# Biosecurity in Australian agriculture

*Murray and Koob argue that to cope with emerging and re-emerging pest and disease risk a multi-disciplinary approach is essential supported by an educated and aware community*


## Abstract

Australian agricultural industries and the environment are relatively free from pests and diseases. Risks include increasing international passenger, mail and cargo traffic, and new and emerging diseases and diseases carried by migratory animals. These increase the likelihood of the introduction of exotic pests, diseases or weeds. The analysis and management of current and emerging risks requires a multidisciplinary approach. Biosecurity management in Australian agriculture is based on a partnership between industry, governments and the community, and is part of a nationally integrated agricultural health system. Australian agricultural emergency management is based on the concepts of graded emergency responses, an all-hazards approach to preparedness, and flexibility in planning.


## Introduction

The relative freedom from pests and diseases of Australian agricultural industries and the environment is of great importance to the Australian trade and the country's way of life. Therefore, Australia has maintained a conservative, but not a zero-risk approach (JCPAA, 2003), to managing biosecurity risks, consistent with World Trade Organisation membership obligations. Australia's biosecurity risks are mitigated by a variety of measures including policies on imported commodities, pre-border activities and border controls, biosecurity plans, enterprise and industry level programs, and post-border surveillance, preparedness and incursion management (Biosecurity Australia, 2003).

Australian biosecurity management has evolved through continual improvement into its current form over many years. The objective of biosecurity is to aid safe, efficient production in Australia's plant and animal industries, to protect public health and to conserve its flora and fauna, in order to contribute to improved national economic and social welfare (Commonwealth of Australia, 1988).

Our favourable animal and plant health status provides benefits to public and environmental health and serves to underpin export trade. Incursions of pests and diseases such as foot-and-mouth disease, Asian Gypsy Moth or Eucalyptus Rust would, variously, severely endanger our international trading position, erode consumer confidence and impact on the private sector.

## Risk, uncertainty and our changing strategic context

Unlike a fictional Douglas Adams character we cannot "demand rigidly defined areas of doubt and uncertainty" (Adams, 1979). Not only do we live in a world of risk, the fabric of risk is ever changing and uncertain.

External risks include increasing international passenger, mail and cargo traffic, diseases carried by migratory species, that in combination, cause a greater likelihood of the introduction of exotic pests, diseases or weeds. More intensive agricultural practices favour the possibility of rapid disease and pest spread (such as with foot-and-mouth disease in the UK in 2001). Diseases can also be introduced by migratory birds and spread by wildlife. New emerging diseases, such as Bovine Spongiform Encephalopathy (BSE or mad cow disease), and strains of animal pathogens (such as Highly Pathogenic Avian Influenza) add significant challenges to the task of ensuring biosecurity.

Endemic risks include the emergence of new diseases, such as Hendra virus that first occurred in the world in Queensland in 1994 killing 16 horses and two people; and Australian Bat Lyssavirus, both of which have been found to be endemic in Australian flying fox populations (Mackenzie et al, 2003).

Emerging and re-emerging risks in agriculture are global issues of direct relevance to Australia and include some well-publicised public health problems associated not only with production animals, but also wildlife and companion animals. Zoonotic diseases that have challenged countries in the region include Avian influenza, BSE, Nipah Virus, Severe Acute Respiratory Syndrome (SARS), Menangle Virus, Japanese Encephalitis, Brucella canis and Leishmaniasis, to name a few (Biddle & Murray, 2004).

Avian influenza (also called 'bird flu') is an infectious disease of birds caused by influenza virus type A strains. Highly pathogenic avian influenza, the H5N1 subtype, has crossed the species barrier from birds to humans three times since 1997. These human infections

can produce severe and often fatal consequences. Although currently a direct threat only to farm workers and those who have close contact with birds, it is possible that the virus may acquire the ability to spread from person-to-person, with the potential to trigger a global influenza pandemic.

Foodborne illnesses caused by Escherichia coli 0157:H7, Campylobacter, and so on have also caused serious problems, with costs associated with such illnesses in Australia estimated at over $1.67 billion a year (Food Science Australia & Minter Ellison Consulting, 2002). Antibiotic resistance poses potential risks to the human population and animal production, and issues associated with gene technology development also pose challenges to biosecurity.

The changing nature of risk is set against a background of a shifting strategic context in natural resource management, sustainable development and consumer expectations.

Consumers, both domestic and international, demand agricultural produce that is both nutritious and safe, with minimal chemical residues and minimal suffering of animals. Not only are we becoming more concerned about safety, but we are also concerned that agricultural production does not impinge on other values, such as the welfare of animals (DAFF, 2004c). Food is the most sensitive of consumer commodities and the Australian 'clean and green' image allows us to market premium produce overseas. A greater emphasis is also being laid on protecting the natural environment, and the long-term sustainability of agricultural production.

These demands require a rigorous approach based on scientific risk assessment, and a multidisciplinary approach to risk management. Current and future biosecurity management must continue to balance more varied and intensive agricultural production with changing consumer and trading partner interests, public health, and environmental management. It must also include the application of new technologies to deal with new risks.

Globalisation has not only changed the nature of risk to agriculture, but has also provided the opportunity for strategic alliances outside our borders for risk management. The results of such alliances include:

- the South-east Asia Foot-and-Mouth Disease (SEAFMD) campaign, lead by Australia with Cambodia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand and Vietnam, participating to control and eventually eradicate FMD;
- building the capacity of south Pacific countries to detect and manage pests and diseases;
- providing training opportunities to SE Asian personnel to assist in combatting avian influenza;
- the International Veterinary Reserve international agreement between Australia, Ireland, Canada, USA, New Zealand and the UK, to help veterinarians, laboratory diagnosticians, animal health technicians and emergency managers to combat an animal disease outbreak in any of these countries;
- sharing experience in the conduct of emergency exercises and simulations; and
- the use of Australian laboratories to provide diagnostic services for countries in the region.

## Risk analysis

Risk analysis frameworks are becoming more refined and are of critical importance to all aspects of biosecurity, such as quarantine, disease management, control and eradication. Economic analyses, cost-benefit analyses and assessing the effectiveness of alternative control strategies also inform judgements on resource allocation for these purposes.

For example, in 2001, the Productivity Commission researched "the economic and social cost of an outbreak of foot-and-mouth disease in Australia" (Productivity Commission, 2002). The Commission estimated the cumulative losses of export revenue could be over $9 billion, most losses being in the beef industry. They predicted a resulting oversupply of meat to the domestic market, depressing the price with a possible decline in domestic revenue of over $3 billion. Control and compensation costs were estimated to be $450 million for a large outbreak, and the cumulative loss to the national economy was forecast to be up to $13 billion in gross domestic product. This economic analysis provided direct evidence that significant resources should be applied to increasing border controls and animal disease response capacities.

Similarly, cost-benefit analysis was applied to the management of Wheat Streak Mosaic Virus (WSMV) when it was detected in a plant breeding facility in the ACT. WSMV affects wheat, barley, corn and perhaps other cereals, is spread by the Wheat Curl Mite, and is prevalent in North America, Eastern Europe and the Middle East. Scoping of the incident included a national delimiting survey to discover the distribution of the disease, which was found to be widespread. Following advice that the costs of eradicating the wheat virus would be greater than the likely benefits and evidence that WSMV had been established for some time without noticeable production losses under Australian conditions, it was decided to forego eradication.

Clearly the analysis and management of current and emerging risks such as these requires a multidisciplinary approach, with consideration being given to social, biological, ecological, and economic issues.

## Approaches to agricultural emergency management

In regard to agricultural emergency management, Australia has become committed to the concepts of:

- an all-hazards approach to preparedness;
- a comprehensive approach to risk assessment;
- flexibility in planning;
- implementation of biosecurity prevention measures;
- rapid detection and eradication; and
- whole-of-government and industry partnerships.

All emergencies are different, but the key to success in agricultural emergency response is rapid detection and investigation. Millions of dollars can be saved in pest and disease control, and damage to our markets and reputation, through application of effective disease eradication responses. Investigation of an agricultural emergency not only requires rapid diagnosis and epidemiological research, but determination of the possible social, economic and environmental impacts. When it is determined that a pest or disease is a significant problem, deployment of human and physical resources must be swift. Those that are found to be endemic, and not amenable to eradication, should be managed to limit the impact of the disease or pest.

The resourcing of emergency responses must be commensurate with the possible consequences of the emergency. Where there is suspicion or confirmation of a highly contagious disease that may have serious consequences, such as FMD, mobilisation of resources must be rapid, and action may be draconian. Where, in the investigation phase of a response, it appears that the pest or disease will not have serious consequences, fewer resources are applied until investigations prove the need is otherwise. Procedures for rapidly escalating and scaling down responses are therefore needed.

Responsibility for biosecurity is dispersed across governments and industry, so whole-of-government and industry partnerships are needed. Such partnerships are evident in:

- SAFEMEAT—a partnership between the Australian meat and livestock industry and State and Australian governments to oversee and promote sound management systems in food safety from farm to plate;
- Memorandum of Understanding—National Response to a Foot-and-Mouth Disease (FMD) Outbreak—an agreement between the Australian Government and State/Territory governments to guide cooperative national measures for handling an FMD outbreak; and,
- Government and Livestock Industry Cost Sharing Deed in respect of Emergency Animal Disease Responses—an agreement between Australia's governments and livestock industries to ensure a rapid and efficient response to emergency animal disease outbreaks.

Even though specific countermeasures will vary with different pests and diseases, it is desirable to establish a single, scalable set of management arrangements capable of encompassing all agricultural emergencies. To this end, a consistent set of arrangements have been developed for animal, aquatic animal, plant and marine pest emergencies. AUSVETPLAN (Animal Health Australia, 2004), the Australian Veterinary Emergency Plan, was developed over a decade ago and continues to evolve in line with our changing risk pattern and strategic environment. Emergency arrangements in the other sectors are also evolving to meet the needs of those sectors. Underpinning these arrangements are:

- State and Territory government emergency plans;
- Australian Government Agricultural Emergency Plan (DAFF, 2004a)—a plan to co-ordinate Australian Government agencies in the event of agricultural emergencies;
- Guidelines for Local Government for Agricultural Emergencies (DAFF, 2004b)—strategies for local government in managing agricultural emergencies, covering risk assessment as well as emergency prevention, preparedness, response and recovery; and
- the DAFF Critical Incident Response Plan—the Australian Government Department of Agriculture, Fisheries and Forestry's internal emergency plan.

A key point in these emergency arrangements is flexibility. The plans are not rigid structures that must be adhered to, but are agreed principles for making decisions, organising resources and sharing information.

The comprehensive approach the Australian Government takes to managing agricultural risks and emergencies consists of the following components:

- co-ordination—mechanisms to ensure the integration of national whole-of-government and industry decision-making;
- communication – timely information exchanged before, during and after emergencies, between governments and government agencies, with industry and with the community – this includes comprehensive community education;
- risk assessment—systematic identification and analysis of hazards, exposures and vulnerabilities;
- knowledge management—gathered, stored, accessible and applied information;
- legislation—supporting laws and regulations;

- resourcing—adequately trained people, appropriate equipment and facilities, and necessary financial arrangements;
- surveillance, warning and alerting—systems for predicting, detecting, warning and alerting of potential emergencies;
- prevention/mitigation—regulatory and physical measures to ensure that risks are minimised, emergencies are prevented, or their effects mitigated, by working with neighbouring countries, conducting import risk analyses, and border and quarantine measures;
- emergency planning—emergency management-related policies, strategies, plans and procedures to enable a high level of readiness;
- assessment and training—personnel are able to perform their assigned tasks to accredited national competencies standards;
- emergency response—actions are rapidly taken in anticipation of, during, and immediately after an emergency to ensure that its effects are minimised;
- emergency recovery—the co-ordinated process of supporting emergency affected communities in the reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical well-being (Emergency Management Australia, 1996); and
- continuous improvement—enhancement of existing systems through exercising, auditing against performance standards, benchmarking and debriefing following emergencies.

## Conclusion

Biosecurity management in Australia is based on a multi-disciplinary partnership between industry, government and the community, and is part of a nationally integrated agricultural health system. The system is transparent to ensure consumer and market confidence and to meet WTO obligations and addresses public and environmental health issues. It has proven to be responsive not only to known disease and pest risks, but also to emerging risks, and is continually revised and improved. The future of biosecurity should include greater community participation, with government, industry and the community working together to prevent, detect and respond to threats to our biosecurity. This will require continued efforts to educate the community and our partners on risks to Australia's biosecurity.

## References


Adams, Douglas, 1979. *The Hitchhiker's Guide to the Galaxy: a Novel,* Harmony Books, New York

Animal Health Australia, 2004. *The Australian Veterinary Emergency Plan,* http://www.aahc.com.au/ausvetplan/index.htm, viewed 17 May 2004

Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), 2004a. *Australian Government Agricultural Emergency Plan*

Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), 2004b. *Guidelines for Local Government for Agricultural Emergencies*

Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), 2004c. *Australian Animal Welfare Strategy*

Biddle, R.R. & Murray, J.G.M., 2004. *The Global Importance of Veterinary Public Health—Planning for the Future*

Biosecurity Australia, 2003. *Import risk analysis handbook,* Agriculture, Fisheries and Forestry—Australia, Canberra

Commonwealth of Australia, 1988. *Australian quarantine—looking to the future: A Government policy statement* Australian Government Publishing Service, Canberra

Emergency Management Australia, 1996. *Australian Emergency Manual —Disaster Recovery,* Canberra

Food Science Australia & Minter Ellison Consulting, 2002. *National Risk Validation Project-Final Report*

Joint Committee of Public Accounts and Audit, 2003. *Review of Australia's Quarantine Function, Report* 394, The Parliament of the Commonwealth of Australia, Canberra

Mackenzie J.S., Field H.E. and Guyatt K.J., 2003. Managing emergency diseases borne by fruit bats (flying foxes), with particular reference to henipaviruses and Australian bat lyssavirus, *Journal of Applied Microbiology,* 94:1

Murray, J.G.M., 2004. *Veterinarians in Society—Some Future Directions*, Kendall Oration—AVA Conference May 2004

Productivity Commission 2002. *Impact of a Foot and Mouth Disease Outbreak on Australia,* Research Report, AusInfo, Canberra.

World Trade Organisation, 1995. *Agreement on the Application of Sanitary and Phytosanitary Measures,* World Trade Organisation website, http://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm, viewed on 26 May 2004.



Authors

Gardner Murray is the Executive Director of Product Integrity, Animal and Plant Health in the Australian Government Department of Agriculture, Fisheries and Forestry, and the Australian Chief Veterinary Officer. He was previously Executive Director of the Australian Quarantine and Inspection Service and of the Bureau of Rural Resources. He has extensive national and international experience in biosecurity issues including disease management, trade and developing international standards.

Peter Koob has worked in emergency management for 15 years. This work has included 11 years managing emergency planning for the Tasmanian State government; one year in the Division of Emergency and Humanitarian Action in WHO in Geneva; two years with Emergency Management Australia; and 18 months coordinating the development, conduct and evaluation of Exercise Minotaur. He specialises in risk management, emergency planning, training, and exercising.