

Report in Focus

HEALTHY ANIMALS, HEALTHY CANADA

The well-being of animals, humans, and the environment are intrinsically linked – when one is at risk, the others will be affected. Not only can some diseases with animal origins cause disease in humans – as in the case of severe acute respiratory syndrome (SARS), bovine spongiform encephalopathy (BSE), and the H1N1 virus – but many animal diseases can also have major economic consequences. The SARS outbreak of 2003 is estimated to have cost the Toronto economy close to \$1 billion, for example, while the BSE scare of the same year cost Canada close to \$6 billion. There are also foreign animal diseases, such as foot-and-mouth disease, which can spread among wildlife and domestic animal populations, upsetting local ecosystems and causing economic losses to animal industries.¹

Animals are frequently shipped between nations for trade purposes. There is a risk that a disease can be brought into Canada if imported animals are infected or are carriers. To guard against this possibility, the disease risks associated with animal imports must be fully evaluated. In addition, it is important to understand the risks of emerging diseases within Canada, and how these may affect humans, animals, and the environment.

By understanding the *potential for* and *consequences of* a disease, governments, industries, and other stakeholders can better position themselves to take the necessary steps to mitigate the risk. Animal health risk assessment is a key tool that can be used for this purpose.

WHAT IS A RISK ASSESSMENT?

It is a structured, systematic process to determine the likelihood of the occurrence of an event and the likely magnitude of the consequences following exposure to a hazard. (Note: although risk assessment employs scientific data, it is not strictly a scientific process.)

Canada's needs in animal health risk assessment are changing. Increased global trade and migration, higher population densities, climate change, and other developments all affect the nature of risks to animal and human health. The pace of these changes, the growing interconnectedness of so many risks and consequences, and the potential impact of various mitigation strategies, make the process of assessing and managing risks increasingly complex.

CONSEQUENCES OF ANIMAL HEALTH EVENTS

An **animal health event** can have consequences well beyond the illness of the animals involved. An outbreak of an infectious disease may result in trade embargoes; a culling of animals with major economic consequences; and human health effects. These are often referred to as the **direct consequences** of an animal health event.

The ripple effects of a disease may extend further, to what may be considered **indirect consequences**.

For example, farmers may feel guilty because their animals have caused significant human illness or because the public sees them as responsible; the behaviour of a community may be altered by the requirements of a disease; and there may be job losses, decreases in income, losses in tax revenue, and increases in health care costs.

Whether a consequence is direct or indirect will depend on the nature of the animal health event.

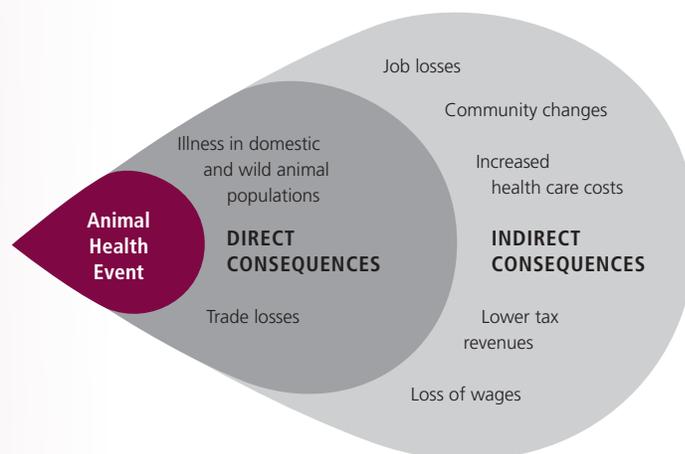


Figure 1: Examples of Consequences of Animal Health Events

Animal health risk assessment can be most effective as a tool for decision-making when undertaken in the context of an integrated, multidimensional approach (IMDA).



Responding to the Question

The Canadian Food Inspection Agency (CFIA) has the federal responsibility for conducting animal health risk assessments in Canada. To adapt to Canada's changing needs, the Minister of Agriculture and Agri-Food, on behalf of the CFIA, approached the Council of Canadian Academies (the Council) to examine:

“the state and comprehensiveness of risk assessment techniques in animal health science, specifically pertaining to risks which may impact human health.”

In response to this question, the Council assembled a multi-disciplinary panel of 12 experts from Canada, the United States, and the United Kingdom. This Expert Panel was chaired by Dr. Alastair Cribb, Professor and Dean of the Faculty of Veterinary Medicine at the University of Calgary. The Panel's report is based on a review of academic literature, risk assessment frameworks, policy reviews, and risk assessments; interviews with representatives from government, industry, and academia; and the Panel's expertise.

KEY DEFINITIONS:²

Emerging Diseases – A disease that is new to a population or is increasing in prevalence in an area where it may have existed before to a much lesser extent.

Zoonotic Diseases – A disease that is common to both animals and humans. Zoonotic diseases result from infectious agents (e.g., bacteria, viruses, prions, protozoa, or parasites). These diseases may be carried by animals but they are able to infect humans or to evolve from an animal disease into one that can have sustained human-to-human transmission.

Multiple Criteria Decision Analysis – A tool that supports decision-making by providing a structured framework for integrating many different types of input on a multi-faceted question or problem, and showing the relative weight of each of the inputs in a transparent way.

KEY FINDINGS

Through the assessment process, the Panel found that Canada is well-equipped to meet the needs of importation and international trade obligations. The Panel also determined that adopting an integrated, multidimensional approach (IMDA) to risk assessment would help to serve both these areas and the broader goals of risk assessment – that is, to better inform decisions about current risks, emerging threats, and optimal risk management strategies. Such an approach could be achieved through moving in the following directions:

Consider a broader range of consequences – To fully comprehend a risk, it is necessary to first understand the full range of important consequences that could result from it. Currently, many risk assessments conducted by the CFIA largely focus on trade implications and animal health. Where necessary, human health consequences are assessed by the Public Health Agency of Canada. Considering a broader range of consequences, however, such as changes in communities and environmental consequences, could better reflect the “real costs” of animal disease outbreaks (see Figure 1). So too could a more integrated assessment of risks to animals, humans, and the environment.

Recognizing the time and resource constraints under which the CFIA and other organizations involved in animal health risk assessment operate, and the broad range of potential consequences of an animal health event, the Panel acknowledges that it is not possible to consider all potential consequences in each and every risk assessment. It maintains however, that the selection of consequences should be carried out in a systematic fashion with decisions on which consequences to include or exclude reported in a transparent way. Moreover, the Panel proposes that the direct and indirect outcomes of management options form part of these considerations in the risk assessment process.³

Expand access to expertise – Consideration of a broad range of consequences requires access to a wide range of expertise. Three approaches that could help expand the current expertise in animal health risk assessment are (i) to increase access to wider training opportunities for risk assessors and managers, (ii) to facilitate more applied animal health research targeted at the interface between animal and human health, and (iii) to integrate more tools and methodologies from other fields into the risk assessment process. Each of these three initiatives would allow risk assessors to benefit from advancements made in a variety of fields (see the box on right), thereby keeping the discipline of animal health risk assessment in Canada on the cutting edge.

Widen stakeholder consultation – Stakeholder consultation contributes to informed and responsive risk management decisions. Stakeholder involvement in the risk assessment process can also facilitate the uptake of risk management decisions, many of which are ultimately implemented by stakeholders in the field.

Currently, stakeholders who request a risk assessment (typically, importers or government agencies) are consulted at the beginning and end of the process. Consulting a wider group in a structured way at key points throughout the process, can result in a more comprehensive understanding of the risks and potential impacts of various management strategies. As illustrated by the experiences of agencies such as the U.K. Human Animal Infection and Risks Surveillance group, and as urged in policy reviews such as the National Research Council *Science and Decisions* report, there are ways to integrate stakeholder input without threatening the scientific integrity of the risk assessment process or jeopardizing the timelines for assessment completion. Again, the key is to have an established, structured process in place for making this happen.

Enhance transparency of decisions – For stakeholders to have effective input into risk assessments, the process itself must be as transparent as possible. Widening consultation is one element of improved transparency; making the results of risk assessments public is another. As it stands, the majority of risk assessments conducted by the CFIA remain confidential. But it may be possible to make more risk assessment documents publicly available, as is the case in other countries such as Switzerland and the United Kingdom.

Transparency is enhanced by a clear recording of the decisions made in the context of a risk assessment. Using a multiple criteria decision analysis approach, or a similar framework, would facilitate documentation of all decisions made and preserve that information for use in subsequent risk assessments.



POTENTIAL DISCIPLINARY CONTRIBUTIONS TO ANIMAL HEALTH RISK ASSESSMENT

Tools and methods from a range of fields can contribute to animal health risk assessment. Examples include:

- **Economics:** Econometrics and cost-benefit analysis can be applied to determine the economic consequences of animal health events and risk management options.
- **Social sciences:** Community case studies and social theory can help to better understand the psycho-social consequences of animal health events.
- **Engineering:** multiple criteria decision analysis provides a useful framework for conducting risk assessments in the animal health context.
- **Ecology/environmental science:** Simulation models and environmental impact studies can assist in understanding the interconnections between animals, humans, and the environment.

Institute Structured Prioritization – Resources available for conducting risk assessments will always fall short of the potential risks that could be assessed. In practice, this means resources are often consumed by the assessment of immediate threats, which limits the ability to conduct research into long-term threats.

The Panel's emphasis on putting a structured system in place to prioritize risk assessments while, at the same time, setting aside dedicated resources for research into future risks would contribute to both timely completion of ongoing day-to-day assessments (e.g., import risk assessments, regulatory reviews, and immediate threats) and effective planning for future needs through foresight assessments (e.g., strategic assessments of potential future threats and plans for mitigation strategies).

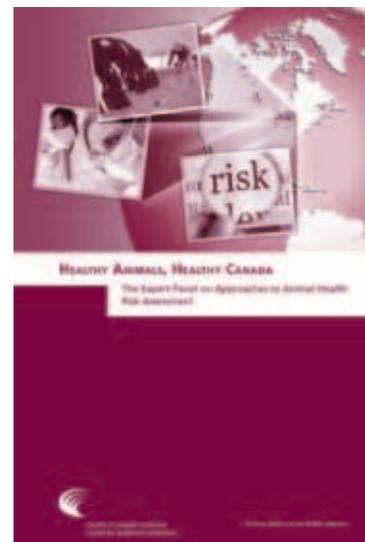
An integrated, multidimensional approach is not inconsistent with Canada's international obligations and guidelines relating to animal health risk assessment. Some of Canada's major trading partners have already adopted aspects of this approach. For more information visit www.scienceadvice.ca/en/animal-health.aspx.

Inside the Full Report

- Insights on the current practice of animal health risk assessment in Canada.
- Key directions for implementing an integrated, multidimensional approach to animal health risk assessment.
- Results of the Panel's surveys of practitioners, researchers, and surveillance organizations involved in animal health risk assessment.
- Discussion of how multiple criteria decision analysis, and other tools and best practices, can enhance animal health risk assessment in Canada and other countries.

Also available at www.scienceadvice.ca/en/animal-health.aspx:

- *Animal Health Risk Assessment Training Trends in Canadian and International Veterinary Colleges* – a benchmarking survey of course offerings in animal-human health risk assessment in veterinary colleges.
- *Bibliometric Analysis of Research Contributing to Animal Health Risk Assessment* – an assessment of how Canada's research output in animal health risk assessment science and the human health consequences of animal health events compares to other countries.



Endnotes

- ¹ The Conference Board of Canada, *The Economic Impact of SARS* (2003); V. Mitura and L. Di Piéto, Canada's Beef Cattle Sector and the Impact of BSE on Farm Family Income 2000-2003 (Statistics Canada, Agriculture Division, 2004); and Fredrick A. Leighton, "Foreign Animal Diseases and Canadian Wildlife: Reasons for Concern and the Elements of Preparedness," *Canadian Veterinary Journal* 43, 4 (2002).
- ² Sources for the Key Definitions include World Health Organization, "Emerging Diseases," http://www.who.int/topics/emerging_diseases/en/, accessed on 26 April 2011; and Report of the Expert Panel on Approaches to Animal Health Risk Assessment: Healthy Animals, Healthy Canada.
- ³ With respect to the consideration of management options, see, for instance, National Research Council, *Science and Decisions: Advancing Risk Assessment* (2009).
- ⁴ The Human and Animal Infections and Risk Surveillance Group (HAIRS), *HAIRS First Report, 2004-2007* (Health Protection Agency, 2008); A.L. Walsh and D. Morgan, "Identifying Hazards, Assessing the Risks," *Veterinary Record* 157, 22 (2005); and National Research Council, *Science and Decisions: Advancing Risk Assessment* (2009).
- ⁵ See the websites of the Department for Environment, Food, and Rural Affairs (DEFRA) for the United Kingdom and the Federal Veterinary Office (FVO) for Switzerland.

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This Report in Focus was prepared by the Council based on the Report of the Expert Panel on Approaches to Animal Health Risk Assessment.