

## *Chapter 1*

### **Farmer and public roles in livestock disease management**

*This chapter sets out the roles of private producers and government to prevent and control animal disease based on the OECD framework for risk management in agriculture. It then introduces key issues of aligning farmer incentives with public objectives as these relate to animal disease risks.*

Livestock disease management is increasingly important given the concentration of livestock production, and the large volumes of cross-border trade of agricultural products, international travel, and the recognition that many diseases pose threats to humans and wildlife. The economic impact of infectious animal disease outbreaks can be enormous. The World Organisation for Animal Health (OIE, 2014) estimated that disease could reduce food output by more than 20% worldwide and create significant risks for human health and animal welfare. More than 75% of emerging diseases are classified as zoonotics – animal diseases that can be transmitted to humans, while the nature of some other emerging diseases remains uncertain. Livestock epizootics may threaten the economic well-being of farmers and ranchers, safety and viability of the food production system, valuable wildlife resources including endangered species, and human health (Cleaveland et al., 2001; Daszak et al., 2000).

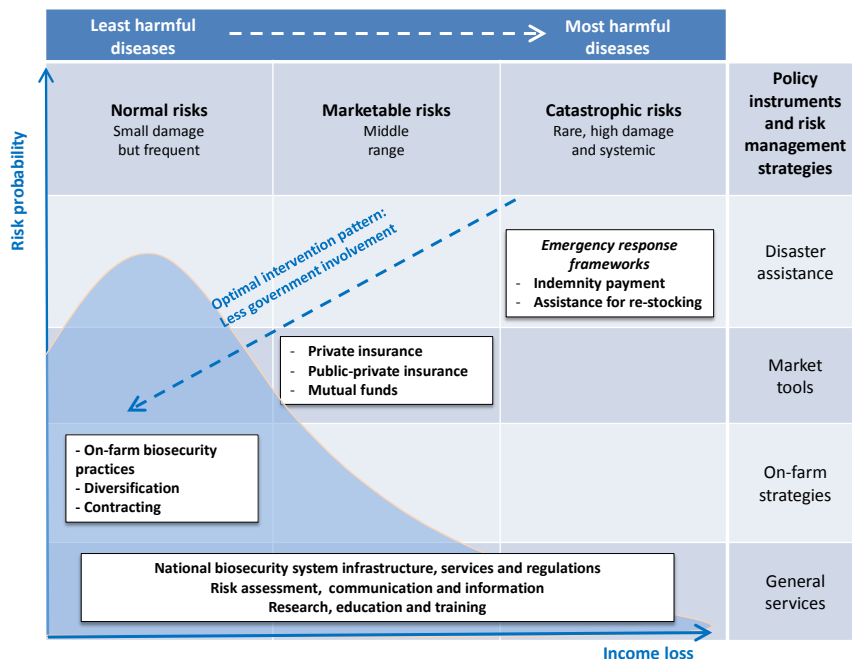
Disease is inherent to animal production and a major concern for farmers with livestock. Although significant economic losses from animal diseases would be greater if not for farm management efforts, producers are unlikely to voluntarily take into consideration all the social costs that disease can have on livestock, wildlife and humans. Disease outbreaks in livestock have repercussions up and down the supply chain. For example, trade losses are of prime importance when considering the economic impact of infectious disease. Private farm disease management behaviour may therefore lead to externalities and a rationale for government intervention (Sumner et al., 2005).

The OECD framework for management of risk in agriculture helps to clarify the roles of private producers and government in risk management (OECD, 2011). This framework classifies risks depending on their probability of occurrence and economic impact (Figure 1.1). Three layers are distinguished: high frequency – low damage normal risks; low frequency – high damage catastrophic risks; and marketable risks with intermediate levels of frequency and damage. A key idea is that a differentiated policy response is required across these risk layers. “Normal” risks should remain the responsibility of the farmer. “Marketable” risks can potentially be managed through market tools, such as insurance, and require institutions for risk sharing – these can be fully private or with public participation. Catastrophic risks are beyond the capacity of individual farmers to cope with. They generate significant negative externalities, and governments are expected to provide assistance.<sup>1</sup>

A challenge for policy makers is to establish an optimal pattern of policy intervention by delineating the different risk layers. This delineation is particularly relevant for catastrophic risks because societies will expect government action with respect to such risks. In the area of animal disease, the frontier of catastrophic risk is relatively explicit due to the formal classification of diseases into the most and least harmful at the international (the OIE) and national levels. All countries have lists of harmful organisms for animals, with the most harmful groups effectively delimiting the catastrophic risk. Such groups are commonly termed “notifiable” animal diseases. Due to the strong cross-border and externality aspects of disease risks, they are the responsibility of national authorities and are governed by international regulations and/or regional biosecurity systems (e.g. within the European Union). The international dimension of animal disease risks is an additional factor that calls for well-developed formal frameworks to prepare for catastrophic risk management. In all countries, national governments have an explicit responsibility with regard to the most harmful organisms: verification of reports about suspected disease, ensuring the response to disease outbreaks through measures such as culling of animals, depopulation, restrictions on animal movement, and vaccination, as well as providing indemnities to farmers to ensure that disease is reported.

Some livestock disease risks can be shared through markets and lie within the “marketable” risk layer. Livestock disease insurance exists in EU countries (Germany, the Netherlands, Spain, Czech Republic, Estonia, Finland, Greece and Italy), Turkey, the United States, Chile, and Korea. These insurances can cover highly contagious notifiable diseases as well as others outside that group. While insurance is well developed for many types of business risks, it is more challenging when applied to livestock disease due to generally insufficient biological and epidemiological evidence, which in turn makes it difficult to estimate the scale and probability of a disease event. But governments can create the general conditions for the development and good operation of risk sharing markets. This could include a subsidy provision where there is a market failure (e.g. public-private insurance schemes or subsidised reinsurance), or some other type of facilitation (e.g. creation of information systems to help the “production” of insurance products).

Figure 1.1. Optimal pattern of risk strategies and policies in livestock disease management



Source: Adapted from OECD (2011).

The “normal” risk layer as applied to an animal disease can be associated with diseases that occur frequently but are not highly harmful. Farmers should be able to manage such risks individually by using on-farm biosecurity techniques, diversification of activity, and other means available to farm households. The government's primary role here should be to support private activity through general economic mechanisms, such as tax, credit or social safety nets. However, some diseases that present a “normal” risk may lead to government programmes, such as those for the eradication of certain endemic diseases.

Finally, governments have responsibilities that cross all risk layers. These are “general services” to enable national biosecurity systems to function as a whole, such as building and maintaining appropriate national veterinary systems for the prevention, control, monitoring of diseases, and supporting regulations. Publicly (co)funded research, risk assessment and communication are other cross-cutting functions of governments. Information is a key element in all risk layers, enabling the detection and evaluation of risks and is a crucial input to decisions of all parties involved in risk management, from government to farmers undertaking biosecurity, to private insurance providers and the food industry. Governments can also be expected to participate in providing training and education that support the whole continuum of animal disease management. However, the boundary between public and non-public provision of such services is intrinsically movable and depends on the nature of the activity, which is not static. Thus, there may be a rationale for collective action by industry in these areas, which can often be undertaken in partnership with governments (Chapter 4).

Farmers are the primary decision-makers and first-incidence parties with respect to animal disease at all layers of risk featured in this framework. This report continues previous OECD work on agricultural risk management by taking a micro-economic perspective that focuses on the incentive-compatible livestock disease management policy. The objective is to examine: a) decision-making by individual farmers with respect to livestock disease prevention and control; and b) relate farmer incentives for animal disease prevention and control to public policies.

This micro-perspective opens a range of issues in animal disease management policy that fall under the broad problem of the compatibility of private incentives with public objectives. Farmers have obvious

incentives to prevent livestock diseases due to their negative effects on farm income, farm asset value, and even the viability of the farm enterprise itself. Farm managers take measures against the introduction of diseases and to mitigate the effects of diseases that are present. A rational profit-maximising farmer will invest in disease prevention up to the point where the marginal private benefit from prevention is equal to marginal costs. From a social optimum perspective, even a fully informed farmer may rationally underinvest in disease prevention. Moreover, farmers do not have perfect information when making their decisions: they are uncertain about the trade-off between marginal benefit (avoided loss) and marginal cost of such investment. The financial consequences associated with farm biosecurity and disease reporting are crucially important. Individual farm disease risk can have negative local externalities and may affect the whole livestock industry and food chain, consumer well-being, and human health. It is difficult to perfectly monitor the actions taken by farms to control a disease. There are risks of moral hazard where the government has a role to regulate and monitor the activities of the different actors in the food value chain (Rushton, 2009). Furthermore, decisions by farmers are in reality more complex than those described by traditional economic rationality. Other values and motivations, farmers' ability to process information and build knowledge, their habits and social connections are also factors in their decisions. Finally, farmers are part of groups that have a common interest in many areas of livestock disease management, which creates a rationale to act collectively.

This report synthesises the economics, veterinary, and epidemiology literature that examines these aspects. The country experiences are also analysed to identify the policy implications for incentive compatible farm disease management decisions.

The review proceeds as follows. Chapter 2 considers farm decisions from a viewpoint of standard economic rationale. Various aspects related to farmer decisions and policy incentives are considered, including the trade-off between the economic costs and benefits of disease management, the presence of risk, information asymmetries, and farm size. Chapter 3 extends the perspective beyond the conventional economic rationale and introduces a behavioural economics approach to farmer decision making. It examines how broader values, perceptions, “important others”, and social norms influence farmers' decisions. Chapter 4 considers influences and actors beyond the farm, including the role of farmer collective action and other participants in the food value chain. It also looks at the impact that wildlife reservoirs and vectors may have on farm management decisions. Each of these chapters concludes with the implications for animal disease policy. Although each chapter takes a specific perspective on farmer behaviour, there is certain overlap and interdependency among and across these topics. The report concludes with the livestock disease policy experiences in Australia (Chapter 5), Chile (Chapter 6) and Korea (Chapter 7).

### *Note*

1. This framework is an ideal representation of the public and private roles in animal disease management and does not intend to capture the complexity of real-world policy situations. Actual government policy responses may differ from the preferred pattern set out below, reflecting the multitude of influences such as the country's political settings, policy path dependency, and institutional specificities and constraints. The case studies for Australia, Chile, and Korea illustrate such variations in actual patterns of policy responses to animal disease risks.

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