It is characterized by the provincial and district financial departments' control of resources. Thus, in almost all provinces, the provincial finance department allocates funds to the district financial department, which in turn distributes the compensation payments to farmers in accordance with the number of animals culled.

238. The compensation scheme clearly does not entail a public-private cost-sharing arrangement (involving contributions from livestock holders). Private insurance for such risks has not yet been introduced in Vietnam, though a new pilot project on insurance has recently been started.

Practical experience in scheme application

239. Problems in compensation scheme management arise from the establishment of different categories and especially different compensation rates between provinces. For instance, farmers try to move and cull their poultry in neighbouring provinces with high support levels and compensation rates. In sum, differing compensation rates and categories between provinces encourages animal movement, thereby enhancing disease spread and hindering disease containment. The rationale behind compensating farmers is to increase compliance with regard to animal culling. It is therefore crucial in the containment of an avian influenza outbreak. If farmers are not compensated because they own only a small amount of poultry, there would be an incentive for them to sell potentially infected animals on the market, thus contributing to the spread of the disease.

240. The table below lists recent major outbreaks that may have impacted Vietnam's implementation of a compensation scheme or led to its modification.

Table 20. Recent major outbreaks that prompted compensation payments

Disease	Time period	Scope of outbreak and compensation	Potentially associated modifications to scheme (if any)
Foot-and-mouth disease (FMD)	2002-2010	Foot-and-mouth disease has been a persistent presence in Vietnam during the past decade. In terms of the number of animals destroyed or slaughtered in response to outbreaks, most years have seen less than 400 instances, but 2006 (4 361 destructions/slaughters), 2007 (4 480), and 2009 (844) were more severe in this regard.	Compensation/support policies for foot-and-mouth disease was approved by government decision (No 738/QD-TTg) and a government circular (No 44/2006/TT-BC) in 2006.
Highly pathogenic avian influenza (HPAI)	2003-2010	Culling of animals susceptible to HPAI has occurred every year since an outbreak in December 2003. The 2004/05 period was particularly severe, with just under 45 million birds destroyed in 2004 and nearly 4 million destroyed in 2005.	The government decision on compensation for avian influenza was approved in April 2004. The percentage of market value indemnified was raised from 10-15 % to 50 % in June 2005 and to 70 % in June 2008.
Porcine Reproductive and Respiratory Syndrome (PRRS)	2007-2010	The initial outbreak occurred in March 2007, and that year 4 425 pigs were destroyed or slaughtered. The year 2008 was more severe – there were 277 602 cases and 52 164 pigs were destroyed or slaughtered. Also, 2010 is notable as over 77 000 pigs were destroyed or slaughtered (there were a total of 112 137 cases).	n.a.

Source: OIE HandiSTATUS Interface (2011); OIE WAHID Interface (2011).

241. Furthermore, late payment and/or compensation rates seen as insufficient by farmers could encourage them to illegally move and sell their animals in order to minimise their share of losses, or to not report an infection among their poultry. Either of these actions would impede rapid containment of the outbreak.

242. The Ministry of Agriculture and Rural Development has insisted that the compensation rate be increased in order to constitute an incentive for improving outbreak notification by farmers. However, in Vietnam the activity of paying farmers for their losses that result from disease outbreaks (referred to as 'compensation' by the OIE and FAO) is often interpreted and understood as financial support, because the central government does not collect any fees/tax from livestock owners yet provides them with funds.

243. In terms of encouraging better prevention/biosecurity practices and early notification the compensation scheme has not had a great effect on the behaviour of livestock holders for three reasons: i)

the rate is low; ii) the speed of disbursement is slow; and iii) there are heavy bureaucratic administrative procedures.

244. Nonetheless, interviewees reported that to some extent the scheme has generally contributed to decreasing the risk of outbreaks of epidemic livestock diseases, their cost, and the pressure for governments to provide *ad hoc* compensation. The scheme reportedly encourages early reporting and incentives to take preventive measures on the farm. Producers may thus be more willing to declare the disease at an early stage and cull their animals, reducing animal movement and illegal selling. Following this rationale, an outbreak is expected to be contained at a much earlier stage, thereby reducing direct and indirect costs and losses.

Table 21. Key features of Vietnam's compensation scheme

Name of scheme	Emergency support policies, including compensation, for disease prevention and control		
Legal basis	Based on series of government decisions dating from 2004; the most recent is Government Decision No 1442/QD-TTg (August 2011)		
Institutional framework			
Scheme governance	Central government regulates the scheme through decisions of the prime minister upon request of the Ministry of Finance and in collaboration with the Ministry of Agriculture and Rural Development. Provincial finance departments manage funds within their respective provinces. Committees for disease control and prevention at provincial and district levels work with commune committees to confirm disease presence and develop culling documents/appraisal forms which serve as the basis for compensation payments.		
Main stakeholders	Central government (Ministry of Finance, Ministry of Agriculture and Rural Development);		
	Provincial departments of finance		
	Provincial and district committees for disease control and prevention		
	Commune committees (include some affected farmers)		
	State owned enterprises (different compensation procedures)		
Is private insurance coverage available?	Yes	Limited availability	No
	Private insurance for such risks is not yet available, though a pilot project on insurance recently began.		
Compensation			
Overview of the scope of compensation	A percentage (currently 70 %) of the market value of culled animals is payable to livestock owners. Per-animal or per-day subsidies are also provided to officials who vaccinate or cull animals.		
Are consequential losses covered?	Yes	No	Other
	Only direct losses (portion of the market value of culled animals) are eligible for compensation.		
Stakeholders' eligibility for compensation	Livestock owners	Direct losses resulting from the culling of animals.	
	Smallholders	Decisions on eligibility have varied. For example, whereas Ha Tay Province once decided to compensate all farmers, Ho Chi Minh and Tien Giang required poultry producers to have more than 100 and 50 animals, respectively.	
	Officials	Per-animal or per-day subsidies are payable to officials who vaccinate or cull animals.	
Rules for valuation	Compensation now pays 70 % of market value (prior to the outbreak) of culled animals, which is assessed on the basis of cost per kilogram. Central government sets homogenous rates (e.g. per head of poultry), but provinces divide animals into different categories such that compensation amounts differ.		
Conditionality	Violating regulations on early notification can nullify compensation. Livestock holders must declare a disease at an early stage and comply with government containment regulations, including susceptible animal movement/selling restrictions. Payment is conditional on the health of the animals in order to encourage early reporting. Animals that die prior to official culling approval not indemnified.		
Timeframe for compensation	Disbursement of the compensation payments can be "slow" according to interviewees.		
Diseases covered	Avian influenza, foot-and-mouth disease, and porcine reproductive and respiratory syndrome		

Differentiated treatment of diseases (yes/no/other)	Yes	No	Other
	The compensation scheme does not differentiate between the three diseases.		
Funding sources and mechanisms	Guiding financial principles include: 1) The central government contributes 60 % to 80 % of disease control costs (through the National Prevention/ Emergency Fund), with the rest financed by provincial Prevention/ Emergency budgets; 2) Ha Noi and Ho Chi Minh City do not receive central government contributions; 3) When provincial shares of control costs exceed 50 % of the local Prevention/ Emergency budget, the central government pays remainder of costs; 4) In provinces where costs are below USD 50 000, they are paid from the local Prevention/ Emergency budget.		
Cost-sharing (yes/no)	Yes	No	
	The compensation scheme is publicly funded; however, in most provinces compensation costs are divided between the central government and the provincial Prevention/Emergency budget.		
Practical experience			
Incentives provided (for prevention/biosecurity practices and early notification)	Payment is conditional on the health of the animals in order to encourage early reporting. Animals that die prior to official culling approval are not indemnified. In terms of encouraging better prevention/biosecurity practices and early notification the compensation scheme has not had a great effect on the behaviour of livestock holders for three reasons: i) the rate is low; ii) the speed of disbursement is slow; and iii) there are heavy bureaucratic administrative procedures.		
Efforts to mitigate potentially adverse incentives	The compensation level of 70 % of market value ensures that livestock holders will bear a portion of any direct losses resulting from an outbreak (as well, of course, as the full burden of consequential losses). Also, the compensation rate has been raised from 10-15 % of the market value of the destroyed/slaughtered livestock in 2004, to 50 % in June 2005, to 70 % in June 2008. These increases have likely helped decrease issues associated with under compensation.		

Part III. Comparison of key compensation scheme aspects and incentives created on notification and prevention practices

245. This part of the report is divided into two sections. The first section presents an overview of the main features of the public and public-private cost-sharing compensation schemes described in Part II. It compares the schemes' institutional frameworks, compensation practices, and financial frameworks and finally discusses the incentives on notification and prevention practices created by the schemes. The second section draws conclusions on the comparative discussion and presents potential avenues for additional research.

Comparative overview of key aspects of the selected country schemes

246. As was concluded in Part I (regarding the main economic issues relevant for the management of epidemic livestock disease risk), there seems to be considerable scope for the effective tailoring of compensation schemes to specific country and risks contexts such that schemes with different designs can efficiently promote good risk management practices, including the principal aims of incentivising early reporting and complete cooperation with disease control measures. Given that Part II of this report examined five compensation schemes for losses caused by epidemic livestock diseases on four continents, including one in a developing country, there are unsurprisingly some differences in scheme design presented in the following comparative tables. Nonetheless, it is notable that in many respects, the tables show substantial conformity on the inclusion and utilisation of key compensation scheme aspects and practices.

Institutional frameworks

The institutional arrangements of the five compensation schemes are primarily surveyed in Table 23, with Table 22 providing basic information – names and legal bases – and Table 24 offering context via description of the availability of complementary private insurance for epidemic livestock disease risks in the countries.

Table 22. Compensation scheme names and legal foundations

	Name of scheme	Legal basis
Australia	Emergency Animal Disease Response Agreement (EADRA)	*Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses* (est. 2002)
Canada	Canadian Food Inspection Agency compensation	*Health of Animals Act*; maximum compensation amounts are set out in the *Compensation for Destroyed Animals Regulations*
Germany	*Tierseuchenkassen* (Animal Disease Funds)	*Tierseuchengesetz* (Animal Disease Act, revised version of 2004) and applicable federal state (*Bundesland*) laws
Netherlands	Animal Health Fund	The Animal Health and Welfare Act (*Gezondheids- en welzijnswet voor dieren*); and the agreements between the government and industry-sector-representing Product Boards (*Convenant financiering bestrijding besmettelijke dierziekten LNV – PVV – PPE – PZ*)
Vietnam	Emergency support policies, including compensation, for disease prevention and control	Based on series of government decisions dating from 2004; the most recent is Government Decision No 1442/QD-TTg (August 2011)

Source: Civic Consulting. See Part II for more details.

247. Below, Table 23 reveals one of the clearest points of distinction among the five compensation schemes. Whereas in Australia, Germany, and the Netherlands the schemes implemented are public-private

in nature, the Canadian and Vietnamese compensation schemes are purely public. This has a couple of important implications. With respect to funding, cost-sharing is clearly used in three cases and public funding in the other two. Additionally, there is the issue of stakeholder involvement in scheme related decision-making. The three cost-sharing schemes institutionalise this public-private collaboration: in Australia the EADRA, which constitutes the legal basis for the compensation scheme, is an agreement between Australian governments (Commonwealth and state/territory), the livestock industry, and Animal Health Australia, the public company that serves as custodian of the EADRA and is itself a public-private partnership; in Germany livestock holders are represented on the governing boards of the *Tierseuchenkassen*; and in the Netherlands private sector contribution ceilings for outbreak response costs are formally negotiated between three industry Product Boards and the government every five years.

248. There is inherent value in engaging, as is clearly done in Australia, Germany, and The Netherlands, such consultative processes for the management of disease control and compensation practices, "because a scheme that is designed to take account of the priorities of different actors is more likely to encourage compliance with disease control" (World Bank *et al*., 2006). While private sector participation in compensation scheme administration does not appear to be formalised to the same extent in Canada (where the *Health of Animals Act* prescribes government administration of the compensation scheme), discussions between the Canadian Food Inspection Agency and associative bodies representing the livestock industry reportedly occur frequently, especially in relation to decisions that impact scheme operation, e.g. modifications to the schedule of maximum compensation amounts. Meanwhile, the key decision-maker within Vietnam's compensation programme is the government, but notable is the existence and role of the commune committees on disease control which comprise a commune leader, a lawyer, an animal health worker, a sample of affected farmers, a police officer, and other local personnel.

Table 23. Comparison of institutional frameworks

	Scheme governance			Main stakeholders
	Overview	Type	Formal industry representation in decision-making	
Australia	Animal Health Australia (AHA) acts as custodian of the EADRA. Following an outbreak, it collects data on the response and processes cost-sharing claims. The National Management Group invokes the EADRA via approval of a post-incident disease response plan. The more technical Consultative Committee on Emergency Animal Diseases informs the National Management Group's decisions.	Public-private cost-sharing	✓	• Animal Health Australia; • Commonwealth Government; • State/territory governments; • 14 industry organisations; And, comprising representatives of the EADRA signatories just listed, • National Management Group; • Consultative Committee on Emergency Animal Diseases
Canada	Administered by the Canadian Food Inspection Agency (CFIA), which reports to Agriculture and Agri-Food Canada minister. CFIA district veterinarians issue animal/property destruction orders upon determining a disease presence. Compensation evaluator(s) are then charged with calculating the market value.	Public	*	• Agriculture and Agri-Food Canada; • Canadian Food Inspection Agency and district veterinarians; • Livestock holders (including national supply-managed representative associations)
Germany	Tierseuchenkassen are administered by federal states (*Bundesland*) and have governing boards comprising members chosen by farmers, state agriculture ministries, county veterinary authorities, and agriculture organisations.	Public-private cost-sharing	✓	• Tierseuchenkassen; • Federal states; • Agriculture organisations; • Livestock holders; • Veterinary officials

	Scheme governance			Main stakeholders
	Overview	Type	Formal industry representation in decision-making	
Netherlands	The compensation scheme functions through the Animal Health Fund, a public-private partnership funded through five-year agreements between the government and three Product Boards. The Ministry is responsible for daily administration of the Fund and for preparing prevention and control policies for the relevant livestock diseases.	Public-private cost-sharing	✓	• Ministry of Economic Affairs, Agriculture and Innovation (previously, the Ministry of Agriculture, Nature and Food Quality (LNV)); • Product Boards for Livestock and Meat, Poultry and Eggs, and Dairy; • Livestock holders
Vietnam	Central government regulates the scheme through decisions of the prime minister upon request of the Ministry of Finance and in collaboration with the Ministry of Agriculture and Rural Development. Provincial finance departments manage funds within their respective provinces. Committees for disease control and prevention at provincial and district levels work with commune committees to confirm disease presence and develop culling documents/appraisal forms which serve as the basis for compensation payments.	Public	**	• Central government (Ministry of Finance, Ministry of Agriculture and Rural Development); • Provincial departments of finance; • Provincial and district committees for disease control and prevention; • Commune committees (including sampling of affected farmers); • State owned enterprises (compensation procedures differ)

* Cooperation with associations representing the livestock industry does appear routine, especially regarding modifications of the *Compensation for Destroyed Animals Regulations*, which set maximum compensation amounts (see, for example, Ritz (2011)).
** At the commune level livestock holders participate via representation (a sample of affected farmers) on the commune committees that are tasked with disease control. Overall, however, the key decision-maker is the government.
Source: Civic Consulting. See Part II for more details.

249. Among the five countries, complementary private insurance for risks related to epidemic livestock diseases (independent from the coverage of the compensation scheme) is only widely available in Germany where it can be purchased to cover an array of livestock risks, including production/business interruption losses. It is also reported that some relevant insurance products are purchasable in Canada (mostly in the poultry sector), the Netherlands,[73] and Australia. Such private insurance has not yet been introduced in Vietnam, though a relevant pilot project is underway.

73. Reports suggest that additional applicable insurance products may have recently emerged (Melyukhina, 2011).

Table 24. Comparative availability of private insurance for epidemic livestock disease risks

	Availability	Description of coverage
Australia	Limited availability	Private insurance for livestock disease risks is not widely held by livestock owners; there are few 'off-the-shelf' products available.
Canada	Limited availability	Private insurance is minimally available, and livestock holders still rely on the public risk management programmes.
Germany	Widespread availability	Private insurance is available for production losses, some direct losses as well as the value of an animal that exceeds the maximum amount paid by the Tierseuchenkassen. Production insurance covers losses resulting from, e.g. sales restrictions.
Netherlands	Limited availability	Private insurance for certain disease-related risks is available, but the uptake rate among livestock holders is below 10 % and the coverage is more limited than in neighbouring Germany.
Vietnam	Next to no availability	Private insurance for such risks is not yet available, though a pilot project on insurance recently began.

Source: Civic Consulting. See Part II for more details.

Compensation practices

250. As Table 25 reveals, the scope of compensation available to livestock holders in the five countries is largely similar. Effectively, the countries' respective compensation schemes indemnify direct losses resulting from destroyed or slaughtered livestock and, in most cases, related products that are destroyed (e.g. animal products or feed). Additionally, compensation is generally available for animal destruction/disposal costs.

251. Extension of compensation coverage to small industries and smallholders/non-commercial farmers is practised in Australia (industries with gross value of production below AUD 20 million need not be represented by an EADRA signatory to be compensation-eligible), Canada (compensation is payable for any animal ordered destroyed under the *Health of Animals Act*), Germany, and the Netherlands where the government pays the full cost of indemnifying smallholders for their direct losses. Past decisions on eligibility in Vietnam have differed by province, sometimes establishing minimum flock/herd populations as a determinant of compensation eligibility.

Table 25. Compensation practices – comparison of the scopes of coverage

	Overview of coverage	Small-holders eligible?	Compensation for consequential losses	Notes
Australia	Payable for destroyed livestock and property and for dead animals that would have been destroyed.	*	Not provided	No allowance made for loss of profit, loss from breach of contract, production loss, or any other consequential loss.
Canada	Covers three loss types: destroyed animals; destroyed items (e.g. animal products); and animal disposal costs.	✓	Not provided**	Only indemnifies direct losses from control measures. But, extension of AgriInsurance programme to cover production losses is being considered.
Germany	Direct losses from officially ordered culling, including animal value and culling/disposal costs.	✓	Not provided	The cost-sharing scheme covers only direct losses, but private insurance coverage for consequential losses is widely available.
Netherlands	Direct losses from control measures, including culled animals and destroyed products, as well as laboratory fees, animal transportation costs, and disinfection expenses.	✓	Not provided	Government principle holds that consequential losses are a private sector responsibility. But, ministry is assisting in development of a potential scheme for consequential losses which would likely be managed by the private sector.
Vietnam	A percentage (currently 70 %) of the market value of culled animals is payable to livestock owners. Per-animal or per-day subsidies are also provided to officials who vaccinate or cull animals.	***	Not provided	Only direct losses are eligible for compensation.

* Livestock holders in industries with gross value of production less than AUD 20 million are eligible for compensation, even if the industry is not represented by an EADRA signatory. ** The compensation scheme administered by the Canadian Food Inspection Agency does not cover consequential losses; however, depending on the context of a livestock disease outbreak, the Business Risk Management suite of programmes managed by Agriculture and Agri-Food Canada might cover some consequential losses. Certainly, the government (matching) contribution to AgriInvest savings accounts could be used by livestock holders to offset a portion of business interruption losses; AgriStability would issue pay-outs if the outbreak led to a whole-farm 15 % margin decline, and the AgriRecovery framework might be activated *** In the past, decisions on eligibility have varied by province. For example, whereas Ha Tay Province once decided to compensate all farmers, Ho Chi Minh and Tien Giang required poultry producers to have more than 100 and 50 animals, respectively

Source: Civic Consulting. See Part II for more details.

252. None of the selected compensation schemes provide compensation for consequential losses incurred by livestock holders as a result of an outbreak and subsequent control measures. Non-coverage of consequential losses is explicitly stated in the EADRA in Australia; the compensation scheme administered by the Canadian Food Inspection Agency only covers destroyed animals, destroyed items, and disposal costs; in Germany consequential losses are a matter for private insurance products; the Dutch government has historically held the principle that such losses are a private sector responsibility; and Vietnam only indemnifies culled animals. However, and significantly, interviews conducted for this report suggest that stakeholders in Canada, the Netherlands, and Germany have discussed potential resolutions to the problem of those consequential losses that result from disease control measures such as movement restriction zones or emergency vaccination programmes.

253. More specifically, in Canada consideration has been given to an extension of the subsidised crop loss AgriInsurance programme to livestock risks; in Germany, stakeholders considered coverage of consequential losses before concluding that readiness and rapid action in the event of a disease outbreak designed to limit the extent and duration of movement restrictions (and therefore related consequential losses) constitutes the preferred approach; and, as detailed in Part II's analysis of The Netherland's Animal

Health Fund, the Dutch government is currently engaging the livestock industry in formalised discussion of potential development of a compensation or insurance scheme that would address certain types of consequential losses. The Australian approach also attempts to limit the extent of this issue by ensuring that the tools and procedures required for quick response plan implementation, and thereby a decrease in the duration and scope of consequential losses-provoking control measures, are in place *ex ante*. Further discussion of this issue will be provided in the 'incentives created' section below.

254. The methodologies employed by the schemes to determine actual compensation levels do differ in some respects (see Table 26) though the assessment mechanisms are notably all based on the market value of animals and products, and in this manner are substantially similar. In the four OECD member countries scrutinised, assessors aim to derive market value or, as described in the EADRA, the farm-gate sale value, based on characteristics that might include such factors as animal category, age, purchase price, and production history. The Canadian compensation scheme and the German Tierseuchenkassen are unique in that they set out specific maximum compensation amounts per animal type, e.g. in Canada compensation for registered cattle cannot exceed CAD 8 000 per head, while in Germany the limit is EUR 3 068 per cow. Notably, different provisions are sometimes made for assessment of market value in cases where a functioning market for the animal in question does not exist. For example, in such cases Canada utilises an economic formula – and what has been termed the 'cost-of-production approach' (World Bank *et al*., 2006) – that takes into account animals' attained life-cycle phase and associated 'grow-out' costs, and the German Tierseuchenkassen can rely on EU figures for buying animals out of the market in the event that regional markets collapse following an outbreak.

255. In sum, the following divisions in the schemes' effective compensation values can be noted. First, unlike Australia and The Netherlands, Canada and Germany cap assessments of market value. Accordingly, there can be cases in which an assessment of, e.g. a rare animal's market value, would otherwise exceed the established compensation maxima. Meanwhile, Vietnam currently pays 70 % of *ex ante* market value (up from 10 % to 15 % in 2004 and 50 % between June 2005 and June 2008), whereas the other countries in the sample compensate the full market value (for Canada and Germany this holds as long as market value is below the legal maximum amount).

Table 26. Compensation practices – comparison of valuation methodologies and conditionality

	Determination of compensation amounts				Attached conditionality
	Market value-based?	Valuation rules	Date of assessment	Owner can appeal?	
Australia	✓	Value of destroyed and dead-from-the-disease animals assessed on basis of a farm-gate sale price. When applicable, a second, top-up payment compensates for the difference between the market value of equivalent livestock on the date restocking eligibility is granted and previously paid compensation.	Earliest occurring: 1) Owner reports disease; or 2) Certified inspector detects disease; or 3) Quarantine measures imposed	*	Reporting: 24-hour limit for industry parties and states/territories Livestock owners must be represented by an industry organisation that is an EADRA signatory (unless the industry sector has gross value of production below AUD 20 million). Payment reduced if owner convicted of offence under any Act/regulations related to disease control/eradication. Dead animals fully indemnified if they would have been culled for control. Owners must notify within 24 hours.
Canada	✓	Market value up to established maximums, minus any value received from carcass. Assessed amounts intended to reflect reasonable depreciation on the market; thus, they are generally below the maxima. In absence of a market, an economic formula accounting for its attained life-cycle phase and 'grow-out' costs is used.	Market value the animal would have had at the time of its evaluation by the Minister if it had not been destroyed	✓	Reporting: immediately after incident The minister can partially or fully withhold compensation for violations or offences of the *Health of Animals Act*, so late reporting or any other act of gross negligence could result in loss of compensation. Dead animals covered only if they die after an applicable destruction order.
Germany	✓	Animal value assessed by district veterinary officers and limited by maxima specified in the *Animal Disease Act*. Generally, assessed values are lower than the maxima. The assessed amounts look at market value on the day culling was ordered, so if the market value drops as an outbreak unfolds, the values are lowered accordingly. If regional markets collapse, the estimate is based on EU figures for buying animals out of the market.	Date on which culling is ordered	✓	Reporting: immediately Farmers must cooperate in disease response efforts and accurately report livestock figures and pay levies. Failure to do so may lead to reductions or denials of compensation. Failure to report an outbreak is a criminal offence. Any reductions are evaluated case-by-case based on the degree to which the farmer failed to comply with regulations. Animals that died or were culled before notification are compensated at 50 %.
Netherlands	✓	Animal/product value tables produced by a research university are used as guides by independent evaluators who factor in animal category, age, and purchasing price. Animals healthy at the time of veterinary inspection are indemnified at 100 % market value.	Date of government decision to implement control measures	✓	Reporting: as soon as possible (a legal requirement) Compensation can be reduced if farmers do not follow reporting law or meet established sanitary standards. Visibly sick animals (during inspection) paid at 50 %; dead animals at 0 %.
Vietnam	✓	Compensation now pays 70 % of market value of culled animals, which is assessed on the basis of cost per kilogram. Central government sets homogenous rates (e.g. per head of poultry), but provinces divide animals into different categories such that compensation amounts differ.	Market value prior to outbreak	n.a.	Reporting: early – violating regulations on notification can nullify compensation. Livestock holders must declare the disease at an early stage and comply with government containment regulations, including susceptible animal movement/selling restrictions.

* The EADRA does not appear to specify a valuation appeal mechanism; however, because a second, top-up payment compensates for the difference between the market value of the replacement livestock on the date the property becomes eligible for restocking and the compensation amount previously paid, the call for such a mechanism may be limited.

Source: Civic Consulting. See Part II for more details.

256. The respective valuation rules also differ in other ways. One point of divergence is compensation rates for sick/dead animals. Uniquely, Australia compensates the full farm-gate value of animals that die prior to notification of an outbreak so long as they would have been culled in subsequent control measures and their deaths are notified by their owners within 24 hours. Conversely, dead animals are compensated in Canada only if their deaths follow issuance of an applicable destruction order, and the Tierseuchenkassen indemnify animals that die or are culled before notification at 50 % of their assessed market value. On this point, The Netherlands appears to make the most substantial reductions for sick or dead livestock – animals visibly sick at the time of inspection (which follows notification) are indemnified at 50 % and dead animals at 0 %.

257. A second notable divergence point is the date selected as the basis for market value determinations. This is an important consideration given that outbreaks may lead to declines in prices of affected animals and products. As mentioned, Vietnam employs *ex ante* market values and multiplies them by the 70 % rate to yield compensation amounts. The resulting amounts were updated in August 2011 to USD 1.75 per head of poultry, USD 1.9 per live weight kilogram of pig, and USD 2.25 per live weight kilogram of cattle. In contrast, the four other countries base market value derivations on – at the earliest – the date on which the disease was reported or detected. This is effectively the case in Australia, where the earliest occurring of three dates – owner notification, inspector detection, or imposition of quarantine measures – serves as the basis for assessment of farm-gate value. In contrast, Germany and The Netherlands base market value assessments on the date control measures, i.e. destruction or slaughter, are ordered.

258. Finally, in a notable departure from the procedures employed in the other countries, Australian livestock holders are eligible for a second, top-up compensation payment which resolves the monetary difference between the previously paid compensation (i.e. the indemnification of the farm-gate value of destroyed and dead-from-the-disease animals) and the market value of equivalent livestock on the date that all restocking restrictions on the concerned property are removed. This results in a maximum compensation level equal to the market value of a full restocking of the property.

259. Similarity in the schemes' approaches is seen again with regard to the conditionality attached to indemnification payments. All five schemes maintain disease notification requirements. Australia's is notable in that it specifies a 24-hour period in which notification must be given to the proper authorities. In contrast, the other schemes require "immediately after" (or similar) reporting of outbreaks or their suspicion. In Germany and The Netherlands compensation can be reduced on a case-by-case basis for violations of reporting rules or laws; in Canada contravention of the *Health of Animals Act*, which calls for immediate reporting of detected or suspected diseases, permits the government to partially or fully withhold compensation; payment can also be reduced in Australia for convictions of offences under acts or regulations related to disease control. Similarly, in Vietnam violations of notification regulations (Veterinary Ordinance) can lead to compensation ineligibility.

Table 27. Compensation practices – comparison of payment timelines

	Date of payment	Procedural notes
Australia	n.a.	The EADRA specifies dates within which compensation claims must be made. For example, the initial claim must not follow livestock death or destruction by more than 90 days; and a request for a valuation of restocking cost needs to be made within 30 days of notification of restocking eligibility. Compensation payments are made in short order by the states/territories.
Canada	Six to ten weeks (about two months)	This timeframe assumes the livestock holder does not appeal the initial compensation evaluation – an appeal must be made within three months of receipt of the evaluation form.
Germany	Within 90 days (three months)	The start date for this time period is the destruction or slaughter of the concerned livestock.
Netherlands	Usually one month, sometimes two	Generally, compensation is paid within one month after the valuation, and the government tries to guarantee that payments follow depopulation/destruction by no more than 60 days.
Vietnam	Disbursement can be "slow" according to interviewees	Funds from the central government are sent to the financial department at the provincial level. This department then allocates the central government funds, along with additional provincial funds, to the district financial department which in turn allocates the total compensation payment to the communes where it is distributed to individual farmers.

Source: Civic Consulting. See Part II for more details.

260. Given that the efficient payment of eligible claims has been identified as a key goal for compensation schemes (World Bank *et al*., 2006),[74] Table 27 presents the timeframes within which the five schemes analysed for this report pay out indemnification. Canada and The Netherlands try to guarantee payments will be made within two months; the Tierseuchenkassen in Germany allow (in line with EU requirements) for 90 days, and though the EADRA does not appear to specify a time limit for payment, it does present deadlines for claim filing, and an interview with an official from Animal Health Australia suggested that payment is made in short order by the states/territories. Conversely, interviewees from the Ministry of Agriculture and Rural Development in Vietnam indicated that one concern with their country's compensation scheme has been slow disbursal of compensation payments.

261. In terms of distinguishing between different types of livestock diseases (Table 28), e.g. between zoonotic diseases and those that primarily or nearly exclusively affect industry production, it is the EADRA in Australia which most substantially differentiates procedures in accordance with its disease classification system. The procedural differentiation is based on the beneficiary-pays principle. Specifically, the EADRA divides the 65 emergency animal diseases it currently lists (uncategorised diseases can also be treated under the cost-sharing system) into four categories on the basis of factors such as their potential socio-economic impact, human/environmental health consequences, and financial effect on the concerned industry sector(s). Only a very limited number of diseases are included in Category 1, meaning their control/eradication carries the most significant public benefits. Disease response expenses for this group are covered 100 % by the Commonwealth and State/Territory Governments. On the other end of the scale, the governments pay only 20 % of response costs for Category 4 diseases which are those that mainly affect industry production. This differentiation follows the general principle, introduced in Part I, Section I of this report, that where livestock producers are the primary beneficiaries of disease control they should pay a greater share than when disease control produces wider societal benefits, e.g. for human health or the environment.

74. Indeed, it has been noted that "In dealing with small farmers in developing countries, compensation should be paid within 24 hours of culling by cash … any delay is likely to have a significant effect on reporting" (World Bank *et al*., 2006).

Table 28. Compensation practices – comparison of coverage of livestock diseases

	Diseases covered	Differentiated treatment of diseases?	
		Differentiation	Explanation
Australia	The EADRA cost-sharing mechanism covers 65 emergency animal diseases in four groups, and there is a mechanism to cost-share expenses from non-listed diseases under certain conditions. Categorisation rests on several factors, including potential socio-economic losses, human or environmental health consequences, and economic impact on the industry.	Yes	Based on the beneficiary-pays principle: *Category 1*: 100 % government funding → very high public benefits *Category 2*: 80 % government and 20 % industry → high public benefits *Category 3*: 50 % government and 50 % industry → moderate public benefits *Category 4*: 20 % government and 50 % industry → low public benefits
Canada	No all-inclusive list of compensation-eligible livestock diseases exists. As long as an animal is destroyed under the *Health of Animals Act* compensation is payable. Yet, the diseases that typically prompt destruction orders are those listed as 'reportable'. This category comprises 32 diseases which must be immediately notified to a district veterinarian by livestock owners, veterinarians, and laboratories.	No	The compensation scheme does not differentiate between types of livestock diseases, e.g. between zoonoses and diseases that purely impact animal production. The procedures are the same in all cases involving destruction orders issued by CFIA district veterinarians, and payment is always made through the federal budget.
Germany	Notifiable epidemic livestock diseases such as BSE, classical swine fever, avian influenza, bovine tuberculosis, foot-and-mouth disease, Aujeszky's disease, scrapie, and anthrax.	No	Compensation payments do not depend on the type or extent of a livestock disease, and the public-private cost-sharing proportions remain constant.
Netherlands	Compensation for direct losses under the Animal Health Fund is covered by the government-industry agreement for the following 14 diseases: avian influenza, African swine fever, classical swine fever, Q fever, bluetongue, bovine spongiform encephalopathy, bovine tuberculosis, brucellosis, foot-and-mouth disease, Newcastle disease, scrapie, brucella melitensis, swine vesicular disease, and bovine leucosis.	n.a.	Compensation procedures do not change with disease type. However, there is some financing differentiation because the Product Boards are liable for different contribution ceilings based on the various species/diseases in their respective sectors, e.g. the industry share of response costs for different diseases is – though potentially often 100 % – actually variable in some cases due to government funding of costs above the contribution ceilings.
Vietnam	Avian influenza, foot-and-mouth disease, and porcine reproductive and respiratory syndrome	No	The compensation scheme does not differentiate between the three diseases.

Source: Civic Consulting. See Part II for more details.

262. In the other two countries with cost-sharing schemes, diseases are not categorised in this manner. The procedures employed by the Tierseuchenkassen do not depend on the type or extent of a disease, and the cost-sharing proportions between the state governments and farmers remain constant (each stakeholder pays 50 % of non-EC-reimbursed sharable costs regardless the disease in question). The Netherlands also does not differentiate procedures based on disease type, but because the industry shares of response costs to various diseases are not percentage- but rather contribution ceiling-based, the proportion of final costs (assuming expenses breach the applicable contribution ceilings) borne by government and industry can vary by disease. Finally, given that funding for compensation payments made in Canada and Vietnam comes entirely from public sources, there is no opportunity for cost-sharing-based disease differentiation in those countries.

Table 29. Compensation practices – reported ad hoc payments related to livestock diseases

	Ad hoc payment reported	Notes
Australia	Yes	Equine Influenza 2007 – Though this disease is among the 65 listed in the EADRA, at the time of the outbreak the affected equine industry sectors had not yet signed onto the EADRA. Accordingly, the cost-sharing mechanism was not officially invoked during the course of the response. The Commonwealth Government ultimately underwrote the industry's share of the response costs and made substantial support payments to various affected stakeholders.[75] Notably, the outbreak was 'abnormal' to some extent because it originated with imported horses and likely passed through quarantine measures on a person or equipment that had been in contact with the animals (Callinan, 2008, pp. xvi, xvii). Also, the horse industry had expressed an intention to become an EADRA signatory prior to the outbreak but progress was delayed by development of the required levy.
Canada	Yes	BSE 2003 – The BSE recovery programme was begun in mid-2003 to financially aid Canadian cattle producers affected by the closure of all major beef and cattle export markets following the detection of a cow in Alberta with BSE. The programme's budget was CAD 460 million, and this amount was cost-shared on a 60-40 basis between the federal government (CAD 276 million) and the participating provincial/territorial governments (CAD 184 million). The payments partially compensated for the difference between the price received for cattle sold for slaughter in Canada after the outbreak and a reference price based on market value in the United States (Agriculture and Agri-Food Canada, 2011).
Germany	No	
Netherlands	Yes	Q Fever 2009/2010 – Significant numbers of pregnant female goats were culled beginning in December 2009 and a breeding ban was subsequently introduced because the disease can spread quickly through the birthing process. Female goats without young were not culled, thus remaining a financial responsibility for their holders. These holders were later compensated – with payments per animal – for the disadvantage they experienced as a result of the breeding ban and their inability to use the female goats for milk production. The decision to compensate in this case was made at the ministerial level.
Vietnam	No	

Source: Civic Consulting. See Part II for more details.

263. Based on interviews conducted for the case studies in Part II of this report, it can be noted that governments of three of the five countries have made *ad hoc*, compensation-type payments related to recent outbreaks of epidemic livestock diseases. Germany and Vietnam (since its implementation of the compensation scheme in 2004) are the two countries for which no such *ad hoc* payments were reported. Details on the payments made by Commonwealth Government of Australia and the Dutch Government are presented in Table 29, which also contains an example of an *ad hoc* programme implemented in Canada. Under the Business Risk Management suite of agricultural risk related programmes, Agriculture and Agri-Food Canada now manages what could loosely be termed a structured *ad hoc* framework – AgriRecovery. The BSE recovery programme identified in the table was implemented prior to the development of AgriRecovery, which is a cost-sharing framework that now allows for flexible programmatic responses to livestock or other agricultural disasters and is thus an important part of livestock disease risk management in Canada.

Financial structures

264. As noted in the 'institutional frameworks' section above, one of the main typological distinctions among this group of compensation schemes derives from the funding mechanisms on which they rely. This

75. The sum of these compensation-like payments committed to by the Commonwealth Government was AUD 268.8 million. They were provided "directly to individuals and businesses whose primary source of income had been affected by the outbreak and the subsequent movement restrictions" (Callinan, 2008, p. 12).

distinction establishes one group of public-private cost-sharing schemes and another comprising the purely publicly funded schemes. As Table 30 depicts, the latter group's financing arrangements are less complex than those of the former group's members. Still, in Vietnam, the sharing of financial responsibility for compensation funds between the central and provincial governments, as well as the influx of international donor contributions, yields a multi-layered financial picture. In comparison, Canada's funding of compensation directly through the federal budget is simple. The relative complexity seen in Vietnam may serve an important purpose, however, because "The level of risk sharing between central governments and province authorities often determines each actor's behaviour and consequently the effectiveness in containing disease spread" (World Bank *et al*., 2006). Where the central government is mainly liable for financing and risk, less pressure is put on provincial authorities to contain outbreaks and subsequently ensure compensation reaches affected livestock holders.

265. Examining the three schemes reliant on public-private cost-sharing also reveals differences in detail. The most visible of these lies in the *ex post* nature of the levies utilised, when or if necessary, by Australian livestock industry sectors to reimburse the Commonwealth Government for its payment of the industry share of a disease response. In contrast to this use of zero-based levies in Australia, livestock producers in Germany and The Netherlands pay levies on an ongoing, annual basis. There is, of course, still a strong *ex post* aspect to these levies – if a disease outbreak triggers reserve-overwhelming expenses then the levies are increased to enable the affected industry sectors to reimburse the Tierseuchenkasse/German federal state or Dutch Government for their initial coverage of the industry sector(s)' share of control costs.

Table 30. Financial structures – comparison of scheme financing mechanisms

	Overview of scheme financing	Cost-sharing with livestock industry		
		Cost-sharing	If yes, levy timing	Industry fundraising mechanism
Australia	Each participating Lead (state/territory) Agency initially pays its own costs during a disease response before the cost-sharing formulae are used for reimbursement. Commonwealth Government can pay the industry share of costs after an outbreak, and the affected industry(s) then have 10 years to reimburse the government. The governments' cost-shares are split such that those states/territories benefiting most from a disease response pay more.	Yes	*Ex post*	Industry sectors use zero-based, i.e. only activated when necessary, statutory levies to raise funds. If a disease affects multiple species, the cost-shares of the affected industries are based on their respective gross values of production (GVP) and a weighting that reflects the disease's impact on them. When multiple industry parties represent a single affected species the cost-sharing is determined by the parties.
Canada	Compensation payments are funded directly through the federal budget. The funding is *ex post* and loss-dependent in that it is utilised to compensate owners of destroyed animals or products following an outbreak.	No	n.a.	n.a.
Germany	Tierseuchenkassen are generally equally funded by farmers and the corresponding federal state, with a portion of outbreak losses co-financed by the European Union (EU). Ultimately, up to 50 % of eligible costs are reimbursed by the EU, and the remaining amount is shared equally between farmers (through levies paid to the Tierseuchenkassen) and federal state government. The Tierseuchenkassen aim to build reserves near 5 % of the market value of insured livestock. If compensation costs overwhelm reserves, state governments pay costs and farmers repay through increased levies.	Yes	*Ex ante/ ex post*	Mandatory, specie-based levies are set by the Tierseuchenkassen and authorised by the state governments. The levies are continuous (i.e. *ex ante*), but are, if necessary, increased *ex post*. In practice, levies are mainly differentiated by regional risk, the absence of infectious diseases, and, in some cases, implementation of specific hygiene standards. But, a number of Tierseuchenkasse only significantly differentiate levy rates by species.
Netherlands	Negotiations between the government and the three Product Boards determine the livestock industry's contribution ceilings. After an outbreak the government initially covers costs then invoices the relevant Product Board up to its contribution ceiling. When costs exceed the ceiling the government pays the additional costs and is partially reimbursed by EU co-financing. 'Peace-time' disease monitoring and structural costs are shared on a 50/50 basis between government and industry.	Yes	*Ex ante/ ex post*	Product Boards raise funds through levies on livestock holders. After an outbreak, the levies on the affected sector are increased, if necessary. Levies are both *ex ante* (because of their continuous nature and the sharing of 'peace-time' monitoring costs) and *ex post*, but the latter aspect is more significant because for larger (i.e. reserve-overwhelming) outbreaks, the majority of industry contributions will be raised *ex post* via increased levies.
Vietnam	The principles guiding the financing of compensation for culling-affected poultry and livestock producers include: 1) The central government contributes 60 % to 80 % of disease control costs (through the National Prevention/ Emergency Fund), with the rest financed by provincial Prevention/ Emergency budgets; 2) Ha Noi and Ho Chi Minh City do not receive central government contributions; 3) When provincial shares of control costs exceed 50 % of the local Prevention/ Emergency budget, the central government pays remainder of costs; 4) In provinces where costs are below USD 50 000, they are paid from the local Prevention/ Emergency budget.	No	n.a.	n.a.

Source: Civic Consulting. See Part II for more details.

266. The industry levies employed in all three cost-sharing schemes are differentiated by sector. Additionally, in both Australia and Germany financial responsibility for control costs is to some extent differentiated by (federal) state/territory. In Germany this occurs with respect to both the government

contributions and the industry levies because there is an independently operated Tierseuchenkasse in each federal state (except in Bremen, which is covered by the Tierseuchenkasse of Lower Saxony). Meanwhile, in Australia, distribution of cost-sharing contributions among the states/territories is based, for Category 1 diseases, on their respective human populations. For other disease categories, the shares are based on their relative populations of the concerned livestock species, their shares of the gross value of production of the affected industry, or a combination of the two.

267. Under the three cost-sharing schemes, the livestock industries also contribute to such 'peace-time' expenditures as disease monitoring or training programmes. For example, in Australia the costs of training programmes and annual workshops which review the EADRA are equally shared among the Commonwealth, the state/territory governments, and the full industry members of Animal Health Australia (the industry organisations contribute to these costs through membership subscriptions to Animal Health Australia). In the Netherlands 'peace-time' costs are divided evenly between government and industry.

268. The Dutch cost-sharing framework is unique in that if in the case of an outbreak disease control costs do not exceed the contribution ceilings negotiated between government and the industry Product Boards, they are entirely funded by the industry. This represents a substantial departure from the Australian and German schemes in which the relevant governments (e.g. Commonwealth, federal state, state, or territory) always pay a prescribed portion of control costs.

Incentives created on notification and prevention practices

269. The very presence of an efficiently functioning compensation scheme (assuming the livestock industry is widely familiar with it) should incentivise early reporting of disease incidents, as well as broader cooperation with disease control measures (relative to the same country/disease context absent a compensation scheme). Indeed, these – early reporting and full industry cooperation with control/eradication efforts – are the public goods which compensation schemes are intended to produce. That said, not all compensation schemes are designed equal – several of their common features can be tailored so as to more (or less) strongly incentivise early notification of outbreaks by livestock holders. For example, incentives for early reporting can probably be enhanced (or lessened) through the specifics of compensation procedures and levels, as well as the design of reporting requirements.

270. Table 31 shows how the five compensation schemes examined in this report have approached the scheme elements – reporting requirements, (reduced) compensation for sick or dead animals, and overall compensation levels – which are expected to heavily impact on livestock holder notification. Perhaps most notable about the left half of the table is the starkly similar approaches taken by the schemes with respect to the establishment of penalty-supported reporting requirements and reductions in compensation for sick or dead animals. Uniformity, with perhaps one significant exception, characterises the positions taken on reporting and reductions for dead animals. The exception is the Australian scheme, which fully indemnifies the farm-gate value of animals that die prior to not just their destruction/slaughter or its mandate, but notification of disease presence. This, in comparison, for example, to the German, Dutch, and Canadian compensation schemes, which reduce or deny compensation for animals that die prior to disease notification, veterinary inspection, and the issuance of a destruction order, respectively. Indeed, if an animal dies prior to post-notification inspection in one of these three countries the highest indemnification level, at 50%, would be found in Germany (Canada would require a destruction order, so the animal would need to be alive at the time of inspection, and in The Netherlands it is also required that the animal be alive when a property is inspected).

271. These 50 % or 100 % reductions in compensation payments for dead animals are in keeping with established good practice in scheme design, because it is thought that reducing or eliminating payments for animals that die prior to their destruction or, at the very least, the notification of their infection,

significantly incentivises early reporting by their owners (see, for example, World Bank *et al*., 2006). The Australian scheme aims at the same goal, namely rapid reporting of disease outbreaks, but does so through arguably stricter notification requirements. The EADRA states that notification of animal death from a reportable disease must be made within 24 hours. This is arguably more concrete than the "immediately after" or "as soon as possible" requirements seen elsewhere. Additionally, the EADRA requires industry parties to advise their members to notify authorities within 24 hours of an incident, and a state/territory may lose claims to cost-sharing under the EADRA through failure to notify the Consultative Committee on Emergency Animal Diseases of an incident within 24 hours. In sum, there is a heavy focus on notification requirements in the EADRA. The question of which method – Australia's regulation-centric approach or financial incentives seen elsewhere[76] – is more effective cannot be answered here, but it is notable that an official from Animal Health Australia reported no problems experienced to-date with late reporting (neither did the interviewees from the other three OECD member countries).

272. There may be a different source of merit in the Australian approach to incentivising early reporting. In areas or countries where there is likely to be a substantial time lag between farmers' notification of a disease and the arrival of an inspection team and/or processing of a destruction order, non-compensation or heavily reduced compensation of dead animals may provoke discontent in cases where farmers appropriately notify authorities as soon as feasible only to see their potentially compensation-eligible animals die before the inspection visit or issuance of a destruction order. The rapidity with which avian influenza kills birds could provoke such cases, especially in developing countries where infrastructural and procedural impediments slow down inspectors or implementation of culling plans.

273. The other side of the good practice-associated advice that animals dead before inspection or destruction should not be fully compensated is that compensation for alive animals must be sufficient to avoid situations in which a financial incentive might exist for the selling of an animal from an infected area prior to notification of the disease's presence – because the sale would yield significantly more money than the compensation payment. This notion, that where compensation levels are too low incentives for early reporting and general cooperation with control measures may be insufficient, was mentioned earlier in the introduction to relevant economic principles (Section I, Part I). As was stated then, the setting of compensation payments at appropriate levels constitutes a key challenge. On the question of whether any of the five schemes provide too-low compensation levels, some experts (World Bank *et al*., 2006) have identified the 75 % to 100 % of market value range as the most appropriate[77] – rates below 50 % are seen as likely to prompt insufficient compliance with the scheme and thereby control efforts. Thus, Vietnam's compensation rate of 70 % of market value (final column, Table 31) is near the lower recommended boundary, according to these guidelines. Certainly, the previous rates implemented in Vietnam (10 % to 15 % in 2004 and 50 % between June 2005 and June 2008) were significantly below the guidelines. In the four OECD member countries, under-compensation does not appear to occur. Australia effectively pays 100 % of the value of a farm-gate restocking through the second, top-up payment that is a feature of the EADRA's compensation provisions; Canada and Germany indemnify full market value except in cases where the established maxima would be breached by the value assessment; and the Netherlands compensates healthy animals at full market value, though it bases that determination, like Germany, on the date when control measures are ordered, by which time market prices could potentially fall a significant amount.

76. As has been pointed out, "Most schemes globally do not cover losses from animals dead by the disease before official culling" (World Bank *et al*., 2006)

77. The lower bound is suggested for contexts in which authorities' control over animal movements is poor, while the 90-plus % rate is suitable when the enforcement of movement restriction zones is practicable.

Table 31. Notification incentives – comparison of mechanisms that may motivate early reporting

	Reporting requirements			Compensation-based incentives		
	Hour- or day-based reporting requirement	Must report "immediately" or "as soon as possible" after incident	Potential penalisation for failure to report on-time	Compensation for sick or dead animals		Effective compensation levels (healthy animals)
				General rule	Explanation	
Australia	✓		✓	Equal to that for healthy animals culled	The EADRA fully compensates animals that die prior to notification if they die of the relevant disease and would have been culled. Owners must notify within 24 hours.	Market (farm-gate) value of restocking (via top-up payment)
Canada		✓	✓	Reduced or none	Dead animals indemnified only if they die after issuance of an applicable destruction order.	Capped market value
Germany		✓	✓	Reduced or none	Animals that die or are culled before notification of the disease are only indemnified at 50 % of market value.	Capped market value, late assessment date
Netherlands		✓	✓	Reduced or none	Animals visibly sick at time of inspection are indemnified at 50 % of market value; dead animals at 0 %.	Market value, based on established guidelines, late assessment date
Vietnam		✓	✓	Reduced or none	Payment is conditional on the health of the animals in order to encourage early reporting. Animals that die prior to official culling approval not indemnified.	70 % of *ex ante* market value

Source: Civic Consulting. See Part II for more details.

274. Further complicating the issue of appropriate compensation levels is the opposite concern, namely that where compensation is set too high, moral hazard may occur, incentivising against the practice of robust biosecurity – because of the knowledge that in case of an outbreak sufficient compensation will be provided. Too-high compensation levels may also incentivise illegal animal movements in times of outbreaks to obtain the highest possible compensation, especially in situations where market prices have been affected by the outbreak and livestock identification systems are not in place. In other words, compensation levels higher than appropriate may prompt the development of adverse incentives. Thus, in sum, prices need to be sufficiently high to encourage early and complete reporting, as well as general cooperation with control measures, but not so high that they lead to the creation of adverse, moral hazard related incentives (World Bank *et al*., 2006). On this point, the schemes studied here guard in various ways against potential overcompensation; thereby, they attempt to ensure incentives for appropriate biosecurity/hygiene practices.

275. Notable in this context is the aforementioned relatively late date on which the German Tierseuchenkassen base their market value assessments. If a livestock property is infected 'late' in the course of an outbreak, assessed compensation payments may be lower than for similar animals on previously infected properties, because market prices might have fallen as a result of the outbreak. This feature of the value assessment mechanism limits adverse incentives that might otherwise result from disparities between falling market prices and static compensation levels.

276. Also, the per-animal maximum compensation amounts established in Canada and Germany, as well as the market value guidelines produced by researchers and utilised by assessors in The Netherlands, work to ensure that animal worth is not significantly overvalued by evaluators. Similarly, Vietnam's post-2008 compensation level of 70 % of market value ensures that livestock holders will bear a portion of any direct losses resulting from an outbreak (as well, of course, as the full burden of consequential losses).

277. Next, the schemes' consistent non-indemnification of consequential losses means that livestock holders in all five countries bear at least some consequential losses in the event that an outbreak occurs.[78] This financial threat may contribute to incentives for engagement in risk-mitigating behaviour at farm-level. There is, however, seemingly a trade-off inherent in this non-coverage: while maintenance of the principle that consequential losses are a private sector responsibility may incentivise biosecurity/preventive measures in 'peace-time', it may also problematically impose financial disadvantage on farmers who fully cooperate with either movement restriction zones or vaccination-based control measures once an outbreak occurs – because restriction zones prompt non-direct losses (such as feed costs for animals that cannot be sold; dairy products that cannot be sold; need for welfare slaughter, etc.) and one consequence of emergency vaccination is that animals and animal-associated products may lose significant value (depending on the acceptance of meat from vaccinated animals by food chain operators and consumers). This can lead to a situation where a livestock holder in a restriction zone would be in a better position if livestock was infected and culled (and consequently compensated), thereby reducing incentives for risk mitigating behaviour once restrictions continue for a longer period of time. Potentially adverse incentives could be prevented through a compensation scheme or (private) insurance-based solution for consequential losses of livestock holders that are under movement restrictions or where livestock is subject to emergency vaccination. While The Netherlands is currently working to develop a potential scheme to cover some consequential losses (under the twin principles that there should be no distinction in financial outcome between farmers in a culling zone and farmers in a restriction zone or between culled farms and vaccinated farms), other countries have taken a different approach to this issue, with an official from the Lower Saxony Tierseuchenkasse reporting that in the absence of a compensation-based solution to consequential losses in restriction zones the pursuit of an extraordinary state of readiness (to react to an outbreak) should be pursued to ensure that the duration and extent of restriction zones is minimised to the extent possible.

278. In addition to constraints on compensation levels which may work to maintain risk aversion levels and accordingly incentivise adherence to biosecurity and hygiene standards, there are other mechanisms through which biosecurity is promoted by the schemes. These can broadly be grouped into two categories (see Table 32), one comprising scheme features related to public-private cost-sharing and the other being the formal requirement of biosecurity plan development or adherence to hygiene standards.

78. As explained in the Canadian case study in Part II, Agriculture and Agri-Food Canada manages a suite of Business Risk Management programmes which can to some extent provide coverage of consequential losses resulting from a livestock disease outbreak. However, these programmes are not designed to fully reimburse livestock holders' consequential losses, and indeed the primary income stabilisation programme, AgriStability, only issues payments when whole-farm margins drop by at least 15 % relative to reference margins.

279. The cost-sharing mechanisms employed by Australia, the German Tierseuchenkassen, and The Netherlands to fund their compensation schemes likely serve to limit adverse incentives. As the OECD (2011) has noted, "cost sharing between stake-holders … and industry co-responsibility are elements of a practical industry-wide arrangement to prevent moral hazard." Under these schemes, industry stakeholders are both liable for a share of disease control costs in the event of an outbreak and involved in decision-making which engenders awareness of animal health related responsibilities. Indeed, the dual, *ex ante* and *ex post* nature of the German and Dutch industry levies may function particularly well in terms of increasing this type of awareness. This is because the timing of premium/levy payment is thought to influence risk awareness and prevention incentives, with a mix of *ex ante* and subsequent payments having the greatest theorised impact (Melyukhina, 2011).

Table 32. Prevention incentives – comparison of mechanisms that may promote biosecurity

	Cost-sharing			Biosecurity plans	
	Cost-sharing	If yes, levy timing	Levies differentiated by individual properties' relative risk levels?	Biosecurity plans required	Details
Australia	Yes	*Ex post*	No – only industry sectors affected by a disease pay share of control costs, but the *ex post* levies are assessed on all farmers in a given sector at the same rate.	Yes	Industry parties commit to development of biosecurity plans through EADRA Clause 14.
Canada	No	n.a.	n.a.	Other	The Canadian Food Inspection Agency has recently been developing voluntary national standards for farm-level biosecurity.
Germany	Yes	*Ex ante*/ *ex post*	To some extent – in practice, levies are mainly differentiated by regional risk, the absence of infectious diseases, and, in some cases, implementation of specific hygiene standards; however, a number of Tierseuchenkassen only significantly differentiate levy rates by species.	Other	National hygiene standards.
Netherlands	Yes	*Ex ante*/ *ex post*	No – the levy system is not differentiated by the risk profiles of regions or individual livestock holdings (and their relative preventive practices).	Other	Livestock holders must meet certain hygiene and disease prevention standards – proof that negligence led to an outbreak could prompt financial penalties.
Vietnam	No	n.a.	n.a.	n.a.	

Source: Civic Consulting. See Part II for more details.

280. Indeed, depending on the details of their implementation, cost-sharing arrangements may adhere to some of the methods for mitigating the disadvantages of compensation, including moral hazard, that were identified above in Part I, Section I. Specifically, annual levy payments could be scaled according to risk, thereby penalising those regions or individual properties posing the highest animal health risk or, similarly, easing the levy burden for properties that participate in certain risk-mitigation practices. The Tierseuchenkassen do effectively scale levies based on regional risk due to their financially independent operations in the different federal states, and sometimes differentiate contributions for individual livestock holders depending on the health status of the livestock.[79] However, levies in The Netherlands are not adjusted on a regional or individual risk basis. Given the mechanism's seeming potential to incentivise heightened biosecurity, it is interesting that levy differentiation based on individual risk (or biosecurity levels implemented at an individual holding that go beyond legal minimum requirements) in both Germany and The Netherlands is generally not used despite this being feasible, since the livestock industries in both countries use annual, *ex ante* levies to meet their cost-sharing responsibilities.[80]

281. The last columns of Table 32 show that the schemes in the four OECD member countries that are part of the sample also incentivise or require biosecurity or hygiene standards through agreement or

79. Lower Saxony's Tierseuchenkasse currently reduces levies for livestock holders whose farms are free from bovine herpes virus Type 1 (BHV1). In 2011, BHV1-free farms paid EUR 6 per animal, while farms not declared free of the virus paid EUR 13 per animal. The difference is equal to the cost of vaccines and medical examinations.

80. Between 1996 and 2000, lower levies were collected from farms in the federal state of Lower Saxony if they met specific hygiene standards, but this practice was discontinued following an analysis that showed losses were not significantly lower for these farms.

regulation. In Australia, Clause 14 of the EADRA specifies the industry sectors' commitment to development of biosecurity plans, while in the Netherlands gross negligence in failing to meet established hygiene standards could result in financial penalisation (withholding of compensation, for example); and, in Canada, the Canadian Food Inspection Agency has recently been publishing voluntary national standards for farm biosecurity in different agricultural sectors.

282. To conclude the section on incentives created by the compensation schemes, Table 33 offers a brief overview of interviewees' impressions on livestock industry participation in and adherence to the schemes. Overall, practical experience in scheme administration appears favourable, though specific concerns were mentioned by the interviewees from Vietnam.

Table 33. Reported practical experience with incentives related to compensation

	Practical experience as reported by interviewees
Australia	Animal Health Australia reports no negative experiences associated with adverse compensation-linked incentives, e.g. a failure to report a disease incident. Livestock industry adherence to the agreement has reportedly been firm.
Canada	The Canadian Food Inspection Agency's experience to-date has shown that overwhelmingly stakeholders are cooperative and make use of the compensation scheme as intended.
Germany	Following a bluetongue outbreak in Lower Saxony in 2008, 97 % of 87 000 compensation applications were approved. This suggests widespread acceptance of the programme because for applications to be approved livestock holders must properly register with a Tierseuchenkasse, must pay levies in a timely manner, and must follow rules for reporting, claiming compensation, and submitting necessary supporting materials.
Netherlands	The scheme-administering ministry feels that the compensation programme adds to overall awareness of livestock holders' animal health responsibilities, not least because the holders have to pay levies annually and are knowledgeable about the contribution ceilings and prospective levy increases in the event of an outbreak.
Vietnam	Interviewees expressed concern on 1) potentially too-low compensation rate; 2) slow payment disbursal; and 3) heavy bureaucratic administration, but suggested that producers are more willing to notify diseases and cull their animals in the event of an outbreak of avian influenza or one of the other two diseases covered.

Source: Civic Consulting. See Part II for more details.

Conclusions and issues for additional research

283. The comparison in the previous section indicates that the five examined compensation schemes share several key aspects and procedures. For example, timely reporting requirements backed by potential penalisation in the form of reduced or withheld compensation are specified for all of schemes. Reliance on market value (or a percentage of it in the cases of Vietnam's compensation rate and reductions for dead livestock applied by the Dutch and German schemes) as the basis for assessing animals' indemnification values is universal, though Canada does provide for the use of production cost formulas in the absence of a functioning market.

284. The most significant deviation from the observable similarities in the schemes' design is the cost-sharing aspect of the Australian, German, and Dutch compensation schemes. Within this smaller group, a second categorisation can be made: whereas in Australia and Germany the relevant governments always pay a portion of outbreak control costs, in The Netherlands outbreak control costs up to the negotiated contribution ceilings are covered entirely by the livestock industry. A third distinction is also visible: industry levies in Germany and The Netherlands are *ex ante* and *ex post* in nature, while in Australia they are zero-based; and therefore entirely *ex post* (though limited 'peace-time' contributions, in the form of membership fees, are made by industry organisations to Animal Health Australia).

285. Looking at the financing of the publicly funded schemes, the key difference is that the Canadian compensation scheme is entirely funded through the federal budget, while the funds for Vietnam's compensation payments generally come from both central government and provincial funds.

286. Turning to compensation procedures, differences are visible in procedural details. Though all schemes base indemnification amounts on market value, effective contribution amounts vary, with Australia's scheme probably providing the highest effective level of compensation, namely the market value of a restocking. On the other hand, Vietnam's compensation rate of 70 % of market value is the lowest rate observed for the schemes scrutinised, though Germany's use of the date culling is ordered as the basis for market value assessments means that compensation rates can potentially decrease to a relatively low percentage of the *ex ante* (pre-outbreak) market price in the case of an extended outbreak that drives down prices. The effective compensation levels provided by Canada and The Netherlands likely fall out mid-group – Canada appears to use a later date for market value assessments than Australia and also caps its compensation amounts, while The Netherlands indemnifies the full market value of healthy animals but maintains perhaps the strictest compensation reductions for visibly sick and dead animals.

287. What concrete and relative effects these slightly differing compensation levels have on incentives related to early reporting, cooperation with disease control/eradication efforts, and prevention practices is not possible to identify within the scope of this study. Notably, there is overall lack of detailed work on compensation-related incentives, with "little existing work confirming empirically that high compensation prices are positively associated with high reporting" and even less evidence tying effective control efforts to high compensation rates, although there is a body of fieldwork linking too-low compensation with disease spread (*World Bank et al*. 2006). Clearly, additional research on compensation-related incentives would be beneficial as this is in many ways a complicated issue, not least because behavioural motivations may differ across farm type and between countries (i.e. they may be affected by, among other items, country factors and differences in structure and practices of farms within sectors). Research might, for example, attempt to clarify appropriate compensation levels with respect to potentially positive and adverse incentives, i.e. what level of compensation explicitly constitutes 'too much' and what level 'too little' in different contexts.

288. Others areas for future research, as identified through the study team, the interviewees in the five case study countries, and the representatives of international organisations contacted, include the following:

- An area for additional research revealed by the case studies is that of levy differentiation by risk profiles of individual livestock holders in the case of cost-sharing schemes. Exploration of levy differentiation was mentioned in the Dutch National Agenda for Animal Health 2007-2015 as a government goal. Specifically, wrote the Ministry of Agriculture, Nature and Food Quality (2008), "the possibilities for using risk profiles for the passing on of the costs incurred by the Animal Health Fund, as a means of reducing the risks in business operations and to encourage preventive measures at farm level…" should be considered. Interviews conducted for the German case study suggested mixed results with previous implementations of differentiated levies. Additional research on simple, effective, and easily observable indicators that could be used to differentiate levies based on risk profiles of individual farmers would be an essential precondition to create cost-sharing mechanisms that provide monetary incentives for higher biosecurity levels/lower disease risks by using risk-differentiated levies.

- The development of schemes to appropriately indemnify consequential losses is clearly another potential area for research. Interest in a fuller understanding of countries' ongoing efforts related to consequential losses caused by epidemic livestock diseases, including the development of alternative mechanisms for sharing associated risks was cited by another official interviewed for

this report. A key aspect would be to describe and analyse the extent to which governments are still largely using *ad hoc* responses to compensate producers in cases of severe consequential losses, or if some countries have been able to negotiate effective public-private schemes in this area, or encouraged the development of fully private schemes. Among the five compensation schemes examined in this report, none indemnifies consequential losses arising from epidemic livestock disease outbreaks. However, private insurance products widely available in Germany do offer relevant coverage, and interviews with officials from the applicable government ministries in The Netherlands and Canada revealed ongoing consideration and work, and in the Dutch case formalised discussion with the private sector, on development of coverage for consequential losses. The principle underlying the Dutch efforts to develop such a scheme, which would likely be administered by the private sector once implemented, is that full livestock holder cooperation with disease control measures should not financially disadvantage some affected holders relative to others. Thus, there should neither be a financial discrepancy between farmers with livestock holdings in restriction zones and those with animals in culling zones nor between vaccinated properties and culled properties. Somewhat similarly, Canada is considering expanding a government subsidised insurance programme for crop production losses, AgriInsurance, to cover livestock risks, including epidemic diseases. Development of schemes to cover consequential losses appears to present significant challenges, however. This has been made clear by the Dutch experience detailed in the 'consequential losses scheme' text box in Part II, Section IV. One problematic issue identified for setting up compensation schemes for consequential losses is that determination of equitable and efficient compensation levels for these types of losses is difficult. For example, a per-egg consequential losses compensation rate might have to take into account such factors as the price difference between the market value of a hatching egg and that same egg in a restriction zone, as well as several continuous operating expenses incurred by farms located in a restriction zone.

- The importance of the issue of consequential losses will not decline in the near future. This is in part because the use of emergency vaccination programmes is bound to increase. In many countries, as has happened in The Netherlands (OECD 2011), the general public will likely come to see mass culling of livestock – in cases where emergency vaccination is a viable control method – as problematic and contrary to established animal welfare standards. And, until the general public becomes more comfortable with consuming products from vaccinated animals, consequential losses from emergency protective vaccination will persist. Indeed, the OECD (2011) has already noted that insurance coverage for losses related to movement standstills "becomes especially relevant with the application of emergency vaccination programmes in restricted areas, since this will likely lead to a substantial decrease in the value of the animals and their products." The outstanding question is how best to design that insurance coverage, and which degree of public involvement is required to make it feasible.

- In addition to generally exploring the area of compensation schemes for consequential losses, research might therefore also focus on how to encourage private insurance companies to underwrite consequential losses. The German experience suggests it is feasible, but interviews of Civic Consulting with insurers and re-insurers for previous studies,[81] confirmed by interviews with government officials conducted for the current study, have revealed substantial obstacles to the development of relevant insurance products.

- At a more general level, research could also focus on preconditions for increasing private insurance company involvement in the coverage of epidemic livestock disease risks, as was suggested by some interviewees. Currently private insurance companies hesitate to underwrite

81. See also Civic Consulting, 2007: Pre-feasibility study – Supporting insurance of disease losses.

risks from epidemic livestock diseases in part because they do not have significant experience evaluating risk and setting premiums in this field, and country specific and up-to-date data on government capacities for disease control,[82] animal health status of the livestock population and detailed data on livestock populations and densities is not accessible or sometimes not existing. Research to be conducted could therefore include how data collected through evaluations of Veterinary Services[83] and other data collected by governments (such as livestock registration data and data on the health status of the livestock population) could be made accessible to those insurers that are willing to explore the market for insurance products covering epidemic disease risks in a given country.

- A case can also be made for more epidemiological analysis of the variables, such as disease incidence, frequency, intensity, and duration, which affect the national costs of control measures including those of compensation payments. Even if compensation payments are publicly funded, policy proposals need to be supported by estimates of the expected costs. The need is more obvious if attempts are made to recover the compensation costs from producers or other stakeholders. Given that the incidence of many infectious animal diseases is too low to provide satisfactory measures of the probability distributions, much of the analysis must be based on theoretical modelling using judgemental estimates of key parameters. The costs of a compensation policy for a particular livestock disease depend not only on the risk factors – frequency, intensity and duration – mentioned above but also on features such as the density of the farm animal host species, the environment, and the effectiveness of other disease control measures, e.g. border quarantine and controls, levels of monitoring and surveillance (in fact, the items contributing to the Costs of National Prevention Systems). Additionally, costs depend on the disease control strategy chosen; therefore, the balance between the use of culling and emergency vaccination is also an important factor in determining total compensation payments and costs. All these variables are likely to affect the probabilities of disease outbreaks and the justification for compensation payments. More analytical work of this nature should be valuable in the design of effective animal disease policies.

82. Losses, and thereby indemnities, would depend on the type and speed of government actions in the area of disease control. Often, private insurers link their indemnification payments to government certification of losses (e.g. insurers' reimbursement of business interruption losses may depend on certified government implementation of control measures in the given region/area); and therefore, existing compensation rules and systems affect 'insurability'.

83. The OIE regularly performs independent evaluations of national veterinary systems through use of the OIE PVS Tool, which is designed to assist Veterinary Services to establish their current level of performance, to identify gaps and weaknesses in their ability to comply with OIE international standards, to form a shared vision with stakeholders (including the private sector) and to establish priorities and carry out strategic initiatives, see http://www.oie.int/support-to-oie-members/pvs-evaluations/oie-pvs-tool/.

ANNEX I:
ABBREVIATIONS

AAFC	Agriculture and Agri-Food Canada
ADIS	Animal Diseases Information System (EC)
ADNS	Animal Disease Notification System (EC)
AGA	Animal Production and Health Division (FAO)
AGAH	Animal Health service (FAO)
AHA	Animal Health Australia
AIST	Avian Influenza Steering Committee (Vietnam)
AUSVETPLAN	Australian Veterinary Emergency Plan
BHV1	Bovine herpes virus Type 1
BRM	Business Risk Management (AAFC)
BSE	Bovine spongiform encephalopathy
CCEAD	Consultative Committee on Emergency Animal Diseases (Australia)
CFIA	Canadian Food Inspection Agency
CMC–AH	Crisis Management Centre–Animal Health (FAO/OIE)
CSF	Classical swine fever
CVP	Permanent Veterinary Committee of the Southern Cone
EAD	Emergency animal disease
EADRA	Emergency Animal Disease Response Agreement (Australia)
EADRP	Emergency Animal Disease Response Plan (Australia)
EC	European Commission
EMPRES	Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (FAO)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FARM	Federation of Rural Associations of Mercosur
FMD	Foot-and-mouth disease
GDV	German Insurance Association
GF-TADs	Global Framework for the Progressive Control of Transboundary Animal Diseases (FAO/OIE)
GLEWS	Global Early Warning System for Major Animal Diseases, including Zoonoses (FAO/WHO/OIE)
GOARN	Global Outbreak Alert and Response Network (WHO)
GVP	Gross value of production (Australia)
HPAI	Highly pathogenic avian influenza
LNV	Ministry of Agriculture, Nature and Food Quality (Netherlands)
LPAI	Low pathogenic avian influenza
MARD	Ministry of Agriculture and Rural Development (Vietnam)
MERCOSUR	Southern Common Market
MOH	Ministry of Health (Vietnam)
NAFTA	North American Free Trade Agreement
NMG	National Management Group (Australia)
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development

OIE	World Organisation for Animal Health
OPI	National Operational Program for Avian and Human Influenza (Vietnam)
PAMA	Free from Foot-and-Mouth Disease Action Program (Mercosur)
PANAFTOSA	Panamerican Centre for Foot-and-Mouth Disease
PAHI	Vietnam Partnership on Avian and Human Pandemic Influenza
PHEFA	Hemispheric Program for the Eradication of Foot-and-Mouth Disease
PPE	Product Board for Poultry and Eggs (Netherlands)
PRRS	Porcine reproductive and respiratory syndrome
PVS	Performance of Veterinary Services (OIE)
OIE PVS Tool	Tool for the Evaluation of Performance of Veterinary Services (OIE)
PVV	Product Board for Livestock and Meat (Netherlands)
PZ	Product Board for Dairy Products (Netherlands)
RAs	(Movement) restricted areas
SOE	State Owned Enterprise (Vietnam)
SPS Agreement	Agreement on the Application of Sanitary and Phytosanitary Measures (WTO)
SPS Committee	Committee on the Application of Sanitary and Phytosanitary Measures (WTO)
STDF	Standards and Trade Development Facility (WTO/World Bank/FAO/WHO/OIE)
TFADS	Task Force on Animal Disease Surveillance (EC)
UNEP	United Nations Environmental Program
WAHID	World Animal Health Information Database (OIE)
WAHIS	World Animal Health Information System (OIE)
WHO	World Health Organization
WTO	World Trade Organization

REFERENCES

Agrarheute.com (2010). *Bayerische Tierseuchenkasse übernimmt Kosten für Impfstoff*. [Online]. Agrarheute.com. 10 Mar. Available from: http://www.agrarheute.com/blauzunge-bayern.

Agriculture and Agri-Food Canada (2008). *AgriStability: The AgriStability Fee*. [Online]. Agriculture and Agri-Food Canada. Available from: http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1296675557986&lang=eng.

Agriculture and Agri-Food Canada (2011). *The Business Risk Management Suite of Programmes* [Online]. Agriculture and Agri-Food Canada. Available from: http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1200408916804&lang=eng.

Animal Health Australia (2008). *Animal Health Australia Annual Report*. [Online]. Animal Health Australia. Available from: http://www.animalhealthaustralia.com.au/wp-content/uploads/2011/05/AHA-Annual-Report-200708.pdf.

Animal Health Australia (2010). *EADRA Business Rules: Guidelines for Accounting and Cost Sharing under the EAD Response Agreement*. [Online]. Animal Health Australia. Available from: http://www.animalhealthaustralia.com.au/wp-content/uploads/2011/04/EADRA-Business-rules.pdf.

Animal Health Australia (2011a). Emergency Animal Disease Response Agreement: Frequently Asked Questions. [Online]. Animal Health Australia. Available from: http://www.animalhealthaustralia.com.au/wp-content/uploads/2011/04/EADRA-FAQs.pdf.

Animal Health Australia (2011b). *Horse Owners and the EADRA*. [Online]. Animal health Australia. Available from: http://www.animalhealthaustralia.com.au/aahc/horse-owners-and-the-eadra/horse-owners-and-the-eadra_home.cfm. [Accessed: 22/9/11]

Anton, J., S. Kimura and R. Martini (2011). "Risk Management in Agriculture in Canada". *OECD Food, Agriculture and Fisheries Working Papers*. No. 40. OECD Publishing.

Australian Bureau of Statistics (2005). *Australia's Beef Cattle Industry*. [Online]. Australian Bureau of Statistics. Available from: http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article232005?opendocument&tabname=Summary&prodno=1301.0&issue=2005&num=&view.

Australian Bureau of Statistics (2010). *Year Book Australia 2009-10: Introduction*. [Online]. Australian Bureau of Statistics. Available from: http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1301.0Chapter16012009%E2%80%9310.

Bergevoet et al. (2011). *Feasibility study on the revision of Council Decision 2009/470/EC (ex 90/424/EEC) on expenditure in the veterinary field with a view to develop a harmonized EU framework for cost and responsibility sharing schemes for animal diseases*. Directorate General for

Health and Consumers. [Online]. Available from: http://ec.europa.eu/food/animal/diseases/strategy/pillars/docs/653006_final_report_08062011.pdf.

Callinan, I. (2008). *Equine influenza: The August 2007 Outbreak in Australia*. Government Report. [Online]. Equine Influenza Enquiry. Available from: http://www.equineinfluenzainquiry.gov.au/eiiexhibits/REP.0001.001.0001.pdf.

Canadian Food Inspection Agency (2011). *What to Expect When an Animal Is Ordered Destroyed*. [Online]. Canadian Food Inspection Agency. Available from: http://www.inspection.gc.ca/english/anima/disemala/comp/compe.shtml.

Canada. Department of Justice (1990). *Health of Animal Act (S.C. 1990, c. 21)*. [Online]. Department of Justice. Available from: http://laws-lois.justice.gc.ca/eng/acts/H-3.3/.

Canada. Department of Justice (1997). *Canadian Food Inspection Agency Act (S.C. 1997, c. 6)*. [Online]. Department of Justice. Available from: http://laws-lois.justice.gc.ca/eng/acts/C-16.5/page-1.html#h-2.

Canada. Department of Justice (2000). *Compensation for Destroyed Animals Regulations (SOR/2000-233)*. [Online]. Department of Justice. Available from: http://laws-lois.justice.gc.ca/eng/regulations/SOR-2000-233/page-1.html.

Canada. Department of Justice (2010). Health of Animals Regulations (C.R.C., c. 296). [Online]. Available from: http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._296/index.html.

Chicken Farmer (2011). "Changes to the Compensation Paid for Animals Ordered Destroyed". *Chicken Farmer*. 13/3 pp. 1-2. Chicken Farmers of Canada.

Civic Consulting (2007). *Prevention and control of animal diseases worldwide: Pre-feasibility study – Supporting insurance of disease losses*. Part III. [Online]. OIE. Available from: http://www.oie.int/fileadmin/Home/eng/Support_to_OIE_Members/docs/ppt/OIE_-_Insurance_products__Part_III_.pdf.

Cowled, B., M. Ward, S. Hamilton, and G. Garner (2009). "The Equine Influenza Epidemic in Australia: Spatial and Temporal Descriptive Analyses of a large Propagating Epidemic". *Preventive Veterinary Medicine*. [Online]. 92, pp. 60-70. Available from: http://www.respe.net/en/system/files/equine_influenza_epidemic%20_in_australia.pdf.

Dutch Ministry of Agriculture, Nature and Food Quality (2003). *CSF Contingency Plan for the Netherlands*. [Online]. World Organisation for Animal Health. Available from: http://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/ClassicalSwineFever-Netherlands.pdf.

Dutch Ministry of Agriculture, Nature and Food Quality (2008). *National Agenda for Animal Health 2007-2015*. [Online]. Ministry of Economic Affairs, Agriculture and Innovation. Available from: http://english.minlnv.nl/portal/page?_pageid=116,1640360&_dad=portal&_schema=PORTAL&p_file_id=24243.

Dutch Ministry of Agriculture, Nature and Food Quality (2010a). *Facts and Figures 2010 - The Dutch agricluster in a global context*. [Online]. Ministry of Economic Affairs, Agriculture and Innovation. Available from:

http://english.minlnv.nl/portal/page?_pageid=116,1640360&_dad=portal&_schema=PORTAL&p_file_id=2001627.

Dutch Ministry of Agriculture, Nature and Food Quality *et al*. (2010b). *Convenant financiering bestrijding besmettelijke dierziekten LNV – PVV – PPE – PZ 2010 -2014 van 29 juni 2010, nr. 123215* (2010). [Online]. Overheid. Available from: https://zoek.officielebekendmakingen.nl/stcrt-2010-11754.html.

EADRA (2010). *Government and Livestock Industry Cost Sharing Deed*. [Online]. Animal Health Australia. Available from: http://www.animalhealthaustralia.com.au/wp-content/uploads/2011/04/EADRA.pdf.

European Commission (2007). *A New Animal Health Strategy for the European Union (2007-2013) where "Prevention is better than cure"*. [Online]. European Commission. Available from: http://ec.europa.eu/food/animal/diseases/strategy/docs/animal_health_strategy_en.pdf.

European Commission (2011). *The New Animal Health Strategy*. [Online]. European Commission. Available from: http://ec.europa.eu/food/animal/diseases/strategy/index_en.htm.

European Union (2006). "Community Guidelines for State Aid in the Agriculture and Forestry Sector 2007 to 2013". *Official Journal C*. 319 (01/2006). [Online]. Available from: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2006:319:0001:0033:EN:PDF.

European Union (2009). "2009/470/EC: Council Decision of 25 May 2009 on expenditure in the veterinary field". *Official Journal L*. [Online]. 155 (18/06/2009) p. 0030-0045. Available from: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:155:0030:01:EN:HTML.

Eurostat (2011). *Eurostat Web site*. European Commission. [Online]. Available from: http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/.

FAO, OIE and WHO. (2010). *The FAO-OIE-WHO Collaboration: A Tripartite Concept Note*. [Online]. World Health Organisation. Available from: http://www.who.int/foodsafety/zoonoses/final_concept_note_Hanoi.pdf.

Farm Animal Welfare Council (2008). *Opinion on Policy Instruments for Protecting and Improving Farm Animal Welfare*. [Online]. Farm Animal Welfare Council. Available from: http://www.fawc.org.uk/pdf/policy-instr-081212.pdf.

Foreign Affairs and International Trade Canada (2011). *Text of the North American Free Trade Agreement (NAFTA)*. [Online]. Foreign Affairs and International Trade Canada. Available from: http://www.international.gc.ca/trade-agreements-accords-commerciaux/agr-acc/nafta-alena/texte/index.aspx?view=d.

Food Chain Evaluation Consortium (2006). Evaluation of the Community Animal Health Policy (CAHP) 1995-2004 and alternatives for the future: Final Report – Part II: Pre-feasibility study on options for harmonised cost-sharing schemes for epidemic livestock diseases. [Online]. European Commission. Available from: http://ec.europa.eu/food/animal/diseases/strategy/main_report_part2_en.pdf.

Franz, A. and L. Theuvsen (2007). "The Role and Success Factors of Livestock Trading Cooperatives: Lessons from German Pork Production". *International Food and Agribusiness Management Review*. Vol. 10, Issue 3. International Food and Agribusiness Management Association.

German Meat GmbH (2011). *Germany – a strong agricultural country*. [Online]. German Meat. Available from: http://www.german-meat.org/en/meat-germany/agriculture/.

German Ministry of Food, Agriculture and Consumer Protection (2009). *Sektorale Einkommensentwicklung der Landwirtschaft in Deutschland 2009*.

German Ministry of Food, Agriculture and Consumer Protection (2011a). *Agrarpolitischer Bericht 2011 der Bundesregierung*.

German Ministry of Food, Agriculture and Consumer Protection (2011b), *Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten 2010*.

Horst, H. S., M.P.M. Meuwissen, J.A. Smak, and C.C.J.M. Van der Meijs (1999). "The Involvement of the Agriculture Industry and Government in Animal Disease Emergencies and the Funding of Compensation in Western Europe". *Rev. sci. tech. Off. int. Epiz*. (*Scientific and Technical Review of the Office International des Epizooties*). 18/1. pp. 30-37. Wagenignen: Department of Economics and Management, Wageningen Agricultural University.

Huirne, R. B. M., M.C.M. Mourits, F Tomassen, J.J. de Vlieger, and T.A. Vogelzang. (2002). *Past, Present and Future Situation of Foot and Mouth Disease: On the Preservation and Control of Foot and Mouth Disease Epidemics*. Agricultural Economics Research Institute (LEI). Wageningen University, the Netherlands, Report 6.02.14.

Knutson, Ronald D. and Rene F. Ochoa (2007). *Status of Agrifood Regulatory Coordination under the North American Free Trade Agreement*. ECLAC Series and Perspectives. Washington: ECLAC.

Mahul, O. and C. J. Stutley (2010). *Government Support to Agricultural Insurance: Challenges and Options for Developing Nations, World Bank.* [Online]. World Bank. Available from: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2010/04/07/000333037_20100407020856/Rendered/PDF/538810PUB0Gove101Official0Use0Only1.pdf.

MERCOSUR (2011). *MERSOCUR*. [Online]. Available from: http://www.mercosur.int/.

Melyukhina, O. (2011). "Risk Management in Agriculture in The Netherlands". *OECD Food, Agriculture and Fisheries Working Papers*. No. 41, p. 68. OECD Publishing.

Mourits, M. C. M. *et al*. (2008). "Veterinary and Phyto-Sanitary Policies". In: Silvis, H., A. J. Oskam and G. Meester (eds.). *EU Policies for Agriculture, Food and Nature; From Policy to Practice*. Wageningen: Wageningen Academic Publisher. pp. 175-89.

NAFTA (2011). *Decisions and Reports*. [Online]. NAFTA. Available from: http://www.nafta-sec-alena.org/en/DecisionsAndReports.aspx?x=312.

Neumann, G. B. and R. C. Keogh (2006). "Managing the Risk and Impacts of Animal Disease in the Australian Livestock Sector". In: Koontz, S. R., D. L. Hoag and D. D. Thilmany (eds.) *The Economics of Livestock Disease Insurance*. Cambridge, MA: CABI Publishing. pp. 145-157.

New South Wales Government (2008). *Summary of the 2007/8 Equine Influenza Outbreak*. [Online]. New South Wales Government. Available from: http://www.dpi.nsw.gov.au/agriculture/livestock/horses/health/general/influenza/summary-of-the-200708-ei-outbreak.

OECD (2011). Managing Risk in Agriculture: Policy Assessment and Design. OECD Publishing.

OIE (2006). *Immediate notification report*. Ref. OIE 4803, 6 Apr 2006, Country: Germany.

OIE (2009). *Follow-up report No. 1*. OIE Ref. 7684, 14 Jan 2009, Country: Germany.

OIE (2010). *Immediate notification report*. Ref. OIE 10089, 23 Dec 2010, Country: Germany.

OIE (2011a). *About Us*. [Online]. World Organisation for Animal Health. Available from: http://www.oie.int/index.php?id=53#c202.

OIE (2011b). *Animal Health in the World*. [Online]. World Organisation for Animal Health. Available from: http://www.oie.int/animal-health-in-the-world/.

OIE (2011c). *International Standard Setting*. [Online]. World Organisation for Animal Health. Available from: http://www.oie.int/international-standard-setting/overview/.

OIE HandiSTATUS Interface (2011). *Annual Animal Disease Status*. [Online]. World Organisation for Animal Health. Available from: http://web.oie.int/hs2/zi_pays.asp?c_pays=10&annee=2002.

OIE WAHID Interface (2011). *World Animal Health Information Database (WAHID) Interface*. [Online]. World Organisation for Animal Health. Available from: http://web.oie.int/wahis/public.php?page=home.

Sparling, D. and J. Caswell (2006). *A NAFTA Approach to Animal Health and Biosecurity: Pipe Dream or Possibility?* Agrifood Regulatory and Policy Integration Under Stress. College Station, Texas: Texas A&M University, pp. 109-133. [Online]. Available from: http://naamic.tamu.edu/sanantonio/sparling.pdf

Sparling, D (2010). "Background report on risk management in Canadian agriculture". OECD Thematic Review on Risk Management in Agriculture. Unpublished internal report.

Standard and Trade Development Facility (2011). *What We Do*. [Online]. Standard and Trade Development Facility. Available from: http://www.standardsfacility.org/en/AUWhatWeDo.htm.

Statistics Canada (2011a). *Production of Poultry Meat*. [Online]. Available from: http://www.statcan.gc.ca/pub/23-015-x/2011002/t001-eng.htm.

Statistics Canada (2011b). *Direct Payments to Agriculture Producers*. [Online]. Available from: http://www.statcan.gc.ca/pub/21-015-x/2011001/tablesectlist-listetableauxsect-eng.htm.

Stephen, Bruce and T. Epps (2006). "Livestock Industry Insurance: Canada". In: Koontz, S. R., D. L. Hoag and D. D. Thilmany (eds.) *The Economics of Livestock Disease Insurance*. Cambridge, MA: CABI Publishing. pp. 158-63.

Ritz, G. (2011). *Regulations Amending the Compensation for Destroyed Animals Regulations*. [Online]. Canada Gazette. Available from: http://www.gazette.gc.ca/rp-pr/p2/2011/2011-03-30/html/sor-dors73-eng.html.

van Asseldonk, Marcel A. P. M. *et al.* (2006). "Public and Private Schemes Indemnifying Epidemic Livestock Losses in the European Union: a Review". In: Koontz, S. R., D. L. Hoag and D. D.

Thilmany (eds.) *The Economics of Livestock Disease Insurance*. Cambridge, MA: CABI Publishing. pp. 115-25.

van Horne, P., M. van Asseldonk and R. Bergevoet (2011). *Verzekeren van broedeieren bij een uitbraak van vogelgriep*. Den Haag: LEI, onderdeel van Wageningen UR.

World Bank, FAO, International Food Policy Research Institute, and OIE (2006). *Enhancing Control of Highly Pathogenic Avian Influenza in Developing Countries through Compensation*. [Online]. World Bank. Available from: http://siteresources.worldbank.org/INTARD/Resources/HPAI_Compensation_Final.pdf.

World Health Organization (2011a). *Strong Intersectoral Partnership in Health*. [Online]. World Health Organisation. Available from: http://www.who.int/foodsafety/about/Flyer_zoonoses.pdf.

World Health Organization (2011b). *Zoonoses and veterinary public health (VPH)*. [Online]. World Health Organization. Available from: http://www.who.int/zoonoses/en/.

World Trade Organisation (2011). *Understanding the WTO Agreement on Sanitary and Phytosanitary Measures*. [Online]. World Trade Organisation. Available from: http://www.wto.org/english/tratop_e/sps_e/spsund_e.htm.