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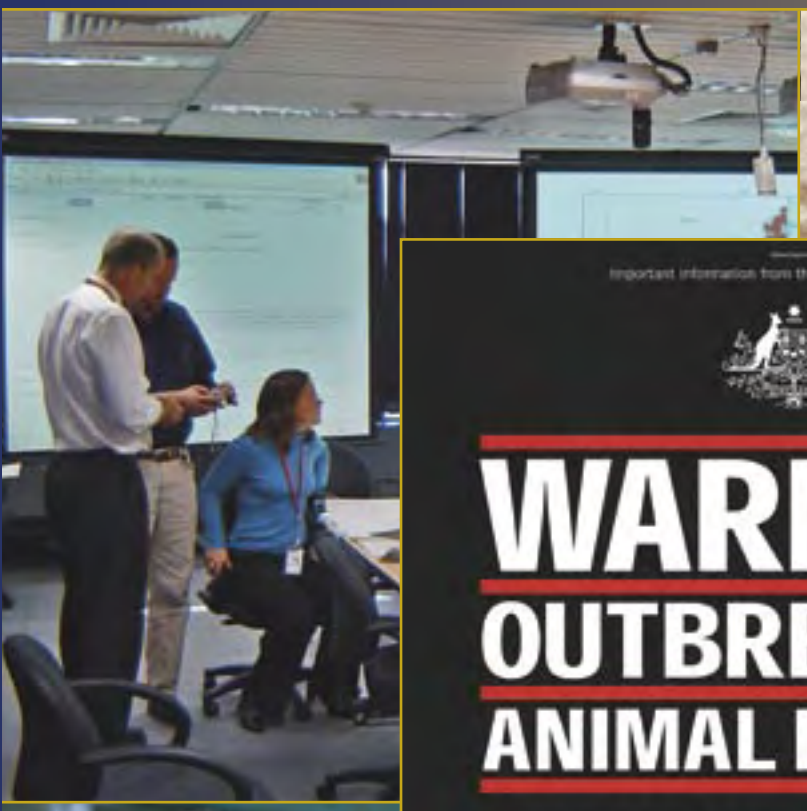
Australian agriculture – securing the future



Protecting Australia from agricultural pests and diseases

Communication practices during agricultural emergencies

SPECIAL EDITION
The role of government and industry in agricultural emergencies

EMA
'safer sustainable communities'

The Australian Journal of Emergency Management

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AJEM acknowledges the Australian Government Department of Agriculture, Fisheries and Forestry for supplying photos and images for this edition.

FOREWORD

Australian agriculture—securing the future

by Michael Taylor

It is a particular pleasure to be invited to write the foreword for *Australian agriculture—securing the future,* a special issue of the Australian Journal of Emergency Management on Australian agriculture. Over 550,000 Australians rely on agriculture for their living. The gross value of Australian farm production for this financial year is predicted to be over $35 billion, and the value of farm exports will be over $25 billion, or around 20 per cent of Australia's total exports.

Historically, we have had to deal with many animal and plant pest and disease emergencies affecting agriculture production and our trade. There have been associated human deaths. We have dealt with each of these incidents efficiently, effectively and successfully. Australia can be proud that it has established systems to protect its agriculture and environment, which are arguably among the best, if not the best, in the world.

As we become increasingly globalised, the risks to Australian agriculture multiply. We have recently witnessed a highly pathogenic strain of avian influenza sweep through southeast and east Asia, causing the destruction of tens of millions of poultry, devastation to the income of smallholders, and human deaths. Foot-and-mouth disease has caused serious damage in other countries, and rural people and the regions affected are still recovering. New diseases emerge and existing diseases are known to evolve over the years and more virulent strains, or strains that may suddenly directly harm people, are a clear and present risk.

The impacts of agricultural emergencies on industry, regions, consumer confidence, human health, the environment and trade can be very significant and are heightened if we don't detect control and manage emergencies rapidly and effectively. We must make absolutely sure we're aware of the risk and have in place systems and people to manage emergencies. New science, technologies and methods emerge and must be utilised in the ongoing process of continual improvement to our capability.

We have developed, and we depend upon, partnerships between the Australian, State, Territory and local governments and industry. We, together with the community, work within systems and processes that have been acknowledged as world's best practice—but we cannot be complacent.

I would like to commend Emergency Management Australia for recognising the importance of agricultural risks and emergencies by dedicating a special publication to this issue. This publication will be used by professional emergency managers and the public at large as a reference document. I would also like to thank the writers for their efforts in producing good quality, readable articles.

Michael Taylor, is the Secretary, Australian Government Department of Agriculture, Fisheries & Forestry.

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.

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Authors

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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.

Using epidemiological modelling to assist FMD preparedness in Australia

Graeme Garner explores how epidemiological modelling can assist in planning for and managing threats like foot-and-mouth disease

Abstract

Epidemiological modelling is a powerful tool to assist in preparedness for animal health emergencies. In Australia, the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) has developed a stochastic spatial simulation model that operates within a GIS framework. It simulates the spread of disease through space and time and has been designed to assist planning and training for FMD and other exotic diseases by enabling a range of outbreak scenarios to be studied and different control strategies to be evaluated under various conditions.

Introduction

Introduced animal diseases have the potential to cause significant impacts on animal health, public health, the economy and the environment. The greatest threat to Australia in terms of its economic impact is foot-and-mouth disease (FMD). A study by the Australian Productivity Commission (Productivity Commission 2002) concluded that an FMD outbreak would result in immediate closure of many of Australia's major export markets. The cumulative loss in export and domestic market revenues would be around $5.7 billion for a single point outbreak, rising to around $13 billion for an outbreak lasting 12 months.

A good understanding of the likely behaviour of FMD under Australian conditions is a necessary component of effective preparedness and response planning. Recent experience with FMD type O 'Pan Asia' strain outbreaks in previously disease-free countries like the Republic of South Korea, United Kingdom, France and the Netherlands have highlighted the importance of well-considered response strategies to manage an incursion.

Role of modelling

In the absence of contemporary experience with a disease like FMD in Australia, epidemiological modelling is one tool that can be used to study disease spread and management. The increasing recognition of local factors that affect spread and specific spatially-targeted strategies like emergency ring vaccination or contiguous slaughter, mean that models that take into account spatial relationships are becoming increasingly important.

Epidemiological modelling can be used for:

- risk assessments, ie to identify areas, sub-populations, production systems etc., that might be at greater risk from FMD;
- evaluating the effectiveness of various surveillance and control strategies;
- underpinning economic impact studies; and
- providing realistic scenarios for preparedness/training exercises.

The UK experience

Up until recently, models have rarely attracted much attention and had relatively little impact beyond the scientific realm (Pfeiffer 2004). In 2001, the United Kingdom experienced a severe epidemic of FMD. By the time it had been eradicated 31 weeks later more than 2000 farms had been infected and more than six million animals had been slaughtered—over four million for disease control purposes and over two million for welfare reasons. The direct cost to the public sector was estimated at over £3 billion and the cost to the private sector was estimated at over £5 billion (National Audit Office 2002).

This UK epidemic was unique, in that models were developed during the epidemic and, for the first time, used to directly control policy during an actual outbreak. The experience produced differing views as to the value of modelling, with some authors commenting on the important role that it played (e.g. Kao 2002) while others condemned it e.g. *"…surely the FMD experience should have made the modellers appreciate the limitations of their science and accept at least some responsibility for the misery and expense that their models initiated"* (Kitching 2004).

A recent comprehensive review of the use of models to inform disease control policy commissioned by the UK Department of Environment, Food and Rural Affairs (Taylor 2003) provides an informed and

thoughtful assessment of the role of modelling in emergency disease management. It concludes that the most appropriate use of models is as tools in peacetime to aid retrospective analysis of real epidemics to gain insights. Hypothetical epidemics can then be modelled to better understand the relative merits of different strategies in different situations.

DAFF FMD model

DAFF has a long involvement in developing and using models. Previous work has looked at regional impacts of exotic diseases (Garner and Lack 1995a); evaluated control strategies (Garner and Lack 1995b, Garner et al. 1997); studied potential for wind-borne spread of FMD under Australian conditions (Cannon and Garner 1999); and provided hypothetical outbreak scenarios for studies on economic impact and zoning (OCVO 2002, Productivity Commission 2002).

The DAFF model is based on the work of Miller (1979) and James and Rossiter (1989) but has been considerably expanded in terms of scope and application from these early models. DAFF has now developed a sophisticated stochastic spatial simulation model that operates within a geographic information system (GIS) framework. It is designed to operate in a regional setting, using appropriate values for various parameters. A region is defined as an area that is reasonably homogenous in terms of climate and production systems.

Model operation

The DAFF FMD model is a stochastic simulation model. The individual unit of interest is a herd or farm. The model has a daily time step and is spatially explicit, ie it uses the location of all farms, either as points or polygons (land parcels). In the absence of 'real' data a method has been developed to 'synthesise' farm locations using agricultural census data and land use information.

The model simulates the spread of FMD through space and time. Disease spread is based on an effective contact rate (dissemination rate) that takes into account direct and indirect movements that could spread infection. There are separate modules to allow for wind-borne spread and spread through saleyards. Once the disease has been found, surveillance and control activities are imposed. Table 1 summarises key control options that are available in the model.

The user can define a scenario by setting where FMD is first introduced (single or multi-focal) and the delay from when disease is introduced until it is recognised. The user also sets resources constraints and how resources are partitioned between control activities. If resources are inadequate, a backlog of herds waiting to be visited, stamped out or vaccinated can build up. There is also the option of stopping the simulation at a given point in time and modifying the control strategy. Figure 1 shows the model set-up screen. Other parameters are stored in data files.

The model stores information on what happens on individual farms and provides summary outputs of events on a daily basis. It also includes a simple economic module that tracks control costs and compensation payments. Outputs are provided in the form of tables, graphs and maps. Figure 2 shows a sample output screen illustrating events during a simulation run for a small hypothetical outbreak in southern Queensland. Table 2 summarises a comparison between two possible

Table 1. Control measures available within DAFF FMD model

Control measure	Notes
Quarantine/movement restrictions	Changes in number and spatial pattern of contacts—in particular, reduction in longer-distance contacts.
Stamping out	Destruction of animals on infected premises (IPs).
Surveillance	1) Ad hoc reporting by farmers, veterinarians etc will generate suspect premises (SPs) subject to surveillance. 2) Local surveillance: patrol visits by surveillance teams—all farms within a given radius of IPs can be scheduled for surveillance. 3) Tracing: probabilities apply that farms linked to IPs will be identified by tracing procedures. These will be subject to surveillance visits.
Pre-emptive slaughter	Two options, separately or in combination: 1) Dangerous contact slaughter—destruction of animals on high risk farms Dangerouse Contact Premises or (DCPs) based on tracing. 2) Contiguous slaughter—destruction of animals on farms within a given distance of IPs. The option to slaughter SPs on suspicion is also available.
Vaccination	1) Emergency ('suppressive') ring vaccination. 2) Targeted vaccination—selective vaccination of 'high risk' premises.
Resources	Resource availability and increases in resources over time can be factored in.
Costs	Model tracks direct control program costs and compensation payments.

Table 2. Comparison of two control strategies with indicative costs, for a small hypothetical FMD outbreak in southern Queensland

Strategy 1: **local surveillance, stamping out of IPs and pre-emptive slaughter of DCPs.** ***Strategy 2:*** **stamping out of IPs and suppressive ring vaccination. One hundred model iterations have been used in each case.**

	Min. value	Max. value	Mean	Median
Strategy 1				
Epidemic duration (days)	35	90	57.7	59
IPs destocked	11	28	18.5	19
DCPs destocked	27	75	48.7	48
Total premises destocked	42	95	67.2	67
Premises vaccinated				
Control costs ($ '000)	3 428	9 261	5 701	5 618
Surveillance	603	2 531	1 005	983
Stamping out	2 825	6 730	4 696	4 635
Vaccination	-	-	-	-
Compensation ($'000)	13 152	41 154	23 936	23 250
Strategy 2				
Epidemic duration (days)	44	113	67.2	65
IPs destoked	18	41	30.1	31
DCPs destocked	-	-	-	-
Total premises destocked	18	41	30.1	31
Premises vaccinated	135	397	254.4	247
Control costs ($'000)	2 642	6 865	4 539	4 553
Surveillance	508	1 266	858	842
Stamping out	1 500	3 775	2 498	2 525
Vaccination	633	1824	1183	1186
Compensation ($'000)	8 313	57 994	30 124	31 535

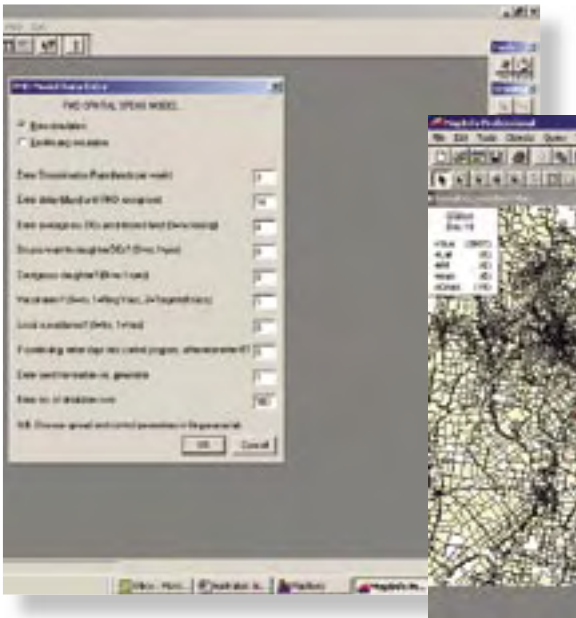

Figure 1. Model set-up screen

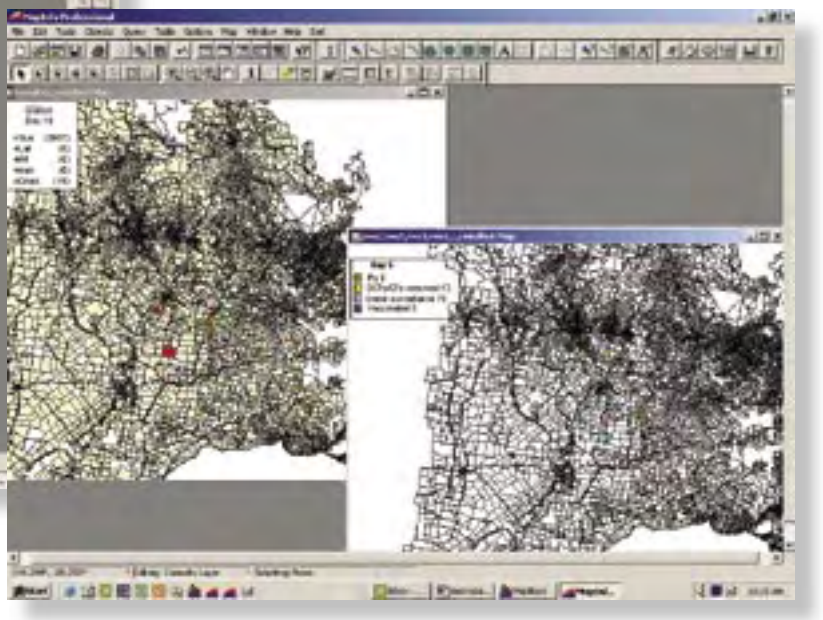

Figure 2. Sample output screens

control strategies. In this example, Strategy 1 results in more premises being stamped out and is marginally more expensive in terms of control costs, but on average reduces the size of an epidemic and results in lower compensation costs.

Discussion

Australia has developed a sophisticated disease model to assist in managing diseases like FMD. The approach has been designed to enable various outbreak scenarios to be studied. For example, one can take into account:

- different areas;
- various times until detection;
- different control strategies;
- availability of resources; and
- effectiveness of control measures.

The focus of the modelling on preparedness (ie pre-outbreak) rather than 'real time' tactical decision-making during an epidemic has been deliberate and is consistent with the findings from a recent review on the use of disease models in the UK (Taylor 2003). In developing the model, the philosophy has been to start simply and add complexity as and when it is needed. Hence, the model has evolved through a series of developmental stages.

The model is particularly useful for evaluating control strategies in the face of resource constraints. Advantages of the approach is that it captures key epidemiological features of an FMD outbreak, including chance elements. The model's logic is relatively straightforward; the complexity comes with estimating appropriate parameter values. The approach is also very flexible. Events can be thought of as being controlled by a series of 'rules'. The rules can be changed and control strategies can be readily modified. The model has been designed with high quality outputs, both visual and tabular, in mind (see Figure 2). This is especially useful for training purposes. It also keeps track of a lot of variables and extensive analyses on the effectiveness of different control options are possible.

However, the model is quite complex and requires good understanding of FMD epidemiology to set it up properly. A good knowledge of local conditions, movement patterns and animal management is also important to set parameter values realistically. As with any model the old adage 'garbage in, garbage out' applies. Unlike simpler mathematical models, the simulation modelling approach is computer intensive and long run times can be expected when the population is large and/or disease diagnosis is delayed. Finally, it needs to be appreciated that while the model is intended to be realistic, one is not dealing with reality—by definition models simplify the real world.

Future work is being planned through the new Australian Biosecurity Collaborative Research Centre for Emerging Diseases, which has identified *'developing new decision support tools and systems which exploit the potential of spatial analysis and computer modelling'* as an important component of its research program. This work is aimed at undertaking detailed studies of a series of potential outbreak scenarios that take into account a range of factors with a view to gaining insights into effective management of FMD under different situations. The intention is to also adapt the approach to other diseases of concern.

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Plant pest surveillance in Australia

Paul Pheloung looks at aspects of plant pest surveillance

Abstract

Plant pests are a major problem in Australia causing productivity losses, incurring management costs, restricting trade and threatening biodiversity in natural ecosystems. Even with rigorous quarantine measures, new plant pests can enter Australia undetected. Surveillance programs are essential. They provide early detection of pest incursions so they can be eradicated, and they define Australia's plant health status for trade purposes.

Introduction

Plant pests include insects, weeds, fungi, bacteria, viruses and other organisms that are harmful to plants or, in the case of weeds, compete with or displace desirable plants. These pests are a major problem in Australia causing productivity losses, incurring management costs, restricting trade and threatening biodiversity in natural ecosystems. Most plant pests are exotic to Australia and were introduced from other parts of the world, mainly through trade and travel. As a relatively isolated continent, and with movements of goods and people from other countries only becoming significant in the last 200 years, Australia is still free of many potentially serious plant pests and benefits from rigorous quarantine measures to ensure these pests do not gain entry. Nevertheless, even with such measures in place, plant pests will continue to enter undetected and, where circumstances are favourable, form a self-sustaining population that will spread and over time become a permanent and undesirable part of the Australian flora and fauna.

Symptoms of sharka (plum pox virus) on apricot fruit and leaves
Photo by John Hammond, Agricultural Research Service, United States Department of Agriculture

A plant pest incursion into Australia can be eradicated through emergency response measures, but the chance of a successful and affordable eradication is dependent on a system of surveillance that will reveal the presence of the pest while it is still confined to a small area. Usually, by the time a pest population has grown to the extent that it is noticeable due to the damage it causes, the prospects for eradication become very poor and prohibitively expensive. It has been repeatedly stated (Nairn *et al.* 1996) that the benefits, in terms of avoided ongoing costs, far outweigh the direct costs of eradicating a pest before it becomes well established. But first, the pest must be detected through some kind of surveillance activity, which must be paid for and managed.

The International Plant Protection Convention, under the United Nations Food and Agriculture Organisation (FAO), is responsible for establishing International Standards for Phytosanitary Measures including Guidelines for Surveillance (FAO 1998). These guidelines distinguish broadly between general surveillance and specific surveys.

Specific surveys

Specific surveys are procedures where information is obtained on particular pests of concern at specific sites in an area over a defined period of time. Examples include a survey of insect pests in citrus orchards or a fungal infection in a cereal crop. Fielding a qualified search team is a costly exercise, particularly if the objective is the equivalent of finding a 'needle in the haystack' and finding nothing is the usual (and preferred) outcome. Clearly, the cost of having search teams routinely and continually searching all production systems, and the native bush for that matter, for every conceivable pest threat would outweigh the benefits derived from early detection and eradication.

It is therefore essential to identify where the risk is greatest and focus surveillance effort accordingly.

Analysis of trade patterns can suggest likely pathways for the introduction of pests. Coupled with knowledge of climate preferences, presence of suitable host plants and a means of spread, specific surveys can be designed to focus on the sites where the hazard is greatest. The Northern Australian Quarantine Strategy (NAQS), a program of the Australian Quarantine and Inspection Service (AQIS), includes a surveillance program that embodies this approach. NAQS surveillance is conducted along the coastal strip between Broome and Cairns, but that coastal strip is partitioned into risk zones and the frequency of surveys is proportional to the risk. In the northern islands of the Torres Strait, within a few kilometres of the Papua New Guinea mainland, comprehensive surveys are done twice a year while the remote southern coast of the Gulf of Carpentaria is surveyed just once every 5 years. NAQS has also developed target lists of the pests most likely to enter via Australia's north and the surveys focus on the hosts and situations in which these pests are likely to be found.

If a good methodology exists, specific surveys can be implemented at reasonably low cost. Fruit fly traps are an example. Many fruit flies are attracted to chemical lures and can therefore be enticed into an insect trap. A network of traps will reveal the presence of an insect target when just a few are present in a region and these traps can be quickly inspected on a routine basis. A network of insect traps placed in the vicinity of Australia's ports of entry and in the Torres Strait has proven to be an exceedingly effective early warning system. Prior to the establishment of this network, papaya fruit fly was detected in Cairns but this was by a grower and at a stage when the population had become well established. Consequently, the eradication campaign (which fortunately was successful) cost about $34 million and the cost to growers in lost markets and production in the meantime was estimated to be as high as $100 million. The trapping network that was subsequently put in place led to the detection of the Philippines fruit fly in Darwin, a pest of comparable importance to the papaya fruit fly. Because this pest was detected at a very early stage, the eradication cost was considerably less, at about $5 million.

General surveillance

General surveillance in Australia is essentially a process whereby information on particular pests that are of concern for an area is gathered from many sources, including the results of specific surveys. It includes measures to facilitate timely reporting on changes in plant pest status, such as a first record of a new pest or expansion in the range of a pest already present. Raising public awareness generally and specifically through the preparation and distribution of booklets and fact sheets on particular plant pests is a central component of general surveillance. General surveillance can effectively capitalise on other activities, such as routine crop monitoring for established pests, undertaken by professionals with the capacity to recognise new pests.

Plant pest surveillance must operate within the broader context of plant health management in Australia. The ability to diagnose or name suspect organisms depends on well-trained diagnosticians, effective techniques, and reference collections. This is particularly challenging for the identification of pests not previously described in Australia. Well-maintained specimen-based collections are equally important in defining pest status in Australia. They include what organisms are present, where and when they are found, and on what host plants. With the growth of digital technologies and the Internet, tools have been developed to allow rapid and convenient access to such information through the Australian Virtual Herbarium (http://www.chah.gov.au/avh/) and the Australian Plant Pest Database (http://www.planthealthaustralia.com.au/our_projects/display_project.asp?category=4&ID=1). These systems actually aggregate specimen-based data from numerous sources, Australian herbariums in the case of the AVH and invertebrate and pathogen collections in the case of the APPD, and generate a report in response to an Internet based user query.

Fire blight infects terminal leaves on an unpruned and uncovered apple tree
Photo (c) Keith Weller, Agricultural Research Service, United States Department of Agriculture

Colorado potato beetle
Photo by Scott Bauer. Agricultural Research Service, United States Department of Agriculture

Other functions of plant health surveillance

The preceding discussion has focused on early detection surveillance. Plant pest surveillance is also an essential component of an emergency response to a pest incursion—attempting eradication is pointless unless the extent of an incursion can be reliably determined and monitored to a point where surveillance establishes that the pest is no longer present.

A recent example of this is the discovery of citrus canker, a serious bacterial disease of citrus species, in a citrus production orchard in Queensland. An essential part of the response to that detection was to quickly undertake a comprehensive surveillance program in the region where the detection occurred, and in other regions where a linkage to the infected region was likely, including nurseries and backyards. This was important to determine the true extent of the disease so that an eradication program could be effectively managed. Effective and rapid delimitation of the extent of the disease was critical for producers whose livelihood depends on being able to sell their fruit to markets, both interstate and overseas, that impose trade restrictions because of the presence of citrus canker.

Another very important role for surveillance is to provide assurance that particular plant pests are not present in an area. Increasingly, this type of data is becoming critical for Australian trade. Quarantine measures applied to imported products to exclude particular pests require some justification that the pest is not already established in Australia. Similarly, such data is important in supporting Australian assertions that exported plant products are not infested or infected with pests of concern to other importing countries, or for that matter, other states within Australia. Exports of Australian fruit to Japan from the Murray River district are dependent on a fruit fly trapping program in the area that demonstrates the absence of fruit flies known to be present in other parts of the country. Examples of the need for such data arose recently following the detection of citrus canker, discussed earlier, and following a claim by an importing country that a consignment of Australian wheat was infected with the Karnal bunt fungus, a pest that affects the quality of wheat. This fungus has never been recorded in Australia and strict quarantine measures are in place to prevent its introduction. Nevertheless, it was necessary to assemble a body of evidence to demonstrate the absence of the pest in Australia. This was based on activities around the country that contribute to general surveillance for the pest and extensive tests on samples of wheat collected prior to export.

Who pays?

While eradicating a pest before it becomes established can offer major benefits in terms of avoided costs, early detection surveillance does impose a cost that must be met.

Clearly, while the benefits of surveillance for plant pests are potentially very large, the cost is also large and therefore best shared by government and those in the private sector that directly benefit. The Australian Government assumes primary responsibility for providing quarantine services at the international borders and also funds the NAQS program that serves the national interest and

Quarantine officer inspecting a fruit fly trap as part of the Northern Australia Quarantine Strategy

operates in sparsely populated regions of the north. The State and Territory governments have primary responsibility for preparing for and reacting to plant pest emergencies although the Australian Government does assist financially where there is a clear national good.

Surveillance to support market access has been the responsibility of State/Territory governments and the private sector. Ongoing monitoring for the management of established pests has been the responsibility of the private sector.

Plant Health Australia (PHA) was incorporated in 2000 to facilitate a partnership between government and industry in dealing with plant health problems. This includes brokering an arrangement for funding the response to plant health emergencies that includes contributions from government and industry. An important step towards this arrangement is the development of industry specific biosecurity plans that, among other things, identify and categorise the major pest threats. While the plans focus on how to respond to an incursion, they could also provide a basis for early detection surveillance activities that ensure incursions of major pests will be detected as early as possible.

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Securing our food supply

Wells and Edwards present current strategies aimed at securing food supply chains into future emergency response systems

Abstract

In the post 11 September 2001 and Bali bombing environment, great effort is being made to ensure the security of Australia's critical infrastructure including the food supply chain. Australian governments have established a partnership arrangement with industry for ensuring the security of our critical infrastructure. An industry-led Food Chain Assurance Advisory Group has been set up to identify and address potential gaps and vulnerabilities in the existing food safety and security system. The Group is working on a strategy and work plan to address key recommendations from a strategic assessment of the system.

Protecting our critical infrastructure

Ensuring the security of our critical infrastructure, those things essential to the normal flow of our daily lives, is a major concern for governments and industry in the new security environment following the 11 September 2001 and Bali bombing incidents. With much of the country's critical infrastructure owned and operated by the private sector, the Australian, State and Territory governments agreed on the need for a partnership with industry to enable the sharing of security information. This partnership was formed with the setting up of the Critical Infrastructure Protection (CIP) program in 2003. The program consists of the Trusted Information Sharing Network (TISN) overseen by the Critical Infrastructure Advisory Council (CIAC), and includes Infrastructure Assurance Advisory Groups (IAAGs) to ensure the identification and protection of the critical infrastructure of particular industries or sectors.

The Australian Government Attorney-General's Department established the TISN and the CIAC including the TISN website, www.tisn.gov.au as an information and networking tool for critical infrastructure protection. The work of the TISN is underpinned by an 'all hazards' approach to addressing risk in the new security environment.

The food supply chain has been identified as part of our critical infrastructure and a Food Chain IAAG (The Food Chain Group) has been established as part of the TISN.

What is the Australian food supply chain?

The food supply chain covers a spectrum of activities from agricultural production of bulk food commodities and ingredients through fresh produce to manufacturing, distribution, sales and consumption. It includes fresh and processed food products, ingredients and beverages.

The food sector is a significant contributor to the economy and an integral part of the normal flow of our daily lives. It contributes in excess of seven percent to the nation's annual gross domestic product. It makes a major contribution to our social, economic and political wellbeing and is a significant element of our national infrastructure.

Food processing is Australia's largest manufacturing industry generating total sales in excess of $55 billion. Food production, not including retail, employs around 250,000 people with one in four manufacturing jobs in the processed food industry. The majority of these jobs are in regional and rural Australia.

Consumer expenditure on food in 2002–03, total was approximately $80 billion, or about 46 percent of Australian retail spending. Australian food exports were $22 billion, or 19 percent of Australian merchandise exports (DAFF 2004).

Is our food supply chain at risk?

For an advanced western society, we still experience a significant level of foodborne illness in our community. Each year in Australia about six million people experience an episode of gastroenteritis from contaminated food. Doctors and laboratories are required by law to notify health departments of certain infections or if they recognise an outbreak. However, the majority of foodborne infections are mild and do not require medical attention. Around 25–30,000 notifications of eleven potentially foodborne diseases are reported to health departments for investigation each year. Outbreaks are less common, with health departments investigating approximately 90 outbreaks of foodborne disease each year. This level of background illness, and the time required to identify the cause and source of the infection, makes it difficult to quickly recognise an incident of accidental or deliberate food contamination.

New risks to agriculture and food production have arisen in our current security environment. Alternate capabilities using emerging technologies could be used against economic targets such as agriculture and food industries. This possibility has been raised world-wide by the World Health Organisation, which states: "The prospect of malicious contamination of food for terrorist purposes is a real and current threat" (WHO 2002). Assurances about the security of the food supply chain are increasingly required, with Australian businesses now required to establish systems to meet heightened US standards for security, and it is likely more will be required for other key export markets.

While the risk of deliberate contamination of our food supply is low, elements of the food supply chain are potentially vulnerable. An act of deliberate contamination could be very serious in terms of human health and trade.

How do we deal with risk in the food supply chain?

For our agriculture and food industries, safety and security are integrated concepts.

> "Outbreaks of both unintentional and deliberate food borne illness can be managed by the same mechanisms. A comprehensive approach including sensible prevention, preparedness, response and recovery measures constitutes the most efficient and effective way of countering all such emergencies, including food terrorism," (WHO 2002)

Identifying and managing risk through an 'all hazards' approach is a basic tenet of good business practice and corporate governance, equally relevant in the agriculture and food industries as any other.

Australia already has a rigorous food safety and security system. A range of industry and government arrangements is already in place to assist industry in meeting current safety and quality standards. The system, including good business management practices and corporate governance arrangements, already provides a high degree of protection of the food supply chain.

However, the system is designed primarily to provide protection against natural and accidental risks to the food supply. Our challenge is to ensure the system is capable of dealing with attempts to deliberately contaminate the food supply as well.

What is critical in the food supply chain?

Food is different from many other elements of our critical infrastructure. We enjoy access to a wide range of food products from a diverse range of production areas, processors, manufacturers and retailers. The supply of food is not reliant on any particularly significant production facilities. Indeed, while devastating for the business affected, the destruction of physical

facilities is most unlikely to have a serious impact on our food supply. What is critical in the food chain is the food itself. Deliberate contamination of the food supply has the potential to threaten public health through injury, illness or death, and undermine confidence in the safety of the food we eat and in our export markets. The mere threat or claim of contamination has the potential to severely affect markets and consumption.

Furthermore, should there be an undeclared incident of deliberate contamination of the food supply, it would be some time before authorities or food businesses could recognise it as a deliberate incident. Health authorities constantly monitor and manage the background incidence of foodborne illness across the nation. Under these circumstances, a deliberate incident may not be immediately apparent.

The food chain group

The Food Chain Group of the TISN was formed in July 2003 and is an industry-led body comprising industry and government representatives of the key components of the food supply chain. The Group is chaired by Mr Dick Wells, Chief Executive of the Australian Food and Grocery Council, with secretariat support provided by the Australian Government Department of Agriculture, Fisheries and Forestry. The role of the Group is to provide leadership and co-ordination in ensuring the food safety and security system is capable of dealing with new and emerging risks to the food supply chain.

The Group has completed a strategic assessment of the food safety and security system to identify potential gaps and vulnerabilities in the event of deliberate attempts to contaminate the food supply. The outcomes of the assessment have formed the basis for the development of a strategy and work plan for the Group, industry and government to ensure the resilience of the food safety and security system.

The food supply chain is also highly reliant on a range of support and service provider sectors and industries for the continuity of production, manufacturing, and supply. These include water, transport, energy and communications, to mention a few. Significant disruption in any of these sectors has the potential to impact directly on the maintenance of our food supply. The Food Chain Group recognises the importance of these dependencies, the need to fully understand them, and appropriate mechanisms to manage the consequences of disruptions in other sectors. This is an area to be further evaluated and addressed by the Group.

A food supply chain safety and security strategy

The Food Group recognises that elements of our food supply chain are potentially vulnerable. While every effort must be made to ensure the safety and security of the food supply chain, it is neither practical nor economically feasible to attempt to protect against all risks. We adopt a risk-based approach in which we consciously accept a certain level of risk. This calls for a high degree of community awareness, and vigilance in industry and government and a preparedness to manage risk and the consequences of incidents.

The provision of targeted information and awareness raising is an important aspect in securing and maintaining the integrity of the food safety and security system and will underpin the delivery of the Group's strategy. The strategy will also improve the co-ordination of existing prevention and preparedness arrangements, including any required enhancements in the existing testing and detection systems. It will also ensure response and recovery plans and capabilities are relevant, tested and validated. Research and development will investigate the means to manage gaps and potential vulnerabilities in the food safety and security system. A program of audit, testing and validation will underpin the strategy to ensure the system continues to be robust and resilient to new and emerging risks.

Conclusion

Australia currently has a robust food safety and security system that is designed primarily to deal with accidental or natural contamination of the food supply. While the risk of deliberate contamination is low, it would be irresponsible to ignore the risks inherent in the new security environment. The industry/government partnership established to assess and address potential gaps and vulnerabilities in the existing system will lead to a national strategy aimed at securing our food supply into the future.

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Dick Wells is the Chief Executive of the Australian Food and Grocery Council (AFGC) and chair of the Food Chain Assurance Advisory Group. He has extensive experience working in government and industry. Before joining the AFGC Dick worked as Director with the Allen Consulting Group and was the Executive Director of the Minerals Council of Australia.

Alan Edwards is a manager with the Food and Agriculture Group, Australian Government Department of Agriculture, Fisheries and Forestry. Before taking up his current role in critical infrastructure protection in the food supply chain, Alan worked on developing and implementing the National Food Industry Strategy that began on 1 July 2002. Alan provides secretariat support to the Food Chain Assurance Advisory Group.

Risk management of a major agricultural pest in Australia—plague locusts

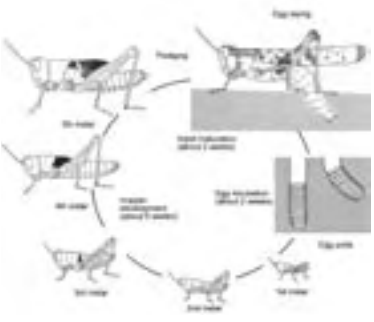
Walter Spratt outlines risk management approaches in minimising a recurrent agricultural emergency—locust plagues

Abstract

Locusts are a major pest of agriculture in Australia. The Australian Plague Locust Commission mitigates adverse impacts of locusts through considered risk management, research and the implementation of control measures. Plague locust operations must balance mission success with the potentially competing objectives of minimising adverse impacts on personal and public health and safety, the environment, the economy and trade.

Introduction

The Australian plague locust (*Chortoicetes terminifera* [Walker]) is a serious pest of agriculture in Australia. Images of widespread devastation and 'plagues' of biblical proportions are often evoked at the mention of locusts—particularly amongst the public and mass media. Primary producers, and relevant authorities, with experience of this pest, adopt a more rational attitude and take what practical steps are available to minimise locust damage.



Locust life cycle

Whilst large locust outbreaks are not frequent, localised infestations (on various scales) are common enough to represent a significant economic risk to agricultural production. The potential impact on crops valued in excess of $19 billion annually (ABARE, 2004) as well as productivity losses from affected pastures and associated industries, can have serious implications for a national economy with high reliance on primary production.

The Australian plague locust is able to consume up to 30 to 50 percent of its body weight daily; can form large, very dense, and highly mobile swarms capable of long distance migration (up to 700 km in a single night—and further over multiple nights); are very well adapted to Australian conditions and are supreme opportunists that can multiply very rapidly under favourable conditions. A single swarm of mature, Australian plague locust adults, at ground densities of 4–50 locusts per square metre covering an area of 1 square kilometre, can consume between 0.8–10 tonne of vegetation per day. (Some swarms may easily exceed 50 km^2 and have densities greater than 50 per square metre). Juvenile stage densities can reach up to 12,000 per square metre—but cover much smaller areas. Considerable further losses result from damage associated with affected vegetation not totally consumed.

Lost production results not only from direct consumption, but also indirectly from damage to

Australian plague locust nymphs in the Riverina District, NSW
[Courtesy: Judit Szabo]

vegetation at a vulnerable growth stage or when simultaneously experiencing adverse environmental conditions such as hot, drying winds that can desiccate and kill damaged plants. Damage to maturing crops can reduce yields and cause grain heads to fall before, or during, harvest. Product contamination may also be an issue if locusts are present at harvest, and are included with grain to result in quality downgrades and premium reductions.

The impact of a significant locust infestation on a crop is generally obvious and immediate. The effect on natural habitat, rangelands, and other pasture, is less apparent and can be grossly underestimated. Locust infestations could also threaten conservation values by

Locust bodies (and parts) can also be a significant crop contaminant during harvesting—Wentworth NSW, Spring 2000 [Courtesy: Randy Larcombe]

realising disproportionate effects on diminishing reserves of natural habitat. These areas are being made increasingly vulnerable by man-made changes to surrounding habitats that have disrupted the previous 'equilibrium'. Locust outbreaks may now be less of a 'natural' event and could further increase pressure on some already threatened species.

The life cycles of native pastures are dependent on similar environmental conditions influencing locust development—this is not coincidence but an evolutionary strategy employed by this insect to synchronise its life cycle with that of its habitat. Between periods of protracted drought and possible locust outbreaks, native vegetation may only have a narrow window of opportunity in which to recover and reproduce for future pasture generation. Locust affected pasture that subsequently experiences extended drought can be severely retarded for many years and might cause corresponding reductions in stock-carrying capacity and longer-term production levels, with corresponding pressure on native fauna.

Locust ecology

All locusts are grasshoppers, however, not all grasshoppers are locusts. Anatomically, the two are similar—the key distinguishing feature is behavioural rather than physical. Under appropriate conditions, locusts exhibit strong gregarious behaviour and a propensity to undertake significant migration, adopted as an overall evolutionary strategy to aid their survival.

Locust ecology is very closely aligned with their environment. The Australian plague locust mostly exists in low numbers as a widely distributed background population over large tracts of preferred habitat in the arid interior of mainland Australia.

In a land of extremes, periods of extended drought, localised or widespread, are commonly followed by substantial rainfall events that provide sudden and greatly improved conditions for survival and breeding. Until such events, locusts generally experience gradual, ongoing mortality—however, their environment is usually diverse enough to provide sufficient habitat, in adequate condition, to constitute a refuge for low numbers of locusts to survive and successfully reproduce subsequent generations. The mobility of winged adults enables them to actively seek out these favourable areas.

Locusts are well adapted and attuned to the Australian climate and weather systems. Their ability to migrate in association with significant moisture-bearing weather systems is well known. Their success in locating areas that have recently received sufficient rain to produce a sustainable vegetation response is almost uncanny. Low numbers of locusts within a vast area can concentrate into large, dense populations that converge into discrete areas virtually 'overnight', if meteorological conditions are suitable. This 'funnelling' phenomenon is thought to be more a function of prevailing atmospheric conditions than any deliberate act of navigation by the insects.

Severe, prolonged drought not only takes its toll on locust numbers, it can dramatically reduce populations of locust predators, parasites and pathogens.

APLC Officer inspecting successful result after treating a swarm of spur-throated locusts—Queensland (Note: APLC Officer is holding a branch broken by the weight of roosting adult locusts)

Aerial photo of a Mitchell grass plain in western Queensland infested with numerous very dense bands of Australian plague locust nymphs. The bands are visible as waves of dark, finger-like projections, eating their way across the grass plain and denuding the vegetation

Differences in 'predator'/'prey' life cycle generation periods introduces a 'lag' phase that allows locust numbers to increase dramatically before being significantly affected by these mortality factors. The ability of locusts to migrate 'en masse' also serves to avoid these natural controls—further contributing to their success as a major economic pest.

Relaxed mortality pressure combined with favourable conditions promotes rapid population increase, with each female being able to lay 30–50 eggs up to four times within a period of several weeks. The density dependent ('critical mass') trigger for gregarious, locust behaviour requires several successful breeding cycles within a single season to produce a cohesive population that behaves in a co-ordinated manner and exhibits synchronised development. This stage of population development poses the greatest risk to agriculture.

The ability of this pest to develop large populations in remote areas without necessarily posing an immediate, significant economic risk to agricultural production in the jurisdiction of origin, combined with its ability to travel large distances in short periods, represents a very real risk to agricultural production in other States and at the national level.

Organisation and strategy

The politics of this situation – an interstate risk from a migratory pest – prompted the formation of the Australian Plague Locust Commission (APLC) in 1974 to combat this pest from a national perspective at a strategic level. An agency within the Australian Government Department of Agriculture, Fisheries and Forestry, the APLC is jointly funded, in pro-rata proportions that reflect perceived respective risk, by member States with an overall matching contribution from the Australian Government.

The fundamental tenet supporting the successful management of locust outbreaks (and mitigation of related damage) at the strategic level, is early intervention. Without adequate explanation, this approach can create confusion for some stakeholders. The early intervention principle is not restricted to the tactical sense. APLC does not engage in operations deliberately intended to protect individual crops or pasture, although this may occur incidentally. Responsibility for control of this pest is tiered in a hierarchical structure beginning with affected landholders, through relevant local and State government authorities to the APLC. The APLC may initiate control operations when a situation assumes a scale and nature that may significantly endanger agriculture in more than one State, becoming a matter, potentially, of national interest.

The APLC approach is primarily proactive and intended to be preventive by disrupting the sequence of successful generations necessary, within a single season, to produce an outbreak with national ramifications. Management intervention aims to control populations by keeping their size below a prerequisite 'critical mass' thereby preventing the stimulation of density dependent behavioural triggers that can be precursors for major outbreaks.

Early intervention principles are also applied tactically within an individual breeding generation. This involves obvious immediate economic and environmental benefits. Consequently, APLC will only intervene to manage large, dense populations that pose a significant actual or potential risk to agriculture in more than one member State.

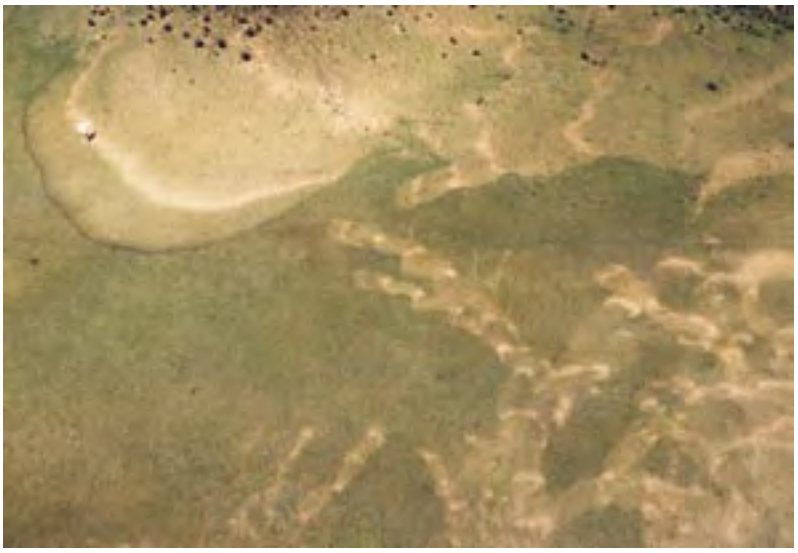
APLC operations frequently occur in isolated areas of the arid interior and remote from the main regions traditionally associated with agricultural production. Consequently operations are less visible and associated benefits often go largely unrecognised. Wright (1986) identified a conservative benefit:cost relationship in the order of 30:1 directly associated with APLC operations, although the study concentrated on the financial effects on crop production and did not examine impact on pasture or other aspects related to locusts. Success is also evident in

the reduced frequency, scale and duration of outbreaks affecting agriculture since the inception of the APLC.

Risks and remedies

Pursuit of a successful outcome is not a straightforward proposition and must accommodate a number of substantial risks. There are four major risks that must be managed to ensure continued provision of net benefit of the program. These broadly fall under two main headings:

- mission failure; and
- collateral, or unintended, consequences associated with management intervention in the key areas of:
  - health and safety;
  - environment; and
  - economy and trade.



Aerial photo of Mitchell grass plain in western Qld. The size of the very large band of locust nymphs on the left of the photo can be gauged by the spray plane flying approx. 10 m above the ground. Several smaller locust bands are also clearly visible on the right. The scalded areas indicate where the locust nymphs have completely denuded the vegetation. Each scalded area is how far the band of nymphs have moved in 1 day

This photo was taken by an APLC officer in a helicopter, directing the spray plane pilot onto the target and ensuring accurate placement of insecticide

Mission failure

The APLC has responsibility for managing populations of the three main Australian locust species in a geographic area of approximately 2 million square kilometres, or about 25 percent of mainland Australia.

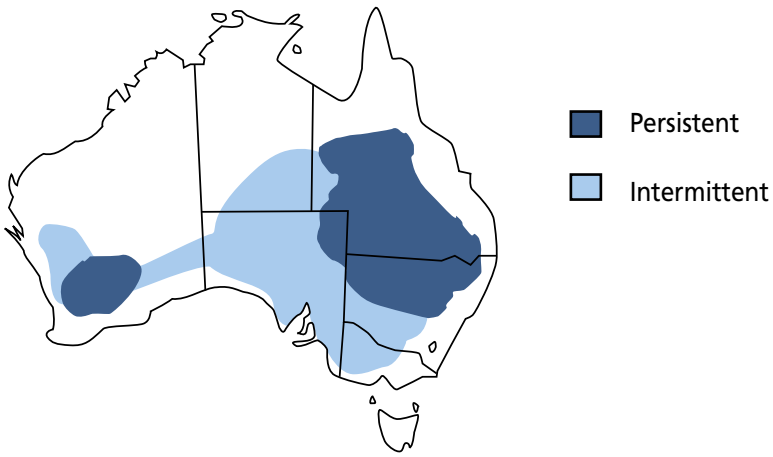
Mission failure could be defined subjectively as the degree of impact on the agricultural industry in a member State from an immigrant population. The APLC objective is to contain the population and prevent migrations of infestations that represent a significant actual, or potential, risk to agriculture in more than one member State. The APLC is a risk management program established to control significant, threatening infestations and to mitigate impact on the agricultural industry that would not otherwise fall within the capacity or province of vulnerable stakeholders. As such, APLC intervention is not intended to eliminate every locust infestation, but to substantially reduce a population and the scale of potential migration. Residual populations are still capable of inflicting a certain amount of damage that should be more readily absorbed across the broader industry, managed at the relevant local level of responsibility, or passively allowed to deteriorate naturally and revert to more normal background levels.

In order to translate early intervention principles into mission success, the APLC must maintain an appropriate rapid response capability supported by applied research and relevant infrastructure.

APLC achieves success with a staff of seventeen permanent officers stationed at three strategically located field offices supported and co-ordinated from a headquarters office in Canberra. The three field offices are virtually self-contained units with a total of eight staff capable of mounting and sustaining multiple, simultaneous control operations, with additional support from appropriate headquarters-based personnel.

Detection and monitoring are critical elements for successful early intervention. The APLC maintains an active field survey capability

Distribution of Australian plague locust in Australia



supported by comprehensive remote sensing and forecasting systems that enhance effectiveness and efficiency. Passive monitoring systems take the form of a strategically-sited network of insect light traps operated by part-time contactors plus the active cultivation of an informal reporting network of landholders plus local and State government officials. Between the active and passive systems, APLC is confident of maintaining a reliable estimate of the overall locust situation and of detecting and forecasting the development of significant events that may warrant early warning sufficiently in advance to prepare an appropriate response.

The second element associated with the rapid response capability required for successful strategic and tactical intervention is that of appropriate treatment systems. The two key factors involved in management of locust infestations are time and distance. The size of areas involved and the distances of those sites from a base of operations with access to suitable infrastructure necessarily introduces the dimension of time. Time is the most critical element as it is a parameter outside APLC control. There is a range of environmental and ecological factors that combine to produce a limited window of response opportunity. This necessitates the use of aircraft—for both aerial survey and aerial treatment. Aircraft remain the most effective and efficient means of achieving the rapid response capability needed to take advantage of any 'windows', when and if they appear.

Management of unintended consequences

The nature and scale of any significant, unintended consequences have obvious and direct links to mission success. This actually represents a subset of risks that must be managed to ensure a safe and responsible outcome.

APLC staff conducting ground and aerial surveys for locust swarms near Broken Hill, NSW [Courtesy: Randy Larcombe]

Within the scope of unintended consequences are three crucial objectives that must be satisfied in order to cultivate continued public and political support. These objectives are:

- minimising impacts on personnel and public health and safety;
- minimising impacts on the environment; and
- minimising trade and economic implications due to residue contamination.

Unless the APLC can demonstrate due diligence and responsible operation, its value (net benefit), credibility and reputation could be adversely affected. In this event, critical access to infested areas plus levels of co-operation and support could be reduced to an extent that might jeopardise overall mission success. Control mechanisms to manage these risks are not mutually exclusive and often realise synergies across all areas.

Pesticides, by their nature, pose credible risks to each of our above social, environmental and economic objectives. The adoption of integrated pest management principles aims to establish a suitable balance between effectiveness, economics and safety by employing a range of materials (with different, but complimentary, properties and modes of action) and by matching their application to suit prevailing conditions. This approach mitigates much of the identified risk whilst simultaneously increasing APLC's response flexibility and reducing operational vulnerability by spreading reliance of pesticide supply over multiple providers.

A relevant case is APLC's investment in the development, and subsequent operational use, of the biological control agent *Metarhizium anisopliae* (var *acridum*)[1]. Although slower to take effect, and not yet as cost effective as conventional chemical pesticides, its implementation is fully accepted and endorsed by all leading organic production certification agencies in Australia. This strategic initiative facilitates continued access to areas of critical locust habitat that were threatened with operational exclusion following their conversion to certified organic production in order to take advantage of niche export markets.

The economics and efficacy characteristics of this biological

1 Not registered at time of writing.

APLC contracted spray aircraft operating 'smoke' generator to assist determination of application drift risk [Courtesy: Randy Larcombe]

control agent currently restrict its operational use to areas that would otherwise be closed to conventional chemical pesticide application operations, e.g. organic production or environmentally sensitive areas. This agent requires no produce withholding period before marketing as there are no associated residue issues, although some environmental concerns remain regarding potential impact on non-target grasshoppers.

Continued use of conventional chemical pesticides, containing active ingredients of varying toxicity, remains a potentially hazardous activity, with obvious implications for personnel, public and environmental health and safety as well as for export trade markets conscious of chemical residues. Residue-related trade incidents have had substantial implications for Australia's primary production export markets, and can damage Australia's reputation for clean, green production (SafeMeat, 2004). For example residues of chemicals exceeding designated limits for beef have cost Australia many millions of dollars (Hill, D. J. 1996).

The APLC seeks to manage risks of this nature by development and implementation of a range of control mechanisms. Some involve ongoing research into improved methods and materials to minimise non-target effects. Research into application methods has resulted in the successful adoption of greatly reduced application rates (in the order of 30 percent or greater) with direct, corresponding benefits to human and environmental health and safety, in addition to significant budgetary savings.

Pre-emptive research also aims to identify any significant non-target impact that might result from locust management operations. The objective is to identify, and incorporate, significant areas of concern into strategic and tactical considerations at the earliest opportunity, and attempt to formulate appropriate countermeasures to satisfy stakeholders without compromising mission success.

Conclusion

A diverse and dynamic operating environment constantly confronts the APLC with new challenges and increasing constraints. In order to remain valid and sustainable, the APLC continually scans its environment to detect trends that might present credible risks or opportunities.

The APLC is constrained to function within the legislative frameworks of the respective States within which it conducts operations. Legislation is closely aligned to, and generally reflects, socio-economic and cultural norms that are constantly evolving. The organisation is proactive and quick to identify, evaluate and implement promising new risk management strategies to contribute to the pursuit of 'best practice'.

The importance of this aspect of risk management should not be underestimated. The impact of adverse incidents, anywhere in the field of locust management, can have a dramatic and disproportionate effect that could conceivably threaten the viability of its important role in agricultural protection.

Risk management involves an intricate mix of interrelated factors and considerations that must be planned, and prepared for, in advance of any requirement. Agricultural risks, including locust plagues, are no less complex but can be managed successfully if approached in a rigorous, systematic and comprehensive manner.

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The Australian Animal Welfare Strategy

Peter Thornber presents the Australian Animal Welfare Strategy

Abstract

Direct and indirect impacts on the welfare of animals are an important consideration during emergency disease incidents. Unforeseen animal welfare incidents can occur at any time and create significant problems and must be factored into a structured response. It is important to recognise broad stakeholder and community animal welfare interests and the need to communicate agreed emergency response policies and approaches as part of emergency planning and preparedness. The development of an Australian Animal Welfare Strategy is an important milestone in defining Australia's current animal welfare approach and establishing a framework to enhance future animal welfare outcomes.

Introduction

The Australian Animal Welfare Strategy builds upon existing animal welfare arrangements in Australia. It recognises the intimate connection between animal welfare and animal health and production.

The Strategy facilitates a national consultative approach to animal welfare that welcomes involvement of broad community, industry and government interests. It establishes a framework for sustainable animal welfare outcomes based on scientific evidence, in order to meet the expectations of the whole of the Australian community, with a focus on achieving a balance between education, extension and regulation.

The Strategy recognises that animal welfare is a complex issue. Science and ethics are both essential. Science provides the body of evidence about animals that is used for moral and ethical judgements about their welfare. At the same time, decisions about animal welfare are influenced by cultural, social, economic, and occupational health and safety considerations. Australia emphasises the importance of stockmanship, the skills and responsibilities of animal carers and their role in good husbandry, and the delivery of acceptable animal welfare outcomes.

Building an enhanced national animal welfare approach

All animals have intrinsic value. The Australian approach to animal welfare requires that animals under human care or influence are healthy, properly fed and comfortable and that efforts are made to improve their well being and living conditions. In addition, there is a responsibility to ensure that animals that require veterinary treatment receive it, and that if animals are to be destroyed it is done humanely. This responsibility towards animals does not necessarily extend to intervention in the management of individual wild animals and their populations, in which animals suffer or die as part of natural processes.

The Strategy covers the care, uses and direct and indirect impacts of human activity on all sentient[1] animals in Australia (*see Figure 1*). This includes animals used in research and teaching, animals used for the production of food and fibre and other products, companion and guide animals, animals used for recreation, entertainment and display, native and introduced wildlife, and feral animals.

The Strategy's vision is that the welfare of all animals in Australia

1 A sentient animal is one that has the capacity to have feelings and to experience suffering and pleasure. Sentience implies a level of conscious awareness.

is promoted and protected by the development and adoption of sound animal welfare standards and practices. It provides direction for the development of future animal welfare policies, based on a national consultative approach and a firm commitment to high standards of animal welfare. The Strategy clarifies the roles and responsibilities of key community, industry and government organisations.

The benefits of the Strategy are:

- achievement of optimum, sustainable welfare outcomes for animals;
- development of a clear and consistent national direction on animal welfare;
- focus and guidance for future resource decisions to protect and promote sustainable animal welfare;
- readily identifiable and clearly defined national standards;
- demonstration and promotion of Australia's standards and performance against domestic and international benchmarks; and
- improved identification of research priorities for Australia, also taking account of international developments.

The Strategy will operate according to the open, consultative and consensual nature of Australia's democratic, tolerant and pluralist society. Australia's approach to animal welfare, through adoption of the Strategy, is to ensure that due consideration is accorded to a multitude of factors including science, practicability, culture, economics, ethics, societal values of the whole community, education and awareness, innovation and international developments. These considerations are relevant to the establishment and promotion of sound animal welfare standards.

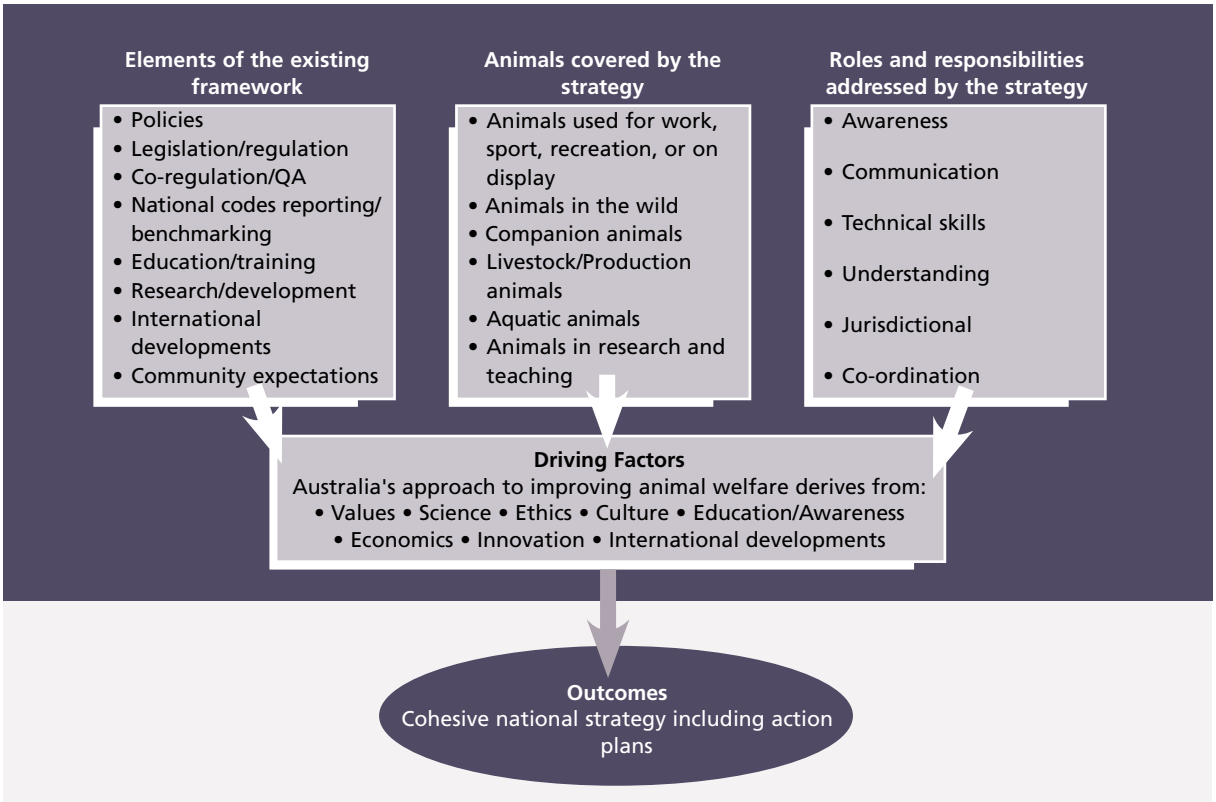
The goals of the Strategy are to achieve:

1. an enhanced national approach and commitment to ensure high standards of animal welfare based on a concise outline of current processes;
2. sustainable improvements in animal welfare based on national and international benchmarks, scientific evaluation and research, taking into account changes in whole of community standards; and
3. effective communication, education and training across the whole community to promote an improved understanding of animal welfare.

Specific objectives and strategies have been identified under each of these three goals. These include:

- involving all key stakeholders in ownership of the Strategy and in the development and implementation of animal welfare standards that have a strong scientific basis.
- improving consistency of legislation and administration across jurisdictions and the enforcement of agreed standards.
- building a shared understanding of respective roles and responsibilities.
- improving the collection and reporting of animal welfare

Figure 1. The Strategy—an overarching national strategic framework



data as a basis to benchmark Australia's animal welfare outcomes.

- enhancing the attitudes, skills and knowledge of animal carers and handlers and all other people whose actions have a potential effect/impact on animals such as wildlife or introduced animals by developing, where appropriate, national training competencies and standards.
- promoting and facilitating the inclusion of animal welfare studies in the curricula of educational institutions.
- creating national Internet sources for national, state/territory and local animal welfare information and establishing a process of national consultation with the general community on nationally important welfare issues.
- monitoring developments in animal welfare in other countries.

Roles and responsibilities

Under current constitutional arrangements, legislative responsibility for animal welfare within Australia rests primarily with State and Territory governments. All States and Territories within Australia have contemporary and comprehensive animal welfare legislation. Local governments have legislation relating to the management of companion animals. The Federal Government has responsibility for trade and international agreements.

Australia has a strong existing framework to establish and enforce acceptable animal welfare outcomes and has contemporary and comprehensive animal welfare legislation and enforcement at national, state, territory and local levels. National codes of practice and auditable industry quality assurance programs are also in place and provide a sound basis for the humane and responsible use and treatment of animals. The Strategy aims to promote and refine the framework used to protect the welfare of animals.

The Strategy further defines animal welfare roles and responsibilities for individual animal owners and users, livestock animal industry groups, community animal welfare groups and governments.

All people who have animals in their care have a responsibility to ensure that they have adequate knowledge and skills to apply to the welfare of animals. These people have an enduring obligation to seek expert assistance where necessary to ensure the welfare of animals.

Implementing the strategy

Once the Strategy is agreed, an Implementation Plan will be developed in consultation with key stakeholders. This plan will incorporate specific action plans as required with nominated lead agencies to deliver the specific objectives under the Strategy. It will also identify any additional resources and funding required to implement the Strategy. It will provide a basis for national co-ordination of the Strategy with the associated reporting on progress of implementation.

The Primary Industries Ministerial Council will assume responsibility to monitor, review and report implementation progress. The National Consultative Committee on Animal Welfare, the nationally representative committee of key stakeholders, will continue to advise the Australian Government on developments under the Strategy.

Conclusion

Australia has developed its current world-class emergency animal disease system based on consensus among key stakeholders who understand their roles and responsibilities. It is important to clearly define animal welfare policies and communicate them before emergency events. The issue of animal welfare in emergency planning and response will be further refined as a specific issue under Australia's emergency animal disease arrangements and the Australian Animal Welfare Strategy.

Author
Peter Thornber has qualifications in agriculture, veterinary science and teaching. He has extensive domestic and international experience in the management of animal health. He has been involved in emergency animal disease management since 1989 and managed the national emergency animal disease program at Animal Health Australia for three years.

The role of local government in agricultural emergencies

Eggleston and Koob examine the vital role played by local government in agricultural emergency management programs

Abstract

As the closest level of government to communities, local government has a key role in community emergency management and is part of whole-of-government emergency management arrangements. Local government prepares, or participates in, the preparation of local risk assessments and risk management reports; uses building and planning approval processes to reduce risk; prepares, or participates in, the preparation of local emergency plans, including planning for the mobilisation of local government and contracted resources; participates in training and exercising programs; and supports emergency services and the community during and after emergencies.

Why does local government participate in emergency management?

The emergency management systems in Australia are based on the principles of:

- all hazards (generic arrangements should be developed for all conceivable emergency risk);
- all agencies (a whole-of-government approach should be adopted);
- comprehensive (emergency management should include prevention/mitigation, preparedness, response and recovery); and
- a prepared community.

As the closest level of government to communities, local government has a key role in community emergency management (Office of the Emergency Services Commissioner, 2001; Montgomery, M., 2003; NSW SEMC Committee, 2004). They possess a detailed and intimate knowledge of the community they serve on a day-to-day basis and of the environment in which they operate.

The health, welfare and infrastructure functions of local government are an integral part of government service delivery. The protection of these services from risks, continuity of these services during and after emergencies, as well as the delivery of extra services during emergencies, is the basis of their role in emergency management. An often-overlooked part of the role of local government is that of leadership. Affected communities are known to look to local elected members for advice and to local government staff for assistance and support.

As a consequence, in most Australian jurisdictions local government is recognised and depended upon in the whole-of-government emergency management arrangements. As part of these arrangements local government:

- prepares, or participates in, the preparation of local risk assessments and risk management reports;
- uses building and planning approval processes to reduce risk;

- prepares, or participates in, the preparation of local emergency plans, including planning for the mobilization of local government and contracted resources;
- participates in training and exercising programs; and
- supports the emergency services and the community during and after emergencies.

A major agricultural emergency, such as an outbreak of foot-and-mouth disease, would have a huge impact on the community that goes beyond those that are directly affected, like farmers. It includes huge social and economic consequences. These negative impacts can be mitigated through co-ordinated actions preventing, preparing for, responding to, and recovering from such an emergency.

The remainder of this article addresses how local government can include agricultural emergency and risk management in their generic emergency management programs.

Reducing the risk of agricultural emergencies

The key to risk reduction is the assessment of risk and the identification of the best balance of risk treatments (Emergency Management Australia, 2000). In local government areas where a significant part of the economy, or large sector of the community, is dependent on agricultural production, it is essential that those risks to and from agriculture be assessed. Such risks can range from weeds (an enormous creeping disaster in some areas), to plague locusts, diseases such as avian influenza, viral haemorrhagic septicaemia in fish, foot-and-mouth disease, or plant pests and viruses. Advice should be sought from the jurisdictional primary industry, agriculture or fisheries department as to what the major agricultural risks for a given local area may be, based on the mix of agricultural production in the area.

In fulfilling the role of development assessor and approver, local government is the first line of defence in ensuring the risks posed to and by intensive agricultural premises are appropriately managed. Such premises could include piggeries, poultry farms, feedlots, abattoirs and fish farms. Development assessment processes are intended to deliver economic, social and environmental outcomes. In this light, local government could request, as part of the development consent:

- contingency planning covering disposal of animals destroyed during an emergency; and
- biosecurity planning including the management of run-off to minimise the spread of diseases and pests, or contamination of the environment.

As part of the local spatial plan local government could consider the separations necessary between such premises to minimise the spread of diseases and pests.

Local government could also fence off landfills to prevent pest animals such as feral pigs having access to waste, or implement a feral animal risk management program if fencing is not a viable alternative. As part of the pest and disease notification systems, local government could also promote reporting of any signs of possible animal or plant pests and diseases as early as possible.

Preparing for agricultural emergencies

Preparing for agricultural emergencies from a local government perspective has at least three aspects.

The first aspect is ensuring the continuity of service provision under sometimes trying emergency circumstances. This requires business continuity planning to:

- minimise the impact of a major agricultural emergency on the community;
- minimise the disruption of the provision of services by local government; and
- contribute to community and industry recovery.

The second aspect is local government input to local emergency planning, including:

- identifying intensive agricultural premises;
- describing their role in response to and recovery from an agricultural emergency;
- describing resources at local government's disposal that may assist in the emergency response;
- identifying possible sites for control centres in conjunction with the jurisdictional agricultural agency; and
- identifying possible sites for the large-scale disposal of destroyed animals and contaminated material in conjunction with the jurisdictional agricultural and environmental protection agencies.

In order to be understood and tested, such emergency plans would be the subject of staff training and exercising.

Responding to agricultural emergencies

Any emergency response action taken by a local government must be part of the jurisdictional emergency arrangements and structures, which vary slightly from State to State. Independent action outside of the existing framework may not be beneficial to the response and may not be eligible for reimbursement under emergency response cost sharing arrangements. Requests for action of local government during an agricultural emergency may include:

- conducting area and route control;
- closing roads and providing signage for closures and diversions;
- providing field staff for an agricultural emergency response;

- providing equipment for an agricultural emergency response;
- undertaking public and environmental health duties;
- assisting with animal disposal/ burial sites;
- assisting in the establishment of a control centre and providing personnel; and
- providing information to and from the community to assist in the response.

Eligible costs incurred by local governments in assisting in an animal emergency response will be reimbursed under existing arrangements. Local governments should discuss this matter with their agricultural agency during their planning stages to have the current cost sharing arrangements explained to them.

Recovery from agricultural emergencies

A major agricultural emergency could have the same short, medium, and long-term impacts as any other natural or technological disaster.

"Whatever the type of incident, the normal functioning of the individuals and community affected are likely to be disrupted. A disaster precipitates a sequence of events which affect the function of a community and the individuals which make up the community." (Emergency Management Australia, 1996)

Recovery activities will commence at the same time as response activities, and the community impact is likely to be broader than just the affected primary producers. Community and industry recovery is likely to take a much longer period to achieve than the emergency pest or disease control phase. Studies of the effects on animal disease emergencies have often reached very similar conclusions.

"At the individual and family level, the social impacts could range from strains on family relationships that are normally associated with adverse events and loss, through to severe mental disorders. At the community level, the impacts could range from a breakdown of normal community activities in the midst of quarantine and movement restrictions, to the changes in interpersonal relationships affecting the longer-term cohesion of the community." (Productivity Commission, 2002)

Local government can assist community recovery by co-operating with the jurisdictional emergency recovery committee and agency including:

- assessing the community impact of an agricultural emergency;
- continuing to provide information on the emergency and on recovery processes;
- coordinating local service provision; and
- assessing the impact of industry restructuring and closures on the community and assisting in any proposed changes and community adjustments.

Conclusions

Agricultural emergencies are a part of the all-hazards approach to risks and emergencies, and local government is the front line of the whole-of-government approach. The leadership of local government is necessary to build community resilience to any emergency, including those that may affect our vital primary industries.

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Authors

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Graeme has extensive experience in emergency management. He was deputy controller for NSW Agriculture during flood relief operations at Moree in 1974–1976. In more recent times he has been the State Emergency Operations Controller for NSW Agriculture co-ordinating the Department's response to emergencies since 1990.

Over the same period Graeme was responsible for managing NSW Agriculture's Emergency Management Policy and Planning. Graeme spent four weeks in a management role in the United Kingdom during the foot-and-mouth disease outbreak in 2001.

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, Geneva; two years with Emergency Management Australia; 18 months assisting with the development, conduct and evaluation of Exercise Minotaur and related activities. He specialises in risk management, emergency planning, training and exercising.

Emergency Plant Pest Response Deed

Garth Donovan reports on a world first industry/government partnership approach to managing responses to plant pest eradication

Summary

Plant industries, governments and the wider community are currently exposed to the risk of emergency plant pests and the current framework for managing pest eradication efforts is now regarded as needing improvement to a more sustainable basis. For this reason, Plant Health Australia is negotiating a world first Emergency Plant Pest Response Deed between industries and governments to fund responses to emergency plant pests.

Introduction

Governments and plant industries are facing a future with increasing international trade and tourism, growing movements of mail, cargo and machinery (see graphs), and the ever present potential for plant pests to enter Australia via natural means. The Australian Quarantine and Inspection Service (AQIS) is committed to ensuring harmful pests are excluded from Australia, and at a national level, maintain a low risk/conservative approach to quarantine, based on sound science and policy, and compliance with relevant international agreements.

Despite all quarantine measures, serious pest incursions will occur in the plant sector, via either natural means or human actions, and plant industries and governments have agreed that the current response and funding arrangements needed to be developed to a more sustainable basis.

Plant industry bodies and the Australian and State/Territory governments established Plant Health Australia (PHA) as a public company in April 2000 with the challenge of taking a partnership approach to key plant health issues and enhancing Australia's ability to respond to both exotic and emergency plant pests. Since late 2000, PHA has been working closely with its plant industry and government members to establish a world first Emergency Plant Pest Response Deed.

Figure 1. Increases in value of cargo movements

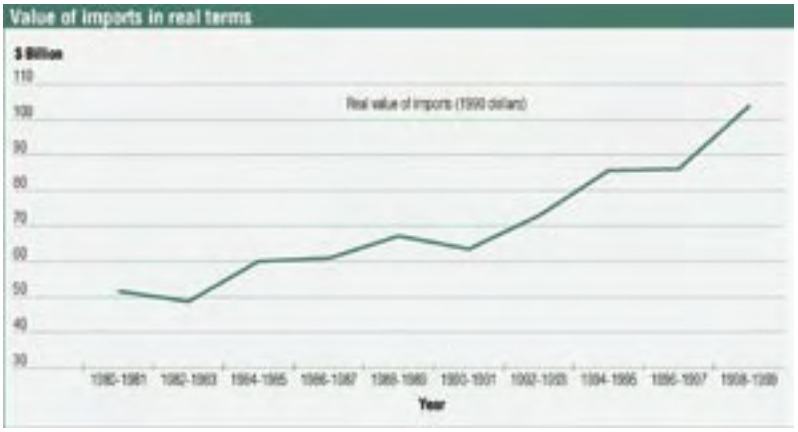
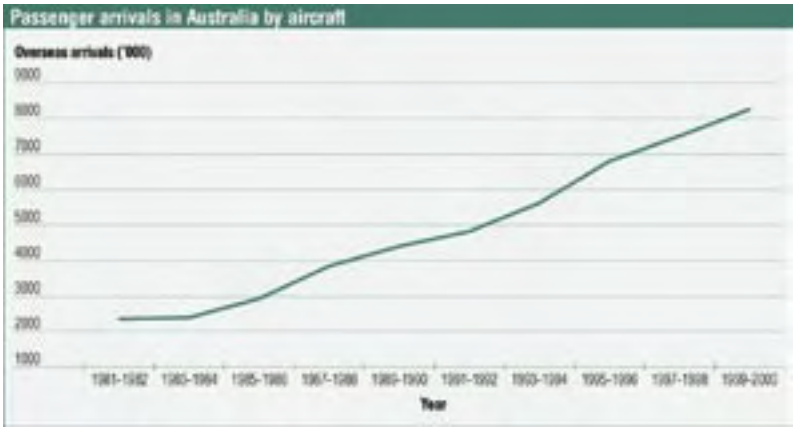


Figure 2. Increases in passenger arrivals in Australia by aircraft



Background

The history of pest and disease cost sharing arrangements between the Australian Government and the States/Territories goes back to the 1930s, with a standard cost sharing formula adopted by the Standing Committee on Agriculture and Resource Management (SCARM—now the Primary Industries Standing Committee—PISC) in July 1993 (Reeves, 2001).

Under this formula, the Australian Government currently contributes 50 per cent of the costs of eradication, while State/Territory governments share the remaining 50 per cent apportioned on the gross value of production (GVP) of susceptible crops in each state or territory.

In the animal sector, this cost sharing formula was confirmed in an agreement that covered 12 specific diseases. An Emergency Animal Disease (EAD) Response Agreement between peak livestock bodies, States/Territories and the Australian Government was ratified in March 2002, with 63 animal diseases categorised under the agreement.

Until now, no formal deed addressing funding for Emergency Plant Pests (EPPs) has ever been established in the plant sector.

Why is a formal Emergency Plant Pest Response Deed required?

The lack of formal government level arrangement has a number of disadvantages that hamper the most effective possible pest responses.

Most significantly, costs borne by industry are generally not recognised, and there is little legislative support to make payments to growers affected by an emergency pest incursion—potentially providing a strong disincentive for growers to report suspect pests. The benefits of early reporting are illustrated by an incursion of Papaya Fruit Fly (PFF) detected in Queensland in 1995, which cost some $34 million to eradicate, with industry indicating additional costs of $100 million due to loss of production (Reeves, 2001). Philippines Fruit Fly was detected in Darwin in 1997 and subsequently eradicated at a cost of approximately $5 million (ARMCANZ, 1998). Although both outbreaks were successfully eradicated, the Papaya Fruit Fly incident in Queensland incurred greater costs as the pest had spread further before being discovered and reported to authorities.

Secondly, there is no formal industry involvement in decision-making, although industries are currently engaged as observers on key decision-making committees.

Thirdly, there are ongoing pressures on agriculture budgets and agriculture departments increasingly need to seek funds directly from treasury or finance departments each time they wish to secure funding for an individual pest eradication campaign. This can significantly delay a response and lead to increased eradication costs.

Lastly, as there is no formal Emergency Plant Pest Response Deed, PISC could change the cost sharing arrangements at any time and any jurisdiction could decide not to participate without breaking any formal, signed agreement.

Emergency Plant Pest Response Deed (EPPRD)

PHA members endorsed the preparation of a Emergency Plant Pest Response Deed for the plant industries based on the following agreed points:

- cost minimisation to all parties;
- early detection and response;
- ensuring rapid responses to emergency pests/diseases—excluding weeds in the first instance;
- appropriate criteria for eradication (must be technically feasible and cost beneficial);
- an agreed list of potential emergency plant pests, including diseases;
- an industry commitment to biosecurity and risk mitigation and a government commitment to best management practice;
- eligible cost payments to growers involved in pest eradication efforts;
- a cap on contributions (based on local value of production);
- an effective industry/government decision-making process; and
- a limit in scope (to only cover emergency pest or disease threats relevant to PHA member industries).

The EPPRD broadly involves categorising the most serious emergency pests for each industry according to the severity and impact of the pest, as well as the pubic and private benefits of eradication, and determining and agreeing on cost sharing arrangements in advance of an emergency. Cost sharing categories are listed on the following page.

A more effective decision-making structure

Under the EPPRD, plant industry and government representatives will have equal involvement in decision-making and technical committees formed to consider a response to an emergency plant pest and if government and industry cost sharing should proceed. In addition, the EPPRD will be underpinned by PLANTPLAN—a national emergency preparedness and response plan for the plant industries co-ordinated by PHA.

Owner reimbursement costs

The deed will include owner reimbursement costs so that industry costs (e.g. destruction of crops or increased labour costs) will be formally recognised and cost shared. This will help recognise the financial burden that industry members face in assisting eradication efforts, and remove disincentives for growers to report suspected emergency pest outbreaks. Industry will also be formally involved in all decision-making, and as funding arrangements are pre-agreed, responses should be undertaken far more rapidly than at present.

Table 1. Cost sharing categories

Category	Description	Cost share
Category 1: Very high public benefits	EPPs which if not eradicated or contained would: • cause major environmental damage to natural ecosystems; and/or • potentially affect human health or cause a major nuisance to humans; and/or • cause significant damage to amenity flora; and • have relatively little impact on commercial crops. This category also covers situations where the pest has a very wide range of hosts including native flora and there is considerable uncertainty as to the relative impacts on different crops. In short, it is almost impossible to properly determine which industries benefit from eradication and to what extent, and in any case, the incursion primarily affects native flora and/or amenity plants, and/or is a major nuisance if not a health risk to humans.	100% government funding
Category 2: High public benefits	EPPs which if not eradicated or contained would: • cause significant public losses either directly through serious loss of amenity, and/or environmental values and/or effects on households, or indirectly through very severe economic impacts and regions or the national economy, through large trade losses with flow on effects through the economy; and • impose major costs on the industries concerned so that these industries would benefit significantly from eradication.	80% government funding, 20% industry funding
Category 3: Moderate public benefits	EPPs which if not eradicated or contained would: • primarily harm the industries concerned but there would also be some significant public costs as well (that is, moderate public benefits from eradication). The EPP could adversely affect public amenities, households or the environment, and/or could have significant, though moderate trade implications and/or national and regional economic implications.	50% government funding, 50% industry funding
Category 4: Mainly if not wholly private benefits	EPPs which if not eradicated or contained would: • have little or no public cost implications and little or no impacts on natural ecosystems. The affected industries would be adversely affected primarily through additional costs of production, through extra control costs or nuisance costs; and • generally there would be no significant trade issues that would affect national and regional economies.	80% industry funding, 20% government funding

Commitment to risk reduction and biosecurity

As well as outlining the funding arrangements for emergency pests, the deed includes significant risk minimisation obligations for both industry and government in recognition that all parties should seek to proactively reduce both the risks and potential costs of emergency plant pests.

Greater transparency, accountability and certainty in funding

Pre-determined limits on liability are included to ensure eradication costs do not exceed the financial capacity of either industry or government parties. In addition, cost sharing will only commence when pest eradication is determined as being both cost beneficial and feasible, and all response efforts will be independently audited upon completion.

Conclusion

PHA is aiming to have the Emergency Plant Pest Response Deed formally ratified by late October 2004. The deed will be a world first in the plant sector and vital for minimising pest and disease risks and the associated financial and social costs of pest eradication, and for establishing a genuine industry/government partnership approach to managing responses to emergency plant pests.

Specific information on the Emergency Plant Pest Response Deed can be found at www.planthealthaustralia.com.au/EPPRD

Information on PHA is available from www.planthealthaustralia.com.au

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National emergency animal disease rapid response team

Callan and Flaherty discuss the RRT concept and its benefits

Abstract

The Rapid Response Team (RRT) concept has been developed to enable the rapid deployment of a control centre in smaller jurisdictions, and to improve national planning, training and preparedness. This development involved selecting, training, and exercising RRT members; developing and testing the activation arrangements; assessing and reporting on the RRT concept; and providing recommendations for its future direction. The RRT concept has resulted in a range of consequential benefits apart from the demonstration that such a team is a necessary and viable strategy.

Introduction

Each State and Territory government is responsible for the safety and well being of its citizens. To this end State and Territory governments have their own police service, fire service, ambulance service, State/Territory emergency service, health services, and agricultural agency. While most people are familiar with the roles and responsibilities of the emergency services, not as many would be as aware of the role agricultural agencies perform in responding to an outbreak of an emergency animal disease, such as foot-and-mouth disease, Newcastle disease or anthrax.

In fact the role of agricultural agencies in controlling an outbreak of an emergency animal disease is not dissimilar to that of a State's rural fire service having to control an outbreak of fire or the State's emergency services when responding to a severe storm. Within each State and Territory there is legislation that gives that jurisdiction's agricultural agency the responsibility for the control of agricultural emergencies.

While a jurisdiction's emergency services may perform their legislated emergency role, responding to emergencies on a regular basis, the occurrence of agricultural emergencies is not so frequent. As such, the level of resources developed within each jurisdiction to deal with agricultural emergencies is generally not as high as that of the traditional emergency services.

Developing the concept

The RRT concept has been developed in recognition of a number of factors. Firstly, in any emergency the longer it takes for responders to get organised and have in place a capable control centre the worse the consequences of the emergency are likely to be. Secondly, the agriculture agencies in smaller jurisdictions are less able than their larger counterparts to maintain the full range of specialists that are required to manage a significant animal disease outbreak. Thirdly, nationally there is a substantial group of highly skilled response personnel and by increasing opportunities for their interaction across borders, a great deal can be achieved in the way of national planning, training and preparedness.

The RRT concept captures these factors by seeking to establish a squad of expert responders, drawn from all jurisdictions, who can be flown into any location at short notice to set up a fully functional control centre within 24 hours.

The current RRT project is a trial to form and evaluate an initial team. The Australian Government provided seed funding for this trial with the responsibility for the project residing with the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF). The strategic direction for this project was provided by a steering committee that consisted of representatives from each State and Territory government, the Australian Government and Animal Health Australia.

The concept of a national "swat squad", although new to the Australian agriculture sector, is not new in other areas, and in its development, the DAFF co-ordinators examined the arrangements that are already in place for a number of similar groups across Australia and overseas. This study included the National Response Team for marine oil spills co-ordinated by the Australian Maritime Safety Authority[1], NSW Rural Fire Service's response teams, NSW National Parks and Wildlife Services response teams, the multi-disciplinary Urban Search and Rescue teams and the U.S. Department of Agriculture's Emergency Animal Disease Eradication Organizations (READEOs).[2]

1 Australian Maritime Safety Authority website, http://www.amsa.gov.au/Marine_Environment_Protection/National_Plan/Contingency_Plans_and_Management/Oil_Spill_Contingency_Plan.asp, viewed 5 May 2004.

2 United States Department of Agriculture, Veterinary Services Emergency Programs website, http://www.aphis.usda.gov/vs/ep/, viewed 10 May 2004.

Control centre in Exercise Noonamah

While the concept of the RRT had been discussed for many years, turning this concept into reality was easier said than done. The tasks faced by the co-ordinators were many and varied and included:

- addressing the interests and concerns of jurisdictions that are potentially donors as well as those that are likely to be recipients;
- identifying which positions are essential in an RRT;
- determining how to fill these positions in a multi-jurisdictional environment;
- identifying specific jurisdictional needs, strengths, weaknesses, etc. that may need to be catered for; and
- developing protocols for the operation and deployment of the RRT.

During the 12 months that the RRT was developed and trialed the following activities were conducted:

- selecting RRT members;
- training and exercising RRT members;
- developing and testing the activation arrangements; and
- assessing and reporting on the RRT concept and providing recommendations for its future direction.

Selecting RRT members

The composition of the RRT was determined by the steering committee that identified key management positions within a State Disease Control Headquarters (SDCHQ) or Local Disease Control Centre (LDCC) that could be filled by the RRT. These positions were drawn from the AUSVETPLAN Control Centre Management Manuals[3] and represented positions that were essential to the success of an EAD response operation. RRT members were selected against these positions on the basis of prior experience and training, and personal characteristics that would enable them to perform the functions of these positions. The project relied for its success on the acceptance of all jurisdictions of the selection process and their endorsement of and commitment to the participation of the selected personnel in RRT activities over the initial twelve-month period. Despite the evident cost in staff time, all jurisdictions agreed to this significant investment.

Training and exercising RRT members

The training for the RRT centered around three major activities, each of five days duration. They represented a significant contribution by each member's organisation and the jurisdictions in which the activities were conducted. These activities were:

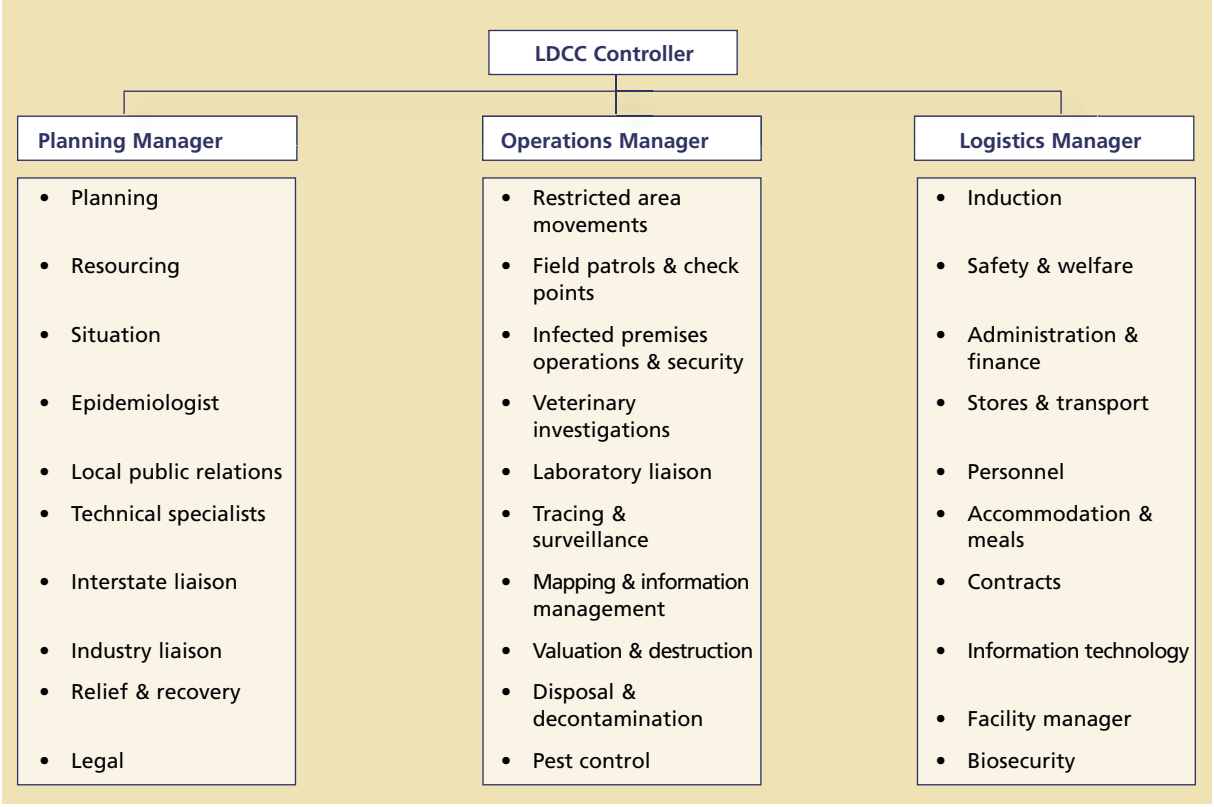
- briefings and competency training for all RRT members, conducted in Adelaide in November 2003,
- a training and development exercise *(Exercise Noonamah)* conducted in Darwin in March 2004, and
- a further development and assessment exercise *(Exercise Sarcophilus)* conducted in Hobart in May 2004.

These activities were conducted in potential recipient jurisdictions because it was important that RRT members had a good understanding of the EAD and emergency management arrangements that applied in those host jurisdictions.

In each exercise the host jurisdiction was actively involved in the development of the exercise scenario and the establishment of facilities as well as actively participating in controlling the exercise. Both exercises were conducted as functional exercises, which required the establishment of an LDCC and SDCHQ. *Exercise Noonamah* involved 100 participants and control staff, while *Exercise Sarcophilus* involved

3 Animal Health Australia website, http://www.aahc.com.au/ausvetplan/index.htm, viewed 5 May 2004.

Figure 1. Local Disease Control Centre (LDCC) structure & functions



Reference: Animal Health Australia (2004) *AUSVETPLAN Control Centres Management Manual, Part 1 Management and organisation of control centres*

more than 150 participants and control staff (including a meeting of their Tasmanian Emergency Animal Disease Inter-departmental Committee).

While the training and exercises were designed to increase the skills and knowledge of the RRT members, there was also a necessity to assess individuals against the EAD competencies as well as evaluate the viability of the RRT as a concept.

Accredited EAD assessors, through summative and formative assessment, assessed individuals where participants were observed performing their role during both exercises, as well as being required to provide evidence as per the EAD competencies.

The RRT was continually assessed throughout these activities using feedback from participants, daily debriefs, exercise debriefs and jurisdictional debriefs, as well as independent assessment by an outside observer.

Activating the RRT

A range of methods for activation was examined and, due to the various locations of participants, no one method was suitable to all. As such members are activated using email, facsimile and/or telephone (including mobile telephone).

When a jurisdiction identifies that they have, or suspect they have, an emergency animal disease it is incumbent on that jurisdiction's Chief Veterinary Officer (CVO) to notify the Australian Chief Veterinary Officer (ACVO). Upon receiving this notification the ACVO convenes the Consultative Committee on Emergency Animal Disease (CCEAD) and provides the RRT co-ordinators with notification that the potential for activation of the RRT exists. This is to be passed on to RRT members. From this notification, members can determine whether they can be released from their duties, commence the necessary approvals, and prepare to disengage from other activities.

The initial CCEAD meeting determines whether the RRT will be activated. Following this meeting the RRT co-ordinators will be advised of the decision and either stand down the RRT or deploy them to the recipient jurisdiction. The initial RRT could expect to be deployed for around ten days. At the end of that time they would either hand over responsibilities to the jurisdiction or be replaced by another RRT.

Using this procedure, the RRT can be deployed to any jurisdiction in Australia within 24 hours of official notification (following the CCEAD decision). It is anticipated that after briefing and induction by the recipient jurisdiction, members could be working in their nominated role within 36 hours.

Benefits of the development of the RRT concept

The development of the RRT concept has resulted in a range of consequential benefits, apart from the demonstration that such a team is a necessary and viable strategy. The benefits that may not have otherwise arisen include:

- the conduct of major EAD response exercises in two jurisdictions, which has led to an increased level of physical preparedness in these jurisdictions;
- the development of national training material not previously available;
- a highly trained and practiced cadre of EAD professionals across Australia;
- raising awareness that EAD response is a national issue, and not one that can be handled by a single jurisdiction alone; and
- the sharing of knowledge concerning EAD response arrangements across Australia.

The future of the RRT

Following *Exercise Sarcophilus*, an evaluation process has incorporated the views of all stakeholders. A report was made available to the Primary Industry Standing Committee (PISC) providing recommendations on the future of the RRT concept. It is clear that most jurisdictions support the concept in principle but pivotal issues affecting its continuation, such as longer term funding arrangements, remain. The PISC report canvasses options for these issues and provide recommendations for the way forward.

Authors

Tony Callan has been involved in emergency management for 25 years, either as a responder, or in a management role. He was an active volunteer member of the NSW State Emergency Service for 15 years until he commenced worked as a District Emergency Management Officer in NSW, a position he held for eight years prior to commencing work with the Dept of Agriculture, Fisheries and Forestry two years ago. During this time he has been involved in a wide range of emergency responses including Sydney storms and bushfires throughout the 1990's, Merimbula Tornado (1995), Thredbo Landslip (1997), Sydney to Hobart Yacht Race (1998), Mangrove Mt-Newcastle Disease (1999), Wollongong Storm (2001), South Coast Fires (2002), and the Snowy Mountains and Canberra Bush Fire (2003). In his current position he is responsible for ensuring that DAFF has arrangements in place to manage its responses to incidents and emergencies that may impact on the agriculture and aquatic sectors.

Greg Flaherty works in the Emergency Risk Management Unit of the Australian Government Department of Agriculture Fisheries and Forestry. Greg has been involved in emergency preparedness activities since 2000 when he redesigned the Department's generic plan for co-ordination of responses to pest and disease emergencies in Australia's agricultural industries. He was part of the team responsible for the design of the national co-ordination framework for outbreaks of serious animal disease emergencies (such as foot-and-mouth Disease and Mad Cow Disease) and the development and delivery of *Exercise Minotaur.* More recently he has been working on the development of the national emergency animal disease rapid response team concept.

CSIRO's Australian animal health laboratory

Martyn Jeggo outlines the five national priorities of the Australian Animal Health Laboratory

Abstract

CSIRO's Division of Livestock Industries' Australian Animal Health Laboratory (AAHL) is a national centre of excellence in disease diagnosis, research and policy advice in animal health. There are five national responsibilities of this facility and it plays a vital role in maintaining Australia's capability to quickly diagnose exotic (foreign) and emerging animal diseases.

AAHL opened in 1985 at a cost of over $150 million, and is one of the most sophisticated laboratories in the world for the safe handling and containment of animal diseases.

AAHL is funded by the Australian Federal Government, via CSIRO and the Department of Agriculture, Fisheries and Forestry, and also by industry organisations and commercial companies. AAHL has a number of external oversight committees to ensure compliance with good microbiological management, OHSE issues and general governance. The most important of these is the AAHL Advisory Council which is Chaired by DAFF and has representatives from States, industry and other key stake-holders, meets twice a year and provides strategic direction and broad prioritisation of activities at AAHL.

Responsibilities

AAHL has five national responsibilities:

1. Diagnosis of infectious exotic diseases;
2. Developing new vaccines and therapeutics;
3. Provision of advice and reagents;
4. Training and education; and
5. Biocontainment.

Diagnosis of infectious disease

Prior to the opening of AAHL, most specimens for exotic disease exclusion needed to be sent overseas to a reference laboratory for a specific diagnosis. This placed Australia in a difficult situation because of a loss of control over important information related to trade and because of the considerable time it took for a result to be obtained from the overseas laboratory. Samples also could be damaged in transport and hence a definitive diagnosis would not be possible. Given the significant value of Australian export of animal products and live animals, AAHL was established to carry out exotic disease diagnostics and to underpin Australia's trade in this area.

In the last 19 years, AAHL has supported State veterinary laboratories by providing exotic disease diagnostic services. Thousands of samples have been tested for disease exclusion, providing continuing evidence of freedom from diseases such as foot-and-mouth disease (FMD), bovine spongiform encephalopathy (BSE), scrapie and a range of fish diseases. A small number of outbreaks have been confirmed—such as the poultry diseases, avian influenza and Newcastle disease. In 1998, the importance of AAHL was highlighted when testing at AAHL showed that FMD was not present in the Toowoomba saleyards, enabling quarantine bans to be lifted within 24 hours. If specimens from Toowoomba had to be flown to the World Reference Laboratory for FMD at Pirbright, United Kingdom, at least three days would have been required for diagnosis and this would have resulted in significant disruption to Australia's export trade.

AAHL has played a major role in detecting and characterising new viral diseases of animals.

In the last 10 years the facility demonstrated that Hendra virus (previously know as equine morbillivirus) was the cause of the unusual disease in horses

and humans that occurred in Queensland in 1994/95. The laboratory also showed that an orbivirus called Wallal was the cause of kangaroo blindness and that flying foxes and insectivorous bats throughout Australia were infected with a dangerous rabies-like virus called Australian bat lyssavirus. In 1997 another virus, called Menangle virus was isolated in New South Wales and was shown to cause serious reproductive disease in pregnant sows and a 'flu like' illness in piggery workers. AAHL characterised the virus and showed it to be novel. In 1999, AAHL worked with key international research organisations investigating another new virus in Malaysia. Now called Nipah virus, the previously unrecorded viral disease killed more than 100 people and thousands of pigs. This paramyxovirus is closely related to Hendra virus. In 2003, AAHL joined investigations in the animal reservoir of SARS. As part of the development of disease control strategies, research is continuing on the viruses in an attempt to better understand the diseases they cause.

AAHL is recognised by the world animal health organisation – *the Office International des Epizooties* (OIE) – as a regional reference laboratory for Newcastle disease, avian influenza, bluetongue and rabies.

The importance of the OIE reference laboratory role was exemplified during the recent avian influenza emergency in South East Asia. Initially a staff member was seconded to the UN Food and Agriculture Organization (FAO) to provide a mix of expertise in laboratory diagnosis, emergency response and animal disease control. This mission involved work at FAO headquarters and with the animal health authorities in Thailand, China and Vietnam. Follow up activities by AAHL included training of veterinary laboratory staff from Vietnam and then Indonesia, Myanmar and the Philippines, and production and distribution of laboratory reagents to a number of countries in the region. AAHL has also recently been designated as an OIE Collaborating Centre for New and Emerging diseases giving it a crucial global role in the risk management of diseases.

Collaborative disease investigations help to reduce the threat of disease incursion by first assisting disease control and secondly by establishing productive working relationships with animal health authorities in Australia's immediate neighbourhood.

Developing new vaccines and therapeutics

AAHL undertakes research to develop new diagnostic tests, vaccines and therapeutics for endemic animal diseases of national importance. This research helps improve animal welfare and industry efficiency. Research focuses on diseases such as Johne's disease (a wasting disease of ruminants) and developing alternatives for antibiotics for intensive animal industries like pigs and poultry.

AAHL recently extended these efforts into a number of exotic diseases through collaboration with a range of national and international partners.

Provision of advice

AAHL provides expert advice to the Australian Government and State governments on exotic and endemic disease management issues. It also provides advice to government, industry bodies and the private sector on issues such as disease risk and disease research solutions. AAHL also assists in overseas development projects in the animal health area. Key staff from AAHL travelled to Malaysia during the 1999 Nipah virus outbreak and to China in 2003 to co-ordinate investigations into the animal reservoir of SARS.

Training and education

AAHL has provided exotic disease training to more than 400 Australian and New Zealand veterinarians. In 1999, with funding from the Northern Australia Quarantine Strategy (NAQS), this training was extended to other veterinarians in the region, with a group from Indonesia visiting AAHL. A further group of veterinarians from Indonesia and Papua New Guinea attended training at AAHL in 2002.

In the early 1990s, AAHL produced a series of exotic disease training videos and slide sets. These resources help educate farmers, vets and others about exotic disease. Three series of videos are available—covering rural awareness, vet training and training for control workers.

AAHL is active in transferring technology to Australian States and overseas. For example, the AAHL Plant Toxins Unit has transferred tests to detect low

levels of corynetoxins (the cause of Annual Ryegrass Toxicity) to State laboratories, allowing inter-laboratory validation.

AAHL has an ongoing collaboration with Vietnam's Veterinary Company/ Veterinary Research Centre (NAVETCO) and the Department of Animal Health (DAH). AAHL staff have provided training in disease investigation and diagnosis for animal diseases such as classical swine fever, avian influenza and duck virus enteritis to their Vietnamese colleagues. Staff from NAVETCO and DAH have also attended training workshops at AAHL.

Biocontainment

AAHL includes a high-biocontainment facility, to safely fulfil its major role of diagnosing emergency animal disease outbreaks.

In addition to use in emergency disease diagnosis, exotic disease agents are also used in evaluating vaccines and related control options, and in training veterinarians to recognise diseases they would not normally see. Some of these exotic diseases pose major economic threats to the nation's animal industries, so they must be securely kept and handled safely inside the laboratory.

Procedures and containment facilities at AAHL conform with or exceed the requirements defined in the *Australian/New Zealand Standard, Safety in Laboratories, Part 3; Microbiological safety and containment facilities.*

AAHL has the capacity to operate at biosecurity level four (BSL4), the highest available. Such facilities are necessary to handle safely zoonotic pathogens that pose a high risk to humans as well as animals.

AAHL's main building has five levels, of which four are inside the secure barrier, a thick concrete wall that forms an airtight 'box' around the secure area. All of this area is held at a lower air pressure than the outside world, to keep any airborne infectious agent inside the laboratory.

Within the secure box are a series of smaller secure boxes, each with a drop in air pressure. A guiding principle in the design of AAHL was that biocontainment should never get by a single barrier. If one containment system or barrier fails, then at least one other barrier is in place to protect Australia's livestock.

All physical containment systems are duplicated, and all essential systems, such as electricity generators, steam and compressed air plants, are triplicated. Biocontainment would not be at risk from a computer or power failure, for example.

Anything leaving the secure area must first be treated. The air is routinely filtered to remove infectious aerosols. All the sewage is heat-treated and solid waste is incinerated. Equipment leaving the secure area is sterilised by autoclave or gas decontamination. Information must be transmitted to the outside by fax or computer network, as books and papers cannot be removed once inside the secure area.

Special biocontainment cabinets are used for laboratory bench work. When working with infected animals that may be excreting viruses potentially fatal to humans, staff work in special plastic suits that cover the whole body and isolate them from the disease hazard. When working with agents such as Newcastle disease virus, which can be carried in the respiratory tract or the eyes, staff wear breathing-air hoods. Access to such agents is strictly limited to trained staff who use a range of measures to contain the disease agents.

The personal containment procedures are backed up by compulsory showering out of infected animal rooms and out of the secure area. As an added precaution, once outside the secure area, staff must not have contact with livestock animals for seven days. In addition, a quarantine suite is maintained on site in the event of a laboratory accident that exposes a staff member to an exotic infectious agent. Staff would then stay on site in the quarantine suite until cleared to leave.

The BSL 4 facilities at AAHL are viewed as best practice by many in the world. In 2002, the National Center for Foreign Animal Disease, part of the Canadian Science Center for Human and Animal Health, commissioned their BSL4 facility in Winnipeg. Prior to commission, a virologist, veterinary scientist and biosecurity officer from the Canadian facility visited AAHL, gaining skills and knowledge on the best practice for operating at BSL4.

Summary

AAHL remains today what it was 19 years ago, one of the world's leading high security biocontainment laboratories, demonstrating best practice and utilising cutting-edge diagnostic technologies to maintain an effective national, regional and global role. As globalisation proceeds the risk from new and emerging disease undoubtedly grows and with the added dimension of bio-terrorism, AAHL continues to be a relevant and critical infrastructure for both Australia and the world.

Author
Dr Martyn Jeggo is the Director of CSIRO Livestock Industries' Australian Animal Health Laboratory (AAHL). He has headed AAHL since September 2002. Dr Jeggo's career has included stints at the United Kingdom's Institute of Animal Health Pirbright Laboratories, the Veterinary Diagnostic Laboratories in Yemen Arab Republic and the Joint FAO/IAEA Division of Agriculture (Food and Agricultural Organisation/International Atomic Energy Agency), in Vienna, Austria. For more than 15 years he has been involved in the management of laboratory networks dealing with rinderpest and contagious bovine pleuropneumonia in Africa, Foot-and-Mouth Disease in Asia, and brucellosis worldwide.

National crisis communication arrangements for agricultural emergencies

Howard Conkey considers effective communication practices during agricultural emergencies

Abstract

A critical success factor for any significant agricultural emergency is how effectively governments and industry communicate to stakeholders. This communication must be undertaken prior to, during and after an emergency. This paper describes a number of communication initiatives undertaken in the agricultural sector including: a national communication network; pre-approved advertising material for use in a crisis; national telephone arrangements; a national agriculture emergency website; biosecurity education and awareness campaigns; and, a course to train PR professionals in crisis communications.

Introduction

There is an adage in crisis communications that at least 50 per cent of a response in an emergency is communications. Most public relations professionals would argue the figure is higher, but whatever the final number getting communications right in a crisis is of utmost importance.

A critical success factor for any significant agricultural emergency is how effectively governments and industry communicate to stakeholders. Good quality, co-ordinated, well planned and delivered public communications substantially shape the willingness of the range of affected parties to assist in the task of resolving a pest, disease or food contamination problem. Co-operation from farmers and affected communities, trust by consumers in response actions and market access outcomes all hinge on how well governments explain their actions and strategies.

Exercise Minotaur in 2002 and subsequent incidents have clearly demonstrated a number of issues that Australia had to address if it wished to put in place an effective public communications arrangement for a major disease outbreak. Much has been achieved since *Minotaur* to develop a more strategic approach to national communication arrangements and to develop tools that will help during an emergency. These include:

- the establishment of a national communication network
- the production of pre-approved advertising material for immediate use in a crisis
- national telephone arrangements
- creation of a national agriculture emergency website
- ongoing non-English speaking background (NESB) biosecurity education and awareness campaigns, and
- a crisis communication course to train PR professionals for a role in an emergency response.

National Communication Network

One of the major lessons from the 2001 UK foot-and-mouth disease (FMD) outbreak (UK Stationary Office 2002) was the need to ensure consistency in public comment in order to maintain stakeholder confidence in the response to the emergency. The mechanism that has been established in Australia for this purpose is the National Communication Network (NCN).

In 2002, COAG signed a Memorandum of Understanding on FMD arrangements (COAG 2002) that required each jurisdiction to identify a key communication manager. The MOU also committed signatories to consistent public comment from key spokespeople and to conduct media briefings. The MOU gave rise to the creation of the NCN, a group of 10 communication professionals drawn from each jurisdiction and including Animal Health Australia to represent the key industry groups covered by the Emergency Animal Disease Cost-Sharing Agreement. (AHA 2003) The network has developed into a powerful communication tool that has been used successfully on numerous pest and disease emergencies including Newcastle disease, anthrax in cattle, wheat streak mosaic virus, the Cormo Express live trade sheep consignment, BSE in Canada and the USA, and small hive beetles. Its strength is the degree of co-operation and trust that has been generated across jurisdictions and with industry in agreeing to and using consistent talking points, identifying key spokespeople, and in devising strategic crisis communication approaches to various issues.

The network is also an acknowledgment that in a large-scale FMD outbreak in Australia as many as 200 agencies may be

directly engaged in the response and the media could legitimately approach any for comment. The major strength of the network is that a small number of people can effectively co-ordinate the overall communication efforts of a group as large as 200.

For example, at the Australian Government level the 12 agencies that would be involved in a FMD outbreak are connected to the national communication arrangements by one person and in Queensland more than 20 agencies including the SES, Ambulance, Police, Transport, Health, etc. are again connected through the one representative. The network has proved to be so effective that it has broadened its focus to include plant pests with the involvement of Plant Health Australia and CSIRO Plant Industry.

Pre-approved advertising material

The Australian Government has produced biosecurity ads that are being held in reserve for use in an emergency animal disease outbreak. The print, radio and TV ads highlight what biosecurity measures producers can take to contain the initial spread of a disease and where people can go for further information. The radio and newspaper versions have been produced in Arabic, Cantonese, Croatian, Greek, Italian, Macedonian, Maltese, Mandarin, Punjabi and Vietnamese.

Designed to have a shelf life of at least 20 years, creation of the material now ensures that protracted production lead-times are avoided during a crisis and useful biosecurity information can be aired immediately on confirmation of a disease. The ads reinforce ongoing biosecurity education and awareness initiatives.

When an emergency animal disease has been confirmed, the Australian Government's "Matters of Public Importance" protocol can be immediately invoked so that the biosecurity advertising material can be aired in place of any existing Australian Government advertising campaigns. The material is expected to be aired for at least the first week of a confirmed outbreak and will be complemented by website

information, press releases, press conferences, phone hotline services, etc. The Australian Government and Commercial Television Australia has already pre-approved the ads, further clearing the way for their immediate use in an animal disease emergency. The advertisements will predominantly be placed in rural and regional Australia. The target audience for them include farmers and producers, service providers for farming enterprises (example shearers), other public including consumers, tourists and non-English speaking background audiences, vets and the media

National telephone arrangements

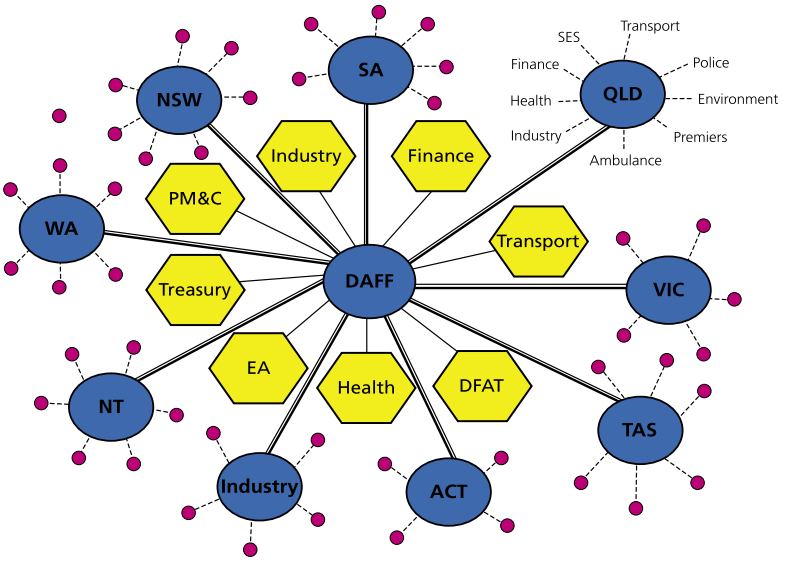
Centrelink has been engaged to provide a telephone hotline in the event of a major animal disease because of its extensive telephone infrastructure, the availability of 3,500 full-time operators, and the flexibility of its service.

Called the Emergency Animal Disease Telephone Service, this important public communication tool was deemed critical in light of the 2001 UK FMD outbreak.

The telephone service can be switched on in 30 minutes and pull-down computer menus that detail relevant information on diseases such as FMD in a question and answer format already support the service posted on the Centrelink intranet.

Figure1. The national communication network

The diagram illustrates how national communication arrangements will work in a FMD outbreak. The blue elements comprise the membership of the NCN, yellow a few of the Australian Government agencies that would be involved, and red some of the State/Territory and industry agencies and bodies.



This information can be updated in a matter of minutes and will be maintained regularly. A number has already been reserved with Telstra for the service – 1800 234 002 – and the availability of this number is highlighted in the pre-approved advertising material.

The service will operate between 8am–10pm local time, seven days per week, but could operate 24 hours a day if required.

It is expected a total of 200,000 calls will be made to the call centre in week one and this will fall in weeks two to seven to a total of 50,000 calls per week. The average length of call is expected to be 150 seconds and operators will require about 30 seconds afterwards to log details for tracking and research purposes.

Expected peaks from some rural callers will be early in the day and again at midday and in the evening. Urban callers are more likely to peak late in the morning. The service has been designed to answer 80 percent of all calls within 30 seconds.

Reporting on the number of calls to the hotline from each State is to be provided on a daily basis. Reporting on the number of calls by region will be available on a weekly basis.

Other types of reporting information will include urgent and important information, telephone call statistics, enquiry types, trends, and individual non-urgent call information. Information will be captured in a database to allow trends to be determined which will shape the targeting of specific communication messages to various geographical locations if required.

National agricultural emergency website

The World Wide Web has developed into one of the most important communication mediums available for the quick and accurate dissemination of information to stakeholders. The media make extensive use of Internet resources for reporting purposes as do others seeking more detail.

During the Newcastle disease outbreak at Meredith near Melbourne in 2002, trading partners informed the Australian Goverment Department of Agriculture, Fisheries and Forestry they were making decisions using Internet-based information rather than contacting overseas posts. The trading partners were subsequently critical of sites not updated on a daily basis. Experience with multi-jurisdictional pest and disease outbreaks such as Wheat Streak Mosaic virus and *Exercise Minotaur* indicate the Australian Government, States and Territories produce their own Internet-based information in an emergency.

While some of the information relates directly to specific jurisdictional issues, much of the material relates to common issues and could give rise to differences that would play out badly if publicly highlighted. Multiplication of effort during a significant emergency such as foot-and-mouth Disease would be a waste of scant resources at a demanding time.

A single national website – www.outbreak.gov.au – has been developed to address these issues and to be the definitive information resource during an outbreak emergency.

Features of the site include:

- An ongoing library resources that will access reference materials such as clinical symptoms, diagnostics, history of diseases, photographs
- Incursion status about any current outbreaks that includes:
  - Situation reports
  - Links to International, State, local and industry related sites
  - Information resources—reference materials (reports, reviews, mortality figures, databases, fact sheets, newsletters)
  - Media information containing print images, vision, audio grabs, fact sheets, transcripts, chronology and media releases
  - Livestock movement advice
  - Advice for travellers, exporters and primary producers
  - Response and recovery information
  - Frequently asked questions
  - Subscription information—notification of when updates occur or notice of press conferences, public information sessions or when media releases are issued.

The site can feature any number of animal, plant and marine pest incursions at the one time. Importantly the site will also indicate if there are no current incursions.

NESB biosecurity education and awareness campaign

The Australian Government has commenced a $300,000 biosecurity education and awareness campaign targeting people of non-English speaking backgrounds (NESB) involved in agriculture as part of broader pest and disease emergency preparedness activities.[4]

Many of the people from this target audience are peri-urban dwellers, engage in swill feeding and, through a lack of understanding and awareness, potentially pose a high-risk of introducing pests and diseases into Australia. This is the first time this group has specifically been targeted by the Australian Government on biosecurity and the campaign will focus on animal, plant, and quarantine issues.

The NESB campaign builds on biosecurity awareness campaigns conducted by Animal Health Australia, Plant Health Australia, industry, State/Territory Governments and the Australian Quarantine and Inspection Service.

Heavily weighted towards face-to-face communication, the campaign is using word-of-mouth and informal and formal networks such as attendance at ethnic festivals and DAFF's roadshow to spread the message.

Resources have been produced in 10 languages including brochures, information sheets, websites, displays and posters. An audiocassette, video and radio series have also been produced.

The objectives for this biosecurity education and awareness campaign are to:

- generate cultural change to improve the biosecurity of individual farms, and
- educate all stakeholders about roles, responsibilities and procedures to be followed in the event of an emergency animal or plant disease outbreak.

Key messages of the campaign include:

- look for and immediately report anything unusual;
- check the origin of material coming on and off farms to assess the risk of disease and pests;
- create a "buffer zone" with neighbouring farms;
- do not feed food waste to production animals particularly swill to pigs;
- if dealing with suspect animals, clean and disinfect yourself afterwards;
- use seed or propagation material that has been certified "free from pests";
- do not bring in plant material of a favourite plant or variety from overseas; and
- tough fines of up to $60,000 or imprisonment can apply to quarantine breaches.

Crisis communication training module for public relations professionals

Crisis communication is a specialist public relations function and plays an increasingly critical role in the response to an emergency such as a pest or disease incursion.

To ensure that all communication staff involved in a response at either the national, state or local level understand what their role and responsibilities are in an emergency, an accredited training module for public relations professionals has been designed for a national roll-out. Course content features basic disease awareness, roles in control centres, response mechanisms and information systems. It includes information on powers, legal provisions, liability, OH&S issues, the Emergency Animal Disease Response Agreement, AUSVETPLAN, and a crisis communication component. The course is being offered for free in each capital city to those agencies that will be involved in a FMD response and it is hoped it will generate a pool of at least 150 accredited professionals.

Conclusions

Agricultural emergencies necessitate co-ordinated national crisis communication. This requires the development and maintenance of government-partnerships, and communication activities undertaken prior to, during and after an emergency. Future efforts on the national communication arrangements will centre on developing a model to meet the large resource needs of a major agricultural emergency, national, State and local simulations to test plans, and to further enhance the communication efforts of a rapid response team capacity.

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Education and awareness

Conkey, Penrose and Donovan explore the importance of awareness communication campaigns to educate and inform before, during and after an emergency

Introduction

A critical area of preparedness for pest and disease emergencies is the need to educate key stakeholders and raise their awareness about roles and responsibilities in the event of an outbreak.

The introduction of exotic pests and diseases (that are not yet found in Australia) pose a major and continued threat to agricultural industries and pose serious long-term ramifications for trade and market access. A major pest or disease incursion could threaten the livelihoods of not only individual producers and rural communities, but also the national interest.

While quarantine is a vital and effective first line of defence, pests and diseases can be introduced in a number of ways, including via natural means. The more aware producers are to exotic pest and diseases and the quicker they report them, the quicker combat agencies can react to contain and eradicate outbreaks.

Awareness campaigns

A series of biosecurity awareness campaigns are conducted by the Australian Quarantine and Inspection Service (AQIS), Animal Health Australia (AHA), Plant Health Australia (PHA), industry, and State/Territory Governments.

These campaigns mostly target the major producers and promote simple biosecurity measures that can be adopted to minimise the introduction and spread of potential pests and diseases. Due to significant overlap, much of the work in this area is now being undertaken cooperatively between governments and industry groups.

Animal

AHA's Protect Australian Livestock Campaign is an ongoing awareness campaign designed to promote an understanding and awareness of an emergency disease watch hotline available to producers. It is the most comprehensive producer awareness campaign in the country.

An objective is to encourage producers who notice any unusual signs or symptoms in their livestock to contact the **Emergency Disease Watch Hotline—1800 675 888.**

Early detection is universally recognised as one of the most important elements in terms of a nation's capacity to minimise and control the impact of an emergency animal disease.

The campaign centres on a 12-month multi-faceted communication campaign focusing on media relations and collateral material as core components. The media relations campaign has been successful in tailoring the biosecurity initiatives of the livestock industries and governments to local areas.

This ensures that stories are covered by local media and producers are able to pick up the central message through a local and relevant issue. The collateral material has been produced using an eye-catching graphic of a 'spotty animal' with the simple tag lines, *"Spot the Risk"* and *"Look. Check. Ask a Vet."*

A deliberate strategy of the campaign is to use existing channels for the distribution of the collateral material, recognised as the most effective method of distribution as it does not duplicate the efforts of information dissemination to livestock producers.

The collateral materials could be included in a conference satchel, a magazine mail out or on a field day stand. This is also beneficial to producers who already receive information from many different sources.

This year the campaign distributed 50,000 fridge magnets with the spotty animal graphic, the simple tag lines and the 1800 number.

Any groups in direct contact with livestock producers have been pivotal in the successful dissemination of this material, including livestock industry organisations and governments.

For example, a magnet was inserted in the *Lotfeeding* magazine, which is distributed to all members of the Australian Lot Feeders Association and one was inserted in an information pack at the Victorian Farmers' Federation Annual Conference.

"Horse dentists take front-role in biosecurity" is one example of a national story that was localised to eight regional areas around Australia. This story was then tailored to seven horse dentists around Australia and distributed to their local media.

It is of national interest that biosecurity procedures have been written into the Equine Dental Association of Australia's "Code of Conduct" and are being taught as part of the Certificate in Equine Dentistry as they are potentially one of the most dangerous vectors for disease in the horse industry.

Sound biosecurity practices or commonsense animal husbandry and hygiene initiatives are a central theme of the Protect Australian Livestock Campaign and an integral part of the wider emergency animal disease preparedness for Australia.

The livestock industries and Australian, State and Territory governments have each developed and promoted to producers a biosecurity plan which details the practices producers can implement on farm to reduce the risk of disease introduction and spread.

AHA will continue to work closely with the livestock industries and governments to reinforce the messages central to the Protect Australian Livestock Campaign—the importance of early detection and availability of the emergency disease watch hotline if producers suspect unusual signs in their livestock.

Plant

PHA's national plant health awareness campaign targets commercial plant producers with the message *"Look. Be Alert. Call an Expert"*. This call to action urges producers to develop and maintain their vigilance and to take action if they spot anything unusual in their crops, thereby helping to protect Australia's $13 billion plant industries.

The campaign focuses on the importance of plant health with an emphasis on the roles and responsibilities of commercial plant producers.

The campaign also aims to make commercial plant producers aware that plant health is an important issue to them individually, to their industry and the national economy at large, and there are steps they can take to reduce the risk of exotic pests and diseases. Industry and government participation is central to the implementation of the campaign.

A number of promotional materials, including postcards, posters, advertisements and web banners have been developed in conjunction with industry members of PHA. Featuring images of distinctive, brightly spotted bugs and crops, these materials provide producers with information on the importance of plant health within their industry, and information on the Exotic Plant Pest Hotline.

Encouraging early detection and reporting is a vital step in ensuring the costs of any harmful pest incursions are minimised.

These materials are distributed through industry bodies, at relevant events, conferences, and field days. The PHA is also working with its members and stakeholders to identify and promote key biosecurity issues and practices using key industry and government spokespeople.

Media releases and feature articles associated with the campaign have focused on a range of plant health and biosecurity issues such as washing down farm machinery, erecting biosecurity warning signs, and issues to consider when returning from overseas travels or when importing farm machinery from overseas.

Commercial plant producers should call the **Exotic Plant Pest Hotline** on **1800 084 881** if they spot anything unusual on their crops.

Non-english speaking backgrounds

The Australian Government has commenced a biosecurity education and awareness campaign targeting people of non-English speaking backgrounds (NESB) involved in agriculture. This is part of its broader pest and disease emergency preparedness activities and builds on existing education and awareness initiatives to take the biosecurity message to a wider audience.

The look and feel of the AHA and PHA campaigns through the use of spotty images to highlight animal and plant pest and diseases is being used to ensure a consistent national biosecurity message.

Many of the people from the NESB target audience are peri-urban dwellers, engage in swill feeding and through a lack of understanding and awareness potentially pose a high-risk of introducing pests and diseases into Australia.

This is the first time this group has specifically been targeted by

the Australian Government on biosecurity and the campaign will focus on animal, plant and quarantine issues.

Sydney firm Multicultural Marketing and Management (MMM) was appointed to develop and implement the campaign supported by the Federation of Ethnic Communities' Councils of Australia (FECCA) through its website (www.fecca.org.au/AFFA/Faffa.html), magazine and other channels that will be used to promote key messages.

The approach is heavily weighted towards face-to-face communications through formal and informal networks developed through briefings involving NESB representatives and an advisory group of key stakeholders including the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), AHA, PHA and the heads of ethnic grower groups.

Resources have been produced in 10 languages including brochures, information sheets, websites, displays and posters. An audio-cassette was also produced along with a video and radio series.

The objectives for the campaign are to:

- generate cultural change to improve the biosecurity of individual farms; and
- educate all stakeholders about roles, responsibilities and procedures to be followed in the event of an emergency animal or plant disease outbreak.

Key messages of the campaign include:

- look for and immediately report anything unusual;
- check the origin of material coming on and off farm to assess the risk of disease and pests;
- create a "buffer zone" with neighbouring farms;

- do not feed food waste to production animals particularly swill to pigs;
- if dealing with suspect animals, clean and disinfect yourself afterwards;
- use seed or propagation material that has been certified "free from pests";
- do not bring in plant material of a favourite plant or variety from overseas; and
- tough fines of up to $60,000 or imprisonment can apply to quarantine breaches.

The campaign is also designed to get producers to phone various hotlines and report anything unusual in their animals or plants so that where necessary immediate action can be taken to contain or eradicate a pest or disease.

Hobby farmers

In order to continue spreading the biosecurity education and awareness message to broader groups, the Australian Government is soon to commence a campaign targeting hobby farmers. Also known as lifestylers or weekend warriors, hobby farmers are one of the fastest growing trends in agriculture and, like the NESB audience, this group has not been specifically targeted previously.

The initial phase of the campaign is to build a better understanding of who the hobby farmers are, where they live, and what their key motivators are. This picture will assist in communicating with this diverse group.

Further information on these campaigns is available at:

AHA web site: www.aahc.au/palc

PHA web site: www.planthealthaustralia.com.au/nphac

DAFF website: www.daff.gov.au/nesb

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Towards a national emergency management framework for marine bio-invasions

Ian Peebles examines the growing threat of bio-invasion to Australian waters

Introduction

The twentieth century heralded a significant increase in the capacity of major trading nations to transport merchandise, commodities and other goods rapidly between countries via ocean-going vessels. It is well documented that the increase in trade of agricultural and biological commodities derived from livestock (e.g. sera, vaccines) and horticulture (e.g. fruit, grains) presents inherent risks of the inadvertent transfer of associated pathogens. The advent of marine bio-invasions due to the accidental transfer of marine species from one ecosystem to another, represents a more recently recognised trade-related biological emergency (Rawlin and Jones, 2001). As a major trading nation, in which the majority of cargo is borne by ocean-going vessels, Australia's marine ecosystems and, in some cases, public health and maritime industries, face a significant and ongoing biological threat. This is the threat of invasion by 'exotic' marine organisms, that may be present in vessel ballast water or as bio-fouling on vessel infrastructure.

Marine bio-invasions are not only associated with trade-related activities but may also occur due to the introduction of an 'exotic' marine species into a susceptible locality by other vectors. These vectors include commercial fishing vessels, cruise ships, recreational yachts and mobile drilling rigs (Kinloch *et al.*, 2003). As a general rule, ports that receive a high volume of international vessel traffic, with an associated large volume of discharged ballast water, are regarded as being high risk potential entry points (nodes) for an exotic marine 'invader'. Other risk factors generally considered to increase the risk of marine bio-invasion between a 'donor' and 'recipient' port include:

1 environmental similarity in characteristics such as water temperature and salinity; and
2 a relatively short transit time between ports (thus favouring increased survival of marine organisms).

Defouling of an international trading vessel on a Cairns slipway
Photo coutesy of Queensland Environment Protection Agency

Background

The Port of Melbourne, located in Port Phillip Bay, Victoria receives approximately two-thirds of all sea-cargo that enters Australia and therefore could be expected to be a locality at high risk of invasion by exotic marine species. Surveillance conducted in Port Phillip Bay has indicated 99 species that are considered to be introduced and an additional 66 species that are considered to be cryptogenic (of uncertain origin), with introduced species being present from all of the world's major bioregions (except the Antarctic) (Hewitt *et al.*,1999). The rate of bio-invasion in Port Phillip Bay has been estimated at approximately two to three new species every year (Hewitt *et al.*, 1999). Nationally,

Northern Pacific Seastar (Asterias amurensis)

137 introduced marine species that have established in Australia have been identified, with an additional 146 cryptogenic marine species identified (Hayes, pers.comm.)[1].

While many of the introduced species detected appear to be relatively benign in their adopted environment, the Northern Pacific Seastar (*Asterias amurensis*), a species native to coastal waters of Japan, Korea, China and Russia is a clear example of an introduced species that has become a pest in invaded ranges in Australia. This species poses an ever-present threat of invasion to estuarine environments along the majority of mainland Australia's eastern, southern and western coastlines from Sydney to Perth, as well as Tasmania. Since its initial introduction into Australia approximately twenty years ago in the Derwent Estuary, Tasmania, the Northern Pacific Seastar has proliferated rapidly in invaded ranges in both Tasmania and Victoria (Port Phillip Bay). It is likely to have caused significant ecological impacts, although it remains difficult to quantify the impacts in the absence of *a priori* baseline data (Ross *et al.*, 2003).

The Northern Pacific Seastar typically inhabits estuarine locations and is a highly fecund (prolific), voracious predator that feeds on a wide range of marine fauna (crustaceans, sponges, ascidians, and other seastars). This invasion could be expected to have major adverse impacts on biodiversity (with flow-on effects on trophic food webs) as well as direct impacts on commercial shellfish farming operations.

In 2001, an interim list of 15 species of exotic marine pests of national concern (refer Table 1) to Australia, including species such as the Northern Pacific Seastar, was

Cluster of mature Asian green mussels (Perna viridis) detected on the hull of an international trading vessel in Cairns (August 2001)
Photo courtesy of Queensland Environment Protection Agency

adopted by all jurisdictions with legislative responsibilities to protect Australia's marine environment, through endorsement by three national Ministerial Councils[2]. The national Consultative Committee on Introduced Marine Pest Emergencies (CCIMPE) was also established to enable nationally co-ordinated responses to incursions of national concern pending the establishment of formal national emergency management arrangements for marine pests.

A national co-ordination mechanism

The Consultative Committee on Introduced Marine Pest Emergencies

The national co-ordination mechanism for the management of incursions by introduced marine pests is based on similar national arrangements that exist for emergency animal diseases via the national Consultative Committee on Emergency Animal Diseases.

The CCIMPE forum comprises representation from all lead agencies (Australian Government, State and Northern Territory governments) with legislative responsibilities to protect Australia's marine environment. Specialist technical input is provided to the forum through representation by CSIRO Marine Research and is also sought opportunistically from marine biologists and scientists with relevant expertise from a variety of sources both within Australia (e.g. Defence Science and Technology Organisation; Australian Marine Invertebrate Taxonomy network; CRC Reef Research Pty Ltd) and overseas (e.g. USDA–ARS)[3].

The Australian Government Department of Agriculture, Fisheries and Forestry provides a Chair and Secretariat for the CCIMPE forum. CCIMPE is convened on notification by any CCIMPE representative of the suspected incursion in Australia's marine environment by a pest of national concern. Initial advice of a suspected incursion is generally provided within 24 hours of an initial report being received

1 Courtesy of Keith Hayes, CSIRO Marine Research, May 2004.

2 Ministerial Council for Fisheries Forestry and Aquaculture; Australian and New Zealand Environment and Conservation Council; and Australian Transport Council

3 United States Department of Agriculture—Agricultural Research Service

Table 1. Interim CCIMPE trigger list of introduced marine pests of national concern

Scientific Name	Common Name	Taxonomic Classification
Aurelia aurita	Moon jelly	coelenterata
Caulerpa taxifolia (Aquarium strain)	Caulerpa	macroalga
Cyanea spp	Lion's Mane Jelly	coelenterata
Dreissena bugensis	Quagga Mussel	mollusc
Eriochir sinensis	Chinese Mitten Crab	arthropod
Mnemiopsis leidyi	Comb Jelly	coelenterata
Mytilopsis sallei	Black Striped Mussel	mollusc
Pfiesteria piscicida	Pfiesteria	dinoflagellate
Potamocorbula amurensis	Asian clam	mollusc
Rapana venosa	Rapa whelk	mollusc
Sargassum muticum	Asian Seaweed	macroalga
In Australia but limited in distribution		
Asterias amurensis	Northern Pacific seastar	echinoderm
Codium fragile spp. tomentosoides	Dead Man's Fingers	macroalga
Musculista senhousia	Asian date mussel	mollusc
Undaria pinnatifida	Undaria	macroalga

and investigated. A teleconference is generally scheduled within 72–96 hours of receiving notification from an affected jurisdiction to enable its personnel to conduct a preliminary site investigation and provide an informative situation report to the CCIMPE forum for its consideration. Meeting via teleconference provides considerable efficiencies for all parties in terms of both time and money and is a *modus operandi* that facilitates participation by representatives from each jurisdiction.

In response to a situation report provided by an affected jurisdiction, the CCIMPE forum evaluates the relevant information and advises the affected jurisdiction whether any actions proposed are either supported, should be modified or, in the event of a situation that is not considered to represent a marine pest emergency of national significance, that no further action is required (from a national perspective).

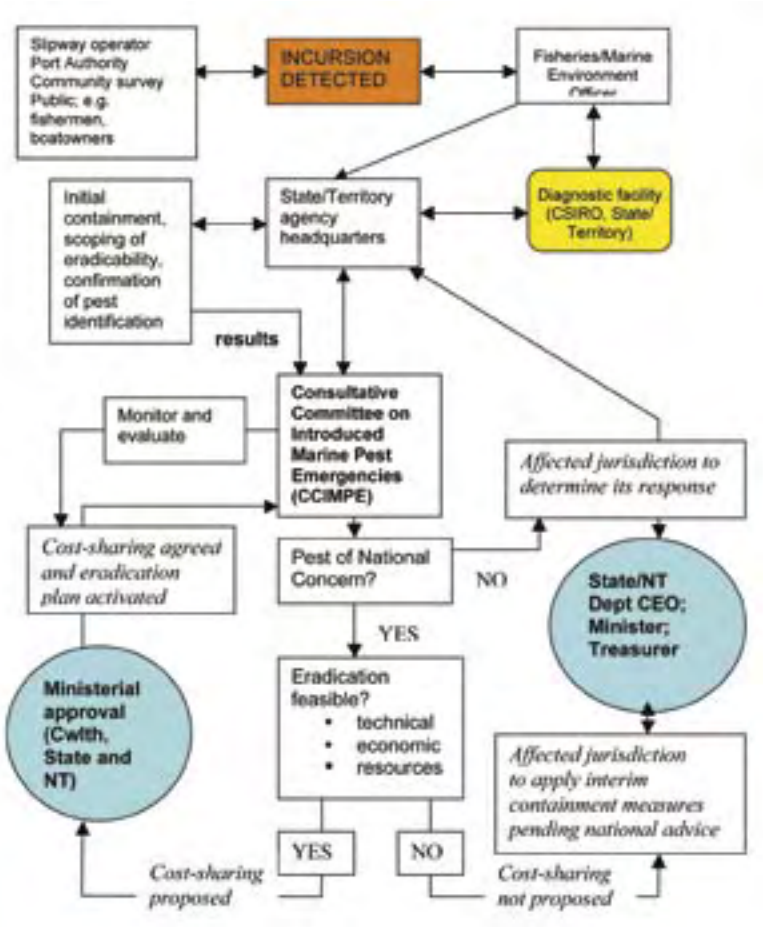


Figure. 1. Schematic Outline of National Emergency Response Framework for Incursions by Introduced Marine Pests

CCIMPE's charter is restricted to the emergency management of incursions by introduced marine pests[4] of national concern. It does not encompass the emergency management of incursions by indigenous marine pest species that are translocated across regions within Australia, nor of freshwater aquatic pests (either exotic or indigenous).

To facilitate resourcing of an emergency response, interim national cost-sharing arrangements were established in 2001. Under the terms of those interim arrangements, the Australian Government, States and Northern Territory agreed an expenditure ceiling of $5 million over a two year period. When all parties agree to provide funding to assist an affected jurisdiction to conduct an emergency response, the Australian Government contributes 50 percent of funds, with an equal commitment provided collectively by all States and the Northern Territory on a per capita basis.
A national Emergency Marine Pest Plan (EMPPlan), that was developed based on AUSVETPLAN response plans for emergency management of diseases of terrestrial livestock and AQUAVETPLAN[5] emergency management response plans for diseases of aquatic animals, is also in place and provides guidance on costs that are eligible for funding under the interim national cost-sharing arrangements. EMPPlan provides a structured emergency management framework that comprises four phases of activation:

1 Investigation;
2 Alert;
3 Operations; and
4 Stand-down.

Table 2. Existing criteria against which CCIMPE evaluates an introduced marine species

Demonstrable invasive history
Demonstrable impact in native or invaded ranges on: – economy; – environment; – human health;or – amenity
Inferred as likely to have major impacts in Australia based on the overseas data and characteristics of Australian environments and marine communities; and
Whether one or more relevant transport vectors are still operating

The decision-making process

To reach agreement to mount a cost-shared eradication response, the CCIMPE forum has to make two principal determinations:

1 whether the pest in question is a pest of national concern[6];and
2 whether it is likely to be eradicable.

A schematic outline of the national emergency decision-making process following reporting of an introduced marine pest is provided in Figure 1.

Any of the 15 pests listed on the CCIMPE 'trigger list' (refer Table 1), as endorsed via relevant ministerial councils in 2001, are considered to be pests of national concern. For species that are not included on the interim 'trigger list', the CCIMPE forum endeavours, on a case by case basis, to access as much information as possible both from within Australia and from relevant overseas specialists to evaluate whether a newly detected introduced species warrants activation of emergency response actions.
In situations where there is little or no overseas information available, a decision to mount an emergency response may need to be based solely on the post-introduction behaviour (e.g. smothering, fouling, establishment of monocultures, displacement of indigenous species) of an introduced species in its new environment. Once all information that can be readily gathered in a timely fashion is obtained, the pest in question is evaluated against the criteria outlined in Table 2 to determine whether or not activation of an emergency response is warranted.

Existing arrangements provide considerable scope for conservative decision-making in that an introduced marine species of uncertain pest potential is only required to satisfy one of the evaluation criteria to be considered as potentially warranting an emergency response.

There are relatively few successful eradications of marine pests that have been documented and accordingly, relatively few guidelines for determining whether or not a marine pest is likely to be eradicable. Successful eradication of marine pests has only been achieved where incursions have been relatively limited in distribution and/or able to be confined. Successful eradications have involved the use of chemicals (*Mytilopsis sp.* in Northern Territory, Australia;), physical removal and burial (*Perna canaliculus*, South

4 An introduced marine pest is defined as one that was originally considered to have been exotic to Australia
5 Aquatic Veterinary Emergency Plan
6 That is, one included on a nationally agreed trigger list, or if not, one deemed likely to have similar significant negative effects in Australia in terms of economic, environmental, public health or amenity values.

Incident #1. Caribbean tubeworm *(Hydroides sanctaecrucis)*

Hydroides sanctaecrucis is a sedentary fouling serpulid worm that constructs calcareous tubes approximately 20mm long on hard substrates

Location and Date of Detection
Cairns, Queensland in May 2001 on the hulls of two navy 'landing' vessels slipped for routine maintenance.

Impacts
A nuisance fouling species due to excessive proliferation of calcareous tubes that can form extensive reefs on submerged structures including wharves, pontoons, mariculture equipment and slow moving vessels. Potential to establish in vessel cooling systems and cause engine damage/malfunction.

Lead agency
Queensland Environment Protection Agency

Phases of Activation
Investigation, Alert, Stand-down

Outcome
Emergency investigation conducted via dive surveillance of numerous hard substrates indicated infestation with *H. sanctaecrucis* was widespread around the port of Cairns. Examination of archived specimens collected from anti-fouling paint test rafts confirmed presence of *H. sanctaecrucis* in Cairns since at least January 1999. Eradication was not considered feasible. Short and long term management actions implemented focused on boat-owner awareness, improved antifouling and vessel maintenance practices.

Comment
Early and accurate detection did not occur as *H. sanctaecrucis* was mistaken for *Hydroides elegans,* a related fouling organism already present and widespread in Australia.

Australia, Australia), physical removal of potential hosts (parasitic sabellid shell borer; California, United States), repeated physical removal (*Caulerpa taxifolia;* Cala D'or, Spain), and physical smothering in combination with chemicals (*Caulerpa taxifolia;* California, United States).

In reviewing rapid response options, McEnnulty *et al.* (2001) note that the potential of most control techniques available for pest species to cause collateral damage for other species and/or the environment, is a particular constraint to the eradication of marine pests. Although chemicals such as copper sulphate and chlorine have been used to achieve eradication outcomes in certain marine environments (Bax, 1999; Anderson, pers. comm.[7]), the broad application of hazardous chemicals in open-water environments is likely to be unacceptable due to the considerable potential for harm to non-target species. In addition, particularly for chemicals with poor bio-degradability, there is considerable potential for residual adverse environmental effects well beyond the intended time-frame of action. Accordingly, for many marine pests, physical removal remains the only acceptable eradication option available, thus presenting significant limitations to the eradication of pests of national concern, particularly in low visibility environments.

While the lack of readily applicable tools provides significant limitations to the eradication of incursions by marine pests of concern, McEnnulty *et al.*(2001) provide a number of useful parameters that are likely to increase the feasibility of achieving a successful eradication outcome, as outlined below:

- Knowledge of the basic ecology and physiology of an invasive pest
- Early and accurate detection post-introduction
- Ability to quarantine an area while eradication is being considered
- Survey capacity to determine whether pest is restricted to quarantine area
- Low risk of reintroduction
- Pre-existing knowledge of available eradication options
- Pre-existing decision-making procedures and structures with powers to determine whether eradication should proceed, how and who should fund it;
- Sufficient technical, field, administrative, funding and legal resources to plan an eradication campaign;
- Ongoing monitoring to modify, amplify or end eradication campaign; and
- A willingness to act by all parties.

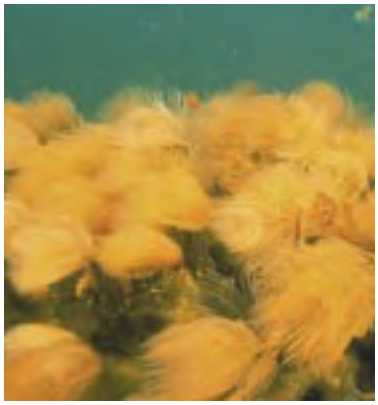
In situations where CCIMPE considers that a pest is either not a pest of national concern, or that an incursion is not likely to be eradicable and therefore activation of an emergency response operation is not warranted, an affected

7 Courtesy of Dr Lars Anderson, USDA Agricultural Research Service, March 2003

jurisdiction is responsible for implementing interim containment measures to minimise the risk of further local spread. This includes minimising the risk of translocation pending appropriate consideration by the relevant national policy forum, the National Introduced Marine Pest Coordinating Group, on national arrangements for long-term ongoing management and control.

Legislative basis to act

The interim emergency management arrangements for marine pests have operated primarily under State and Territory legislation and it is intended that this should continue to be the modus operandi when formal emergency management arrangements become established. Formal arrangements will be underpinned by an intergovernmental agreement that outlines agreed co-ordination and funding responsibilities between the Australian Government and the governments of the States and the Northern Territory.



Giant fanworm (Sabella spallanzanii)—*A european invader widespread in southern Australian waters*

Case studies

Following establishment of the interim national emergency management arrangement in 2001 there have been a number of incidents when the national Emergency Marine Pest Plan has been activated and national co-ordination arrangements have come into effect. These are outlined below in report card format.

Incident #2. Asian green mussel *(Perna viridis)*

Perna viridis is a large bivalve mussel ranging in size between 80-165 mm that forms dense populations (up to 35,000 individuals per square metre) on a variety of structures including vessels, wharves, mariculture and hard substrates. *P. viridis* has a broad salinity and temperature tolerance but is generally found in tropical estuarine habitats. It is widely cultivated as a food species throughout the Asiatic region.

Location and Date of Detection
Cairns, Queensland in August 2001. Significant colony (hundreds) of mature mussels detected on the hull of a Hong Kong registered trading vessel that had been seized in Cairns by Customs (in 2000) due to illegal (people) entry activities and was being slipped for cleaning.

Impacts
A dense, fouling species that affects the cooling systems of industrial complexes, increasing corrosion and reducing efficiency. Fouling of vessel hulls and intake pipes can raise vessel maintenance and running costs. It has the potential to establish in vessel cooling systems, increasing corrosion of internal seawater pipes and cause engine damage/malfunction.

Lead agency
Queensland Environment Protection Agency

Phases of Activation
Investigation, Alert, Operations, Stand-down

Outcome
Emergency investigation identified a number of poorly maintained vessels moored in proximity to the infested vessel. A quarantine zone was established in Trinity Inlet Cairns and at-risk vessels were progressively slipped for cleaning and inspection over a three-month period. Vessel internal sea-water systems were also treated with biodegradable detergent to minimise the risk of patent infestations. Of 56 vessels slipped for cleaning, further infestation was detected on a total of eight vessels. One additional mussel was also detected on a mooring buoy. Subsequent to completion of the intensive vessel treatment and slipping operation in June 2002, mussels have been detected on the hulls of three vessels and in May 2004 one adult mussel was detected on the frame of an anti-foul paint test raft.

Comment
The detection of a sexually mature adult mussel in May 2004 confirms that complete elimination of the mussel population present in Trinity Inlet, Cairns has not been possible. Ongoing monitoring is being carried out via slipway operations and other surveillance in an effort to identify the possible location of other mussels in Trinity Inlet. Although it is likely there have been a number of spawning events, it remains feasible that, with a high rate of larval attrition and a small base population, the remaining (undetected) mussel population present is too small to establish a self–sustaining population.

Incident #3. Northern pacific seastar *(Asterias amurensis)*

Asterias amurensis is a large seastar with a small central disk and five distinct arms that taper to pointed tips. The seastar is a voracious predator and in its native range (China, Korea, Japan, Russia) is a major pest for the shellfish industry sector.

Location and Date of Detection
Seastars were detected in rockpools near Inverloch, Victoria in January 2004. The nearest known population of *A. amurensis* to this locality was at Port Phillip Bay, approximately 120 km west of Inverloch.

Impacts
The seastar feeds on a wide range of marine fauna and can have an adverse effect on the recruitment of shellfish populations that form important components of the marine food chain. Indications are that it can also have significant impacts on farmed shellfish (e.g. oysters).

Lead agency
Department of Sustainability and Environment, Victoria

Phases of Activation
Investigation, Alert, Operations (current at time of writing)

Outcome
Emergency investigation identified a relatively localised infestation within the tidal estuary of Anderson's Inlet. An emergency response operation was established based on physical removal of seastars by scuba divers. Ongoing dive activities supported by volunteers and the local community has lead to the physical removal of over 260 seastars in the affected locality. Indications are that this represents a significant reduction in the available population, as the dive effort required to detect seastars (as at 7 June 2004) is significantly greater than the effort required to detect seastars in April 2004.

Comment
CCIMPE considered the detection of Northern Pacific Seastar at Inverloch to represent a significant translocation from the pest's existing range within Australia (in Port Phillip Bay, Victoria and Tasmania) as it increases the potential for the seastar to establish along the eastern seaboard of Australia, where there is significant fishery sector activity (both recreational and commercial). Based on the existing population of *A. amurensis* in Port Phillip Bay, the seastar is known to spawn in Victorian waters between May and July. Although the emergency response operation appears to have resulted in a significant reduction of the seastar population at Inverloch, it is unlikely that all adult seastars will be removed from the locality before spawning occurs. Follow up surveillance will be required in early 2005 to determine whether additional recruitment of juvenile seastars has occurred in the affected locality.

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Industry preparedness and biosecurity

Michael Hartmann outlines the beef cattle industry's approach to exotic disease prevention and response

Abstract

As an industry focused upon exports, the prevention of, and response to, exotic disease incursions is one of the fundamental priorities for the Australian beef cattle industry.

This paper summarises the activities undertaken and mechanisms in place to ensure the Australian beef cattle industry maintains its reputation as a provider of clean, safe and disease-free product to the local and world consumer market.

Introduction

Beef production is Australia's most common agricultural activity with 35,000 specialist producers raising a herd around 24 million strong. While only producing around 4 percent of the world's beef, Australia remains the largest beef exporter with 70 percent of its production leaving the shore, reaping a value to Australia of over $4 billion in export earnings.

Unlike most other beef producing nations, the Australian beef industry is reliant on its export markets for its continued prosperity (in the US for example, local consumers account for over 90 percent of annual consumption as opposed to 30 percent in Australia).

One of Australia's major strengths on the world beef market is its reputation and acknowledgment as a producer of high quality, safe, and disease-free beef. The maintenance and promotion of that reputation is one of the industry's key activities.

Australian beef producers are well aware of the devastation that an exotic disease incursion would cause, particularly as a result of the closure of export markets. Consequently, the prevention of, and response to, exotic animal disease incursions is one of the fundamental priorities for the Australian beef cattle industry.

The lucky country

It could be argued that historically, Australia's freedom from exotic animal disease is based more upon good luck than good management. Up until the mid 20th Century, the "tyranny of distance" worked strongly in Australia's favour. Long voyages on leaky boats meant that diseased animals either recovered or died on route. That all changed dramatically with the advent of trans-continental air travel.

Today, around 5 million short-term visitors come to Australia every year, each being a potential risk to Australia's quarantine. Ten billion dollars worth of merchandise imports arrive in Australia every month, and every crate, boat and aeroplane also constitutes a quarantine risk.

Quarantine matters!

The importance of strict quarantine measures to Australia cannot be over-emphasised. To a country still largely reliant on agriculture, the consequences of an incursion could be disastrous. The first lesson was learnt back in 1872 when foot-and-mouth Disease (Australia's last outbreak) found its way into the country. An outbreak of FMD today would cost Australia over $13 billion (Productivity Commission, 2002).

The Australian Quarantine Inspection Service (AQIS) works diligently to minimise the risk of visitors and imports carrying exotic animal disease into Australia. Every visitor and their luggage is screened before entry, and every import is inspected before release. Visitors are educated on the importance of quarantine to Australia before arrival, and hefty fines and actions are applied to those who do not heed the warnings.

Nevertheless, while AQIS activities may minimise the risk it is impossible to provide a 100 percent guarantee that no exotic disease will ever enter the country. Hence, post-border activities are vital to ensure that any such diseases are quickly identified and eradicated.

It is not enough for Australia, and particularly the export-focused beef industry, to sit on its laurels and completely rely on AQIS to keep the nation clean. We must be prepared for the worst, and work on the philosophy of not "if" but "when" we find an exotic animal disease within Australia.

Not "if" but "when"

With that philosophy in mind, Australia has set in place an array of procedures and safeguards to be put into action in the advent of a confirmed, or suspect, disease outbreak. The AUSVETPLAN disease response manuals act as the "How to" books for Australia, while the ground-

breaking Exotic Animal Disease Response Agreement (EADRA) sets out the framework upon which a response will operate.

The EADRA takes the guess-work out of an exotic animal disease response, particularly in terms of which groups have what power, the composition of those groups, and importantly, how the response will be funded. This agreement has been signed by the Australian Government, State and Territory governments, and the representative bodies of the major livestock industries.

Industry involvement

Australia is somewhat unique in its attitude to exotic animal diseases in that both government *and* industry share the responsibility and work closely together both in the response itself, and in the development of the procedures, protocols and policy.

Cattle Council of Australia is the peak body representing beef cattle producers in Australia. Through its member organisations, Cattle Council is able to directly represent 70 percent of the specialist beef producers in this country.

Cattle Council continually represents the interests of the industry at meetings and policy forums concerned with Australia's exotic animal disease preventative and response measures. The partnership approach between industry and government places Australia in an enviable position internationally in terms of the creation of a cohesive and working format through which to develop and implement required mechanisms for the national good.

Industry members are key stakeholders of the company "Animal Health Australia". Its role is to facilitate the creation, improvement and adoption of animal health policy and programs. It is a not-for-profit company established and jointly funded by the Federal and State/ Territory governments and livestock industry bodies (see www.aahc.com.au).

Industry measures

As responsible members of Animal Health Australia and signatory to the EADRA, the industry organisations are required to take necessary measures to assist in the prevention of exotic animal disease incursions, while also setting in place appropriate mechanisms to allow quick responses in the event of an outbreak within that particular industry.

In the case of the beef industry, Cattle Council works to educate beef producers about the need for on-farm biosecurity practices, while also supporting initiatives encouraging producers to quickly report suspicious symptoms in animals. As the peak representative body, Cattle Council also has a lead role in exotic disease responses that involve beef cattle, and hence has developed its own "in house" set of guidelines to operate by during an outbreak.

Beef industry biosecurity plan

The Beef Industry Biosecurity Plan has been developed to drive producer awareness and adoption of practices that could prevent or contain a disease outbreak. Simple and non-onerous practices are promoted surrounding such areas as people and animal movements, sick and dead stock, and feral animals. These principles have been promoted though the development of a poster that has been distributed to beef producers throughout the country.

The poster incorporates the "Spot the Risk" theme from Animal Health Australia's continual "Protect Australian Livestock Campaign".

Beef industry EAD response plan

Cattle Council's Beef Industry Emergency Animal Disease Response Plan is a document that provides, in an easily digestible format, an overview of the national response framework, and, in particular, the roles and responsibilities incumbent therein on the organisation. The Plan also incorporates a series of "Job Cards" for each staff member within Cattle Council (from President to receptionist) clearly stating each person's responsibilities and duties during an outbreak. Each staff member keeps a copy of the plan close by, and an electronic version is maintained on the Cattle Council website (www.cattlecouncil.com.au). New staff are trained regarding their roles and responsibilities as per their job card.

Industry training

Cattle Council is also conscientious in ensuring it has a wealth of beef producers trained and available for instant action upon the commencement of a response. Through Animal Health Australia, regular training sessions are conducted where nominees from government and industry are accredited to work at various levels of the response framework. This ensures that competent personnel is available throughout the country and prepared to be activated not "*if*" but "*when*" they are needed.

Simulations

Industry was a critical component of in 2002, *Exercise Minotaur* that tested Australia's capacity to deal with an outbreak of Foot-and-Mouth Disease. Cattle Council was fully engaged in the simulation, and was a key player in the development and organisation of the simulation itself.

Significantly, Cattle Council and other industry organisations were engaged as evaluators of the exercise and reported back on the performance of the key components of the simulated response.

Conclusion

As an industry reliant on its exports, the Australian beef industry places enormous importance on its quarantine, biosecurity, and exotic disease response measures. Through the development of a working relationship with government authorities, the beef industry (as well as the other major livestock industry bodies) enjoys full ownership of the policies and systems that are developed at a national and state level. It is this working relationship that engenders understanding and respect, and therein the foundation of a rapid and effective exotic animal disease response.

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Assessment and training for agricultural emergencies

Terry Thomas examines agricultural emergency training

Abstract

Training for agricultural emergencies in Australia has been conducted over a long period, pioneered by the animal health sector. AUSVETPLAN, the agreed manual for strategies and response to emergency animal diseases (EAD) was developed in the early 1980's. In 1999 competency standards for EAD were developed and implemented. Plant and fish industries are in the process of developing strategy manuals and training material. The EAD competency standards are being revised, expanded, updated and are to be accredited nationally. Significant training activities, including exercises, are being conducted.

Why train for agricultural emergencies?

Australia has been fortunate that it has not had outbreaks of emergency animal diseases with severe economic and social consequences. It experienced outbreaks of Rabies and foot-and-mouth Disease in the 1800's but they were swiftly eradicated—a credit to the authorities of the time. In the past ten years we have experienced relatively minor outbreaks of Newcastle disease, Anthrax and Avian Influenza. Further outbreaks of Newcastle disease and Anthrax are likely. In the former case the genetic precursors to virulent virus are widespread in Australia and can mutate to the virulent form. In the case of Anthrax, soil contamination has occurred over decades and the agent can persist for long periods. It requires a combination of environmental factors for anthrax to reappear.

Other emergency diseases recently appearing in Australia have been minor. Australia has never experienced crippling outbreaks in the style of for example:

- Foot-and-Mouth Disease (FMD) in Britain in the 1960's and 2001;
- Bovine Spongiform Encephalopathy (BSE—mad cow disease) in Britain;
- Avian Influenza with a human dimension, as recently occurred in SE Asia;
- Foot-and-mouth Disease in South American countries.

Australia does have a fine record of eradicating economically important animal diseases and preventing their entry. Pleuropneumonia of cattle and Classical Swine Fever were eradicated in the 50's and 60's. Cattle Tuberculosis and Brucellosis were eradicated in the 70's and 80's (Lehane, 1996). The eradication of these diseases has proven difficult or impossible in several developed countries.

The world community that trades in agricultural commodities treats Australia as a single entity. In the event of an outbreak of an economically important disease such as FMD or BSE, no State or Territory would be allowed to export even if it were initially seen to be unaffected. Proof of freedom can be a lengthy and involved process. The discovery of a significant EAD in Australia will profoundly reduce animal and product exports with consequent effects on the balance of trade, the value of the dollar and living standards.

Responsibility for the control of agricultural emergencies resides in the State and Territory governments. No jurisdiction has sufficient resources to handle large emergencies and this implies co-operation between jurisdictions. As there are very small numbers of full-time agricultural emergency preparedness workers in each jurisdiction, an emergency animal response relies on taking government staff and non-government personnel from their usual employment.

Co-operation in the response to major animal diseases is covered by a national agreement (Emergency Animal Disease Response Agreement, Animal Health Australia, 2002) whereby parties have undertaken to share the cost of disease outbreaks and to have trained personnel available.

The emergency animal disease training program

The National Emergency Animal Disease Training Program was introduced in 1999 by Animal Health Australia—a non-profit company whose members are the Australian Government, State and Territory Governments and the livestock industries. It was developed to provide education and training to producers, veterinarians and government personnel.

This training system includes:

- standards describing the application of skills and knowledge required for Emergency Animal Disease Preparedness (EADP),

- an assessment method to identify and accredit those who have the skills and knowledge required to function in an EAD response, and
- a system to develop EADP-specific skills and knowledge.

The program was designed to train participants in the key roles of the 90 positions described in AUSVETPLAN, the agreed manual for an EAD response.

The skills and knowledge for key positions were identified and 25 units written for five functional areas—emergency management, field operations, veterinary investigations, managing data and information, and communication and public relations (see Figure 1). The units developed in this program were not intended for accreditation by the Australian National Training Authority. Assessors were identified and trained for each jurisdiction. Since 1999, over 5,000 competency units have been awarded to over 2,000 personnel.

Exercise Minotaur was conducted in 2002 as a means of assessing Australia's EAD preparedness as a consequence of the foot-and-mouth Disease outbreak in Britain in 2001. A number of recommendations resulted including that for a Rapid Response Team (RRT) of members from all jurisdictions who were to be trained and available at short notice to establish disease control centres anywhere in Australia, but particularly in NT, TAS and SA, the jurisdictions with the least animal health resources.

The RRT was established in 2003 and has since conducted three major training activities, including two five-day exercises in NT and TAS in 2004. RRT training has been longer and more intense than that previously conducted in this country and has significantly improved Australia's EAD response capability.

Figure 1. Current EADP standards framework

Functional areas	Levels of competence
• Emergency management • Field operations • Veterinary investigations • Managing data and information • Communication and public relations	**E (Expert):** Has specialist and/or management skills and knowledge to perform tasks to specified standard **C (Competent):** Has skills and knowledge to perform tasks to a specified standard **A (Aware):** Has a basic understanding of concepts and practices

The Australian Veterinary Reserve will be established in 2004 to train 100 private veterinary practitioners for surveillance duties during an EAD outbreak. Surveillance to rapidly establish the distribution of a disease is vital when a disease discovery is made. Veterinary practitioners may constitute the main surveillance effort in an EAD. Reasonably large numbers may be required and these should be trained, assessed as competent and available for rapid deployment.

The future

As a general trend, primary industry departments are developing emergency management units with generically trained staff who will be augmented by specialist staff in outbreaks—the primary skills being those of emergency management. Responses to animal, plant and fish emergencies will in future be handled similarly, with common nomenclature, similar documentation and generically trained personnel making full use of emergency management resources. The EAD training is being re-written in a generic form and will be nationally accredited. New competency units have been added to the existing training framework to enhance the skills and knowledge of those performing agricultural emergency response roles. A number of training activities are planned for the coming year including a major exercise in conjunction with health authorities involving a zoonosis—an animal disease affecting humans.

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Terry Thomas has administered the Emergency Animal Disease (EAD) Training and Assessment Program for Animal Health Australia since its inception in 1999. For over ten years he served as a Principal Veterinarian in the (now) Dept of Primary Industries, Victoria in emergency disease management and training where he assisted in developing the EAD competency standards. He holds a bachelor degree in Veterinary Science and a Diploma of Agriculture. He served in the Army Reserve, Royal Australian Infantry Corps, retiring as Lieutenant Colonel in 1997.

Emergency management—there's nothing fishy about it

Scott and East report on the importance of emergency management training and the relevance of exercises as training tools

Abstract

Within Australia, most aquaculture industries are relatively new and have been established in the past 30 years. Overseas, various diseases have devastated the aquaculture industries with on-going losses estimated to be of the order of $3 billion per annum. Australia has experienced few of these disease epidemics and its favourable health status enables Australia to market its seafood at premium prices and without health-based trade impediments. Over the past five years, a national program of exercises has been conducted to train both government staff and industry members in the management of disease emergencies.

Introduction

Australia is a world leader in the field of aquatic animal health management. While many fisheries and aquaculture industries around the world have suffered major production losses through the impact of disease epidemics, Australia has avoided many of these epidemics and retains a favourable disease status. This status facilitates international trade and the receipt of premium prices for Australian seafood exports.

However, in the words of Thomas Jefferson *"The price of freedom is eternal vigilance."* The ease and speed with which disaster can arrive was clearly demonstrated in 1995 when a major die-off occurred in the Australian pilchard population along the coast from Geraldton in Western Australia across the southern Australian coastline and up the east coast to Noosa Heads in Queensland. The resulting government inquiries into the die-off found that Australia's emergency response capability was limited and ad hoc in nature.

The Government response to these inquiries lead to the development of AQUAPLAN—Australia's National Strategic Plan for Aquatic Animal Health 1998–2003. AQUAPLAN included eight programs that addressed all aspects of aquatic animal health, from legislation, policies and jurisdiction to surveillance, monitoring and reporting. Program Four—Preparedness and Response—focused on the development of effective institutional arrangements to manage disease emergencies, and two integral components within this program were the development of AQUAVETPLAN and the conduct of exercises to test the capability and capacity of Australia's State and Territory authorities to manage emergency disease incidents.

Black lip abalone

AQUAVETPLAN is a series of technical response plans that describe the proposed Australian approach to an aquatic animal disease emergency event. It comprises a series of manuals outlining control strategies for aquatic animal disease emergencies in Australia. The manuals provide guidance based on sound analysis, linking policy, strategies, implementation, co-ordination and emergency management plans.

Atlantic salmon

Marron—a crayfish from Western Australia

Planning however is only half the story. Those who need to implement these plans need to be familiar with the plans and the plans need to be both realistic and practical. With the development and adoption of AQUAVETPLAN by Australian and State and Territory governments, the conduct of exercises became both an important tool to test Australia's emergency management capability and capacity and an effective way to train aquatic animal health officers nationwide in the appropriate AQUAVETPLAN manuals.

Over the past five years, the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) has conducted eight exercises at the State and Territory government level and in 2003 conducted the world's first national simulation exercise focused on the aquaculture industry.

Small fish…

The program of exercises at the State and Territory government level was conducted under the auspices of the Federal Budget Initiative entitled *Building a National Approach to Animal and Plant Health* and was designed to provide individual jurisdictions with training in the management of an aquatic animal disease emergency. Developed in conjunction with officers from the relevant state department of fisheries (or primary industries) these simulation exercises have also tested the adaptation of the generic AQUAVETPLAN Control Centres Manual to the specific government framework within each State, as well as addressing any areas of concern highlighted by these state officers.

To date, DAFF has conducted exercises with:

- the Queensland Department of Primary Industries and both the prawn farming and redclaw crayfish industries;
- the Tasmanian Department of Primary Industry, Water and the Environment and the salmon industry;
- the Victorian Department of Natural Resources and Energy and the aquaculture and trout industries;
- the Western Australia Fisheries Department and both the pearling and freshwater crayfish industries;
- the New South Wales Fisheries Department and the oyster industry; and
- the South Australian Department of Primary Industries and Resources and the abalone industry.

For the most part, these exercises have been desktop in nature, simulating the work of either a State Disease Control Headquarters (SDCHQ) or a Local Disease Control Centre (LDCC) during the two-day exercise. Over the two days, participants from the State and Territory government Departments of Fisheries (or Primary Industry) and industry representatives took on the role of SDCHQ or LDCC members. They carried out tasks such as investigating the source of infection; tracing fish and products forward from the infected farm; tracing them back to the source; communicating with industry, media and ministers; developing response plans; and resource identification.

An integral part of these exercises has been the involvement of industry in the conduct of each exercise. While emergency management policies and frameworks are developed by governments, it is the people on the farm who will have to bear the consequences of these policies and carry out any activities deemed necessary during a response. Industry involvement serves to improve the practicality of emergency response procedures, as well as highlighting the importance of emergency preparedness to industry and fostering a good working relationship between industry and government.

While DAFF has provided reports on these exercises to the relevant agencies to provide guidance on where improvements can be made, perhaps the greatest benefit of the conduct of exercises is the training of officers to work in an "emergency situation" prior to facing the "real thing".

The big fish…

While the majority of other countries continue to focus on emergency management training in the terrestrial sector, Australia is again leading the world with the conduct of the first national exercise focused on the aquaculture industry.

Developed with funding from the Fisheries Research and Development Corporation, *Exercise Tethys* was aimed at addressing issues of inter-jurisdictional[1] communication and co-operation in response to an emergency disease incident, and heightening the awareness of these jurisdictions to the potential for incursions of emergency disease in Australia's aquatic environment.

The exercise, held over two days, involved the active participation of all Australian government jurisdictions (except the Northern Territory), CSIRO and three producer organisations of the NSW Silver Perch Growers Association, the Tasmanian Salmonid Growers Association, and the National Aquaculture Council.

The exercise scenario and activity incorporated a simulated disease outbreak that spread from the initial infected premise to a total of seven farms and two enclosed lakes in three States as well as an export shipment of live fish. The interstate movement of infected fish required a large amount of communication between jurisdictions and a high level of co-operation. All seven participating State and Territory governments were involved in disease surveillance activities, controls of fish and product movement and national decision-making and resource allocation. The aquaculture industry participated at both a national and State and Territory level (through the National Emergency Animal Disease Management Group mechanism); and the activation of SDCHQ's and the Consultative Committee on Emergency Animal Disease (CCEAD).

The exercise did not incorporate physical field operations, actual communications with other countries or the establishment of local disease control centres, although these activities were simulated as required.

Government staff tackle the outbreak of a disease in the oyster industry under the watchful eye of exercise facilitator, Karina Scott

A group of farmers tackle the on-farm aspects of disease management during a simulation exercise in the Queensland prawn industry

Exercise Tethys was a functional exercise in that it took place in an operational environment and required participants to actually perform the functions of their roles. Emergency operations centres were established and participants were required to meet and make decisions. Among other things, participants had to:

- communicate across five time zones;
- investigate the source of infection;
- deal with and identify resources required for an immediate and a protracted response; and
- communicate with the media, ministers, departmental executives, industry, and the public.

Again, industry involvement in the simulation was an integral part of the success of its conduct. Through the involvement of the three industry groups the importance of aquatic animal health and emergency preparedness was highlighted at the national level. It gave producers the opportunity to see how the government emergency management framework would work in an emergency situation, and how industry would be involved in the response.

Evaluation of the outcomes of the exercise highlighted that

1 The term "jurisdiction" refers to State/Territory Governments and the Australian Government as whole entities, as opposed to individual agencies within the State, Territory or Australian governments.

communication, consultation and co-operation between jurisdictions are vital elements of an emergency aquatic animal disease response. The exercise report made a number of recommendations that aim to improve pre-existing frameworks and resources in order to develop more robust communication systems and procedures for an emergency response. A number of recommendations also came out of the reports of the jurisdictional debriefs, held in late November 2003. In some jurisdictions, actions are already being taken to address these recommendations.

Overall there was found to be a general knowledge and understanding of current emergency response procedures and frameworks amongst jurisdictions, but more training of a broader range of officers is required.

Over the next wave...

Overall, the conduct of exercises focused on the aquaculture industry at both the State and Territory and national level has not only provided training to a large number of officers nationwide, but has demonstrated the importance of emergency management training and highlighted the continuing success of exercises as a training tool.

But the work doesn't stop there. With aquaculture industries increasing production to meet a proposed production target of $2.5 billion by 2010, the number of farms will increase. Farms may be closer together and stocking densities may increase all the factors associated with increased disease problems. In international trade, disease problems are increasingly becoming a *de facto* barrier to trade and it is only with continued training and enhanced preparedness that Australia will be able to respond effectively and efficiently to whatever is waiting over the next wave.

Authors
Karina Scott (B.A/B.Sc) is a scientist with qualifications in marine biology and journalism. She has experience in emergency animal disease responses in both the terrestrial and aquatic sectors. Karina has been involved in three exercises including the design and conduct of Exercise *Tethys*.

Dr Iain East is a research scientist with 15 years experience in diseases of livestock including experience with viral diseases affecting the prawn industry. In the past five years Iain has conducted nine exercises for Australian State and Territory governments and a range of aquaculture industries.

Improving Australian animal health emergency preparedness – the experience of *Exercise Minotaur*

Peter Koob reports on Exercise Minotaur *and its contribution to testing Australia's emergency response systems*

Abstract

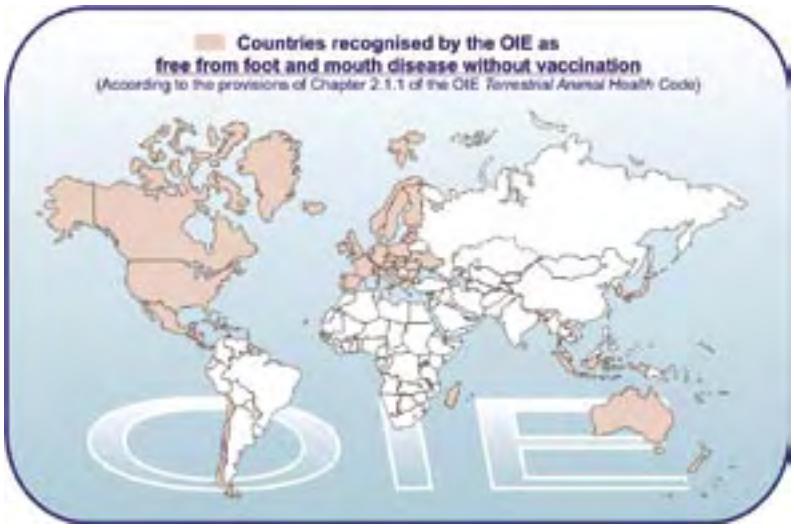
Exercise Minotaur was conducted in Australia in September 2002 as a direct response to the outbreak of foot-and-mouth disease (FMD) in the UK. Over 1000 people from government and industry agencies were formally involved in this COAG sponsored activity, which was a major stimulus to enhance the level of FMD preparedness in all jurisdictions and in industry. The aim of the exercise was to test Australia's national arrangements for managing post-border aspects (preparedness, response and recovery) of an FMD outbreak as a part of continuous improvement. The scenario included a description of the spread of FMD through the livestock population and a description of effects on the economy and communities and concentrated on critical points in a potential FMD outbreak. *Exercise Minotaur* improved Australia's emergency response systems, increased community, industry & government awareness, demonstrated Australia's ability to manage a serious animal emergency and highlighted areas for further improvement.

Introduction

Foot-and-mouth disease (FMD) is a highly contagious viral disease of cloven-hoofed animals that occurs throughout most of Africa and Asia, and much of South America.

The FMD outbreak in the United Kingdom in 2001 involved 2,020 infected premises, caused more than 9,300 farms to de-stocked with more than six million stock destroyed, with a cost to the public sector of £3 billion and a cost to private sector £5 billion. Predicted impacts on Australia from an FMD outbreak include $450 million in disease control and compensation, $13 billion in lost earnings, and significant social costs (Productivity Commission, 2002). It was recognised that a single case of FMD in Australia would seriously stretch current arrangements and resources, and a review and test of whole-of-government and government-industry preparedness was requested by the Council of Australian Governments (COAG, 2001), including "the holding as soon as possible of a full-scale simulation under third party oversight to test the arrangements." The simulation was called *'Exercise Minotaur'*.

Figure 1. Countries recognised by the OIE as free from FMD without vaccination



Exercise Minotaur was the largest ever agricultural exercise in Australia and may have set an international benchmark. There was a significant improvement of awareness, particularly across non-agricultural agencies, of the potential impact and complexity of a major national animal disease outbreak such as FMD. Tangible evidence of enhanced preparedness was the number and level of people involved in the lead up to and during Minotaur. Over 1000 people from government and industry agencies were formally involved (and a multiple of this number unofficially involved), 100 observers, facilitators and evaluators and 18 people in the control team. There was serious engagement at the highest level of government and agricultural industries.

Enhanced Australian emergency animal disease preparedness

Exercise Minotaur was a major stimulus to enhance the level of FMD preparedness in all jurisdictions and in industry.

The COAG decision of 8 June 2001 required the upgrading and testing of emergency plans and the development by States and Territories and the Australian Government of complementary whole-of-government frameworks, for their respective jurisdictions. All jurisdictional emergency animal disease plans were reviewed and tested, and a national co-ordination framework for FMD was agreed between all jurisdictions (COAG, 2002).

Training was conducted in all jurisdictions and within industries including personnel operating in LDCCs, SDCHQs, CCEAD and NMG. A series of exercises was also planned and conducted by all jurisdictions and within many industries prior to *Exercise Minotaur*.

By August 2002, Australia was undoubtedly better prepared for an emergency animal disease outbreak than it had ever been.

Developing *Exercise Minotaur*

In order to organise *Exercise Minotaur* at the strategic, operational and tactical levels, an Exercise Steering Committee, an Exercise Working Group and an Exercise Control Team were formed (DAFF, 2002a). Members of the Exercise Control Team, representing all jurisdictions and industry, developed:

- the aim, objectives and scope of the exercise;
- the disease and socioeconomic scenarios that formed the background to the exercise;
- the concept of operations and rules of engagement; and
- the exercise control messages.

The aim of the exercise was to test Australia's national arrangements for managing post-border aspects (preparedness, response and recovery) of an FMD outbreak as part of continuous improvement. The objectives of the exercise included testing:

- the integration of national arrangements (both intra- and inter-jurisdictional);
- administrative arrangements in support of operations;
- the capacity and capability of resources for managing an FMD outbreak and its consequences;
- the logistics arrangements;
- communication;
- disease control policies and strategies as described in AUSVETPLAN;
- trade management arrangements; and
- socioeconomic relief and recovery strategies and processes.

Risks to the development and conduct of the national FMD exercise were identified, risk treatment options considered, and risk treatment strategies developed and implemented. The greatest risk caused by the exercise was the possibility of an adverse reaction to the exercise following misreporting, or unexpected media, community or trading partner response.

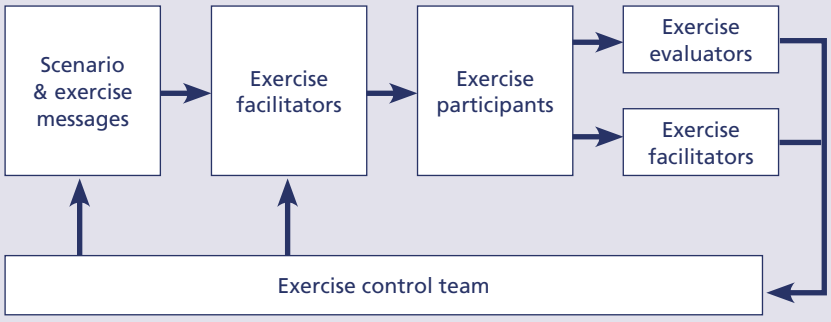
Conducting *Exercise Minotaur*

The exercise consisted of a number of elements including (DAFF, 2002b):

- the scenario;
- over 350 exercise control messages;
- exercise control staff; and
- exercise participants (refer Figure 2).

The scenario included a description of the spread of FMD through the livestock population and a description of effects on the economy and communities and concentrated on critical points in a potential FMD outbreak. The scenario was not revealed in its entirety until after the exercise, but information on what was 'happening' in the scenario was conveyed to exercise participants through exercise control messages. The exercise control messages were prepared prior to the exercise and passed by exercise facilitators to exercise participants at pre-arranged times. The exercise control messages had attached, for the eyes of exercise control staff only, the expected actions of exercise participants.

Figure 2. Overview of the exercise



Simulated spread of FMD in Australia, day 1

Simulated spread of FMD in Australia, day 84

The 18 people in the exercise control team were located in Canberra and provided overall direction and control of the exercise. There were 80 exercise facilitators, evaluators, and assistants selected from Australian Government, State and Territory governments, and industry.

Exercise facilitators provided briefings and debriefings for exercise participants, provided input into the exercise of events and information, monitored the progress of the exercise, reported to the control team and solved problems when the exercise went off-track. Exercise evaluators worked in a jurisdiction other than their own, observed exercise participants, noted actions taken against expected actions, and evaluated arrangements based on these actions.

A select group of observers, both international and domestic, were asked to review the exercise and through visits, interviews and debriefs provide an overall assessment of the effectiveness and relevance of the exercise to FMD management.

The exercise required the actual deployment of personnel in each State and Territory, in Australian Government organisations, in national organisations, and in industry, at each level of the response structure. Exercise participants worked from their designated operations centre or normal work areas. There were no field deployments. The role of exercise participants was primarily decision-making and undertaking activities to support the decision-making.

The exercise simulated three months of a large multifocal outbreak of FMD over a four-day period. FMD was chosen as the scenario disease because of its potential impact on the economy and community of Australia.

Information about a suspected vesicular disease was provided to authorities in the week before the exercise to simulate the lead-up to an outbreak. Specific points in the epidemic curve were chosen for testing specific aspects of response to and recovery from the simulated FMD outbreak. These points were:

- first day of outbreak;
- second day of outbreak;
- eight day of outbreak; and
- end of third month of outbreak.

The scenario time periods were played out in real time by the exercise participants as shown in the table below.

The dates and times ('timetable of engagement') expected when emergency centres would be set up and management groups would meet were pre-determined and communicated to exercise participants prior to the exercise. This was an unusual move in the conduct of an exercise, but was

Figure 3. Scenario time periods

Real time	Exercise time period	Action	Day #
Thursday 5 – Friday 6 September 2002	Suspected disease	Pre-reading provided to exercise participants	D-3 – D-4
Monday 9 September 2002	Confirmation of FMD outbreak	Exercise from 9:00am to 5:00pm	D O
Tuesday 10 September 2002	2nd day of the outbreak	Exercise from 9:00am to 5:00pm	D +1
Wednesday 11 September 2002	7th day of the outbreak	Exercise from 9:00am to 5:00pm	D +7
Thursday 12 September 2002	End of 3rd month of outbreak Debriefs for management groups	Exercise from 9:00am to 5:00pm	D+84
Friday 13 September 2002	—	Debriefs for emergency centres	—

taken to ensure that people would be available. The exercise was not designed to test activation, alerting, or the setting up of control centres.

Evaluating the exercise

Exercise evaluation and reporting was undertaken to:

- record and communicate lessons from the exercise as a part of continual improvement; and
- record and communicate lessons from the management of the exercise for future exercises.

The evaluation of *Exercise Minotaur* ensured:

- the validity of the exercise;
- the process of evaluation would stand up to scrutiny;
- the evaluation framework was used consistently;
- the evaluation was inclusive;
- perceived individual jurisdictional weaknesses were handled sensitively;
- consensus could be achieved on the recommendations; and
- the resulting recommendations were evidence-based, reasonable, practical, achievable and measurable.

The evaluation consisted of two major parts:

- validating the exercise (performed prior to and during the exercise); and
- evaluating decisions made, actions taken and communication (activity) within the exercise (performed during and after the exercise).

To ensure the validity of the exercise

- the exercise outline was endorsed by the Exercise Steering Committee;
- the exercise was developed by a multidisciplinary team with internal checks;
- a pilot exercise was conducted to ensure internal consistency and efficacy;
- independent reviewers validated the exercise as an appropriate test; and
- exercise observers were asked to comment on the value of the exercise after its conduct.

Activity within the exercise was evaluated using the following:

- participants' daily evaluations;
- daily debrief reports;
- exercise evaluators' reports;
- industry/agency/jurisdictional debrief reports;
- international and domestic observers' reports and debrief report;
- the national, multi-jurisdictional and industry debrief;
- the National Management Group debrief; and
- the control team report—a description of how to improve the planning and conduct of future exercises.

There was a remarkable amount of agreement between the various debriefs and reports as to the exercise findings and recommendations.

Results and lessons of *Exercise Minotaur*

Exercise Minotaur improved Australia's emergency response systems, increased community, industry and government awareness, demonstrated Australia's ability to manage a serious animal emergency, and highlighted areas for further improvement.

Lessons learnt from the exercise include:

- that a whole-of-government and industry approach is essential to the management of major emergency animal disease outbreaks;
- that good information and co-ordination systems are critical;
- that decision-making during emergencies should be risk-based in the face of incomplete information;
- that public communications during a major emergency animal disease outbreak would be very large scale and is critical;
- that emergency plans and disease control policies must be up to date and understood;
- that all parties should develop and conduct emergency exercises regularly; and
- that community recovery will continue long after the disease is eradicated.

The next steps in improving Australia's animal health emergency system include the enhancement of existing:

- management and information systems;
- public communications strategies;
- training and exercising programs; and
- livestock identification.

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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.

Zoonotic disease risk—protecting Australia from BSE or mad cow disease

Adams uses the example of BSE to examine risk assessment

Abstract

Australia is free of bovine spongiform encephalopathy (BSE or mad cow disease). However, it provides a contemporary and compelling case study in the application of risk assessment in designing appropriate responses to an emerging disease where uncertainties abound and where decisions have to be made on the basis of the best available knowledge. Risk assessment can channel knowledge on key questions such as 'how do we know when a new animal disease will escalate into an epidemic or pandemic and when could it affect people'. Risk assessment sets out procedures for assembling and analyzing the available evidence relating to risk and then presenting the results in a form that is easy to understand and to act upon fairly and effectively.

Overview of BSE

It has several distinctive characteristics and is simultaneously a zoonosis (a disease of animals that affects people), a major food safety concern and a major disease of cattle in its own right. BSE is also a classic example of an emerging disease. It is a disease that was previously unknown to science and which came about as a result of a web of particular events and circumstances at a particular place and time in history. Some specific factors in the husbandry of cattle allowed the emergence of BSE and it is doubtful that the disease could have originated anywhere else but in the United Kingdom and in the last two decades of the twentieth century (UK BSE Inquiry, 2000a).

A quick picture of BSE sets the scene. It is a transmissible, but not infectious or contagious, degenerative disease of the central nervous system of cattle and belongs to the class of diseases known as the transmissible spongiform encephalopathies (TSEs). BSE has a long incubation period, usually about six years, which provides some problems for management of the disease and mandates lifelong identification of individual cattle in the 21st century. BSE does not spread from cow to cow as occurs in the usual infectious or contagious diseases. Transmission only takes place when cows consume rendered tissue, meat and bone meal, derived from other cows with the disease. The infectious agent for BSE is a prion, a modified form of a protein that occurs naturally in most vertebrate animals. Prions are highly resistant to degradation by heat and modifications to the rendering process in the UK involving the use of relatively low temperatures are likely to have contributed to the emergence of BSE in that country (Taylor and Woodgate, 2003). Contaminated meat and bone was and remains the only source of transmission of BSE and live cattle with the disease spread BSE to other countries when these animals enter the feed chain.

Prion diseases, like BSE, are complex and present scientists with great intellectual and technical challenges (Lasmezas, 2003). On the other hand, the cardinal control measure for BSE is simple and straightforward. Do not feed contaminated meat and bone meal and, as a failsafe, do not feed meat and bone meal of any sort to ruminant animals (Prince et al., 2003). Australia is recognised as being free of BSE. Australia has not imported meat and bone meal from any country except New Zealand since 1966

and rigorous border control is in place. Australia banned imports of live cattle from the UK in 1988 and the few remaining live animals are in lifetime quarantine. Similar bans and management have been placed on cattle from Europe, Canada, the USA and Japan. At the same time Australia has stringent and audited bans on the feeding of cattle and other ruminants with meat and bone meal from any vertebrate. These measures are supported by a national surveillance program on nervous disorders in cattle.

Risk assessment and BSE

Why discuss BSE in a journal on emergency management? The answer is that experience with BSE has demonstrated the indispensability of risk analysis for guiding a rational approach to disease control. The continuing saga of BSE provides an object lesson on risk analysis as a vital backroom activity for Australia's responses to any disease. Risk assessment is especially valuable in situations of uncertainty and where control measures have to be based on the best knowledge available at the time. How can we know when a new animal disease will escalate into an epidemic or pandemic and may or will affect people? The best judgment is available through risk assessment, which sets out a rational framework for assembling and analysing the available evidence relating to risk and then presenting the results in a form that is easy to understand and to act upon fairly and effectively.

To be effective, risk assessment requires a special set of disciplines. For example, advocacy for one viewpoint about a disease over another is disallowed. Each viewpoint must be considered in relationship to disease control and the ultimate truth is determined by pragmatism; by effectiveness in action. This issue of intellectual discipline has been vital for the control of BSE. Hypotheses other than the prion hypothesis (for example, those related to mineral nutrition; Purdey, 1996) could have disrupted key control measures and allowed the disease to act like wildfire, had they been heeded.

Hindsight suggests that the approach to BSE in the UK would have benefited from the more vigorous application of risk assessment and the use of public policy processes that foster it. The policy aspects of the BSE experience deserve further reflection on the benefits it can bring to disease and emergency management in Australia. Why repeat errors if a similar situation were to occur? BSE has compelled the UK and EU to make more effective use of scientific advice in policy (UK BSE Inquiry, 2000c). The UK Office of Science and Technology has produced some insightful papers on the subject (Office of Science and Technology; 1997, 2000a and 2000b).

Risk management

As background to the responses Australia has made to BSE, it is worthwhile considering the disastrous impact of this disease. The BSE epidemic in the UK and in other countries in Europe has clearly receded and entered an extended elimination phase. BSE has been detected in 16 other countries and has prompted some unparalleled actions to protect human and animal health. Nevertheless, the effects continue to reverberate throughout the world. The single cases of BSE in cattle in Canada and the USA have led to the allegation that the disease has taken root in North America; a possibility that is unlikely to be true, but only time will tell.

The point now is that BSE has degenerated into a disease of trade and current irrationalities have become a source of economic danger for Australia's red meat industry. The key concern is to make the necessary responses to maintain trade without compromising disease control principles, especially that of 'proportionality', which requires some explanation. The simple idea is that management of disease should be proportional to the risk involved and that risk assessment should be kept separate from risk management as far as possible (May, 2001). The European Commission has produced some excellent guidelines and advice on the harmonisation of risk assessment for various purposes in response to the BSE experience (Scientific Steering Committee, 2003).

As for the animal health impacts of BSE, figures to the end of 2003 show that 183,496 cases have been reported in the UK since records commenced in 1987and that the epidemic peaked in 1992 with 37,280 cases in that year. Other figures for incidence to the end of 2003 are Ireland (1297), France (841), Portugal (788), Switzerland (443), Spain (300) and Germany (264). The economic costs and trade impacts have been enormous and have resonated in countries like Australia that do not have the disease. The UK BSE Inquiry (2000b) stated that total net cost of the BSE crisis to the Exchequer would be £3.7 billion by the end of the 2001/02 financial year and that the complete collapse of the beef and cattle export market, at one point worth £720 million a year, occurred after the European Commission banned the export of UK beef and cattle in March 1996.

The human cost of BSE has been tragic. There is a virtually inescapable link between BSE and variant Creutzfeldt-Jakob disease (vCJD), which is similar to Creutzfeldt-Jakob disease (CJD) but has the unhappy distinction of occurring in younger people. Up to April 2004, 140 deaths have resulted from definite or probable vCJD. Fortunately, only one death has been recorded in 2004. Six deaths from vCJD have occurred in France and one each in Ireland, Italy, Canada and the United States as a result of exposure in the UK (WHO, 2004).

Fear of vCJD has had other potentially dire consequences, which reflect just how dependant the world is on bovine products other than meat. For example, bovine products like fetal calf serum are essential for the manufacture of some important vaccines and other pharmaceuticals and BSE has cast a pall over their production and use. Furthermore, the BSE epidemic has compromised the supply of human blood. People resident in the UK during the peak years of the epidemic are not allowed to be blood donors. Whether there is any real risk remains to be seen.

Conclusions

BSE does not occur in Australia and the pathways for entry into Australia have been blocked. Given the consequences of the disease on the red meat industry and the balance between risk and consequence, the layered defences in place in Australia can be considered essential for the foreseeable future. Continuing risk assessment is necessary to make sure they remain adequate.

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Import risk management

Wilson and Koob consider Biosecurity Australia's role in developing and protecting the best quality quarantine policy for Australia

Introduction

Australia's conservative approach to quarantine has helped preserve the favourable health status of our agricultural industries since Federation, and has been a key factor in developing many valuable export markets. We have a managed risk approach to quarantine, not a zero risk approach. Zero risk would mean no tourism, no international travel or trade, and would deny Australian primary industries access to produce such as new genetic material; for example bud wood, semen and seeds.

With the recent outbreak of citrus canker on a property at Emerald, Queensland, it is timely to reinforce the importance of adhering to quarantine measures developed to protect Australia's human, animal and plant health, and the environment.

The Australian Government has been at the forefront of efforts to reduce international trade barriers faced by Australian farmers. Our farmers export two-thirds of everything they produce and Biosecurity Australia works with them to help win market access into other countries—basing each case on sound science. Biosecurity Australia consults with trading partners on quarantine conditions that facilitate access for Australian exports to new markets and to preserve and improve existing markets.

Since the World Trade Organisation (WTO) came into force in 1995, Australia has gained access to hundreds of new markets for animal, plant and food products, and improved existing market access for many Australian commodities. The World Trade Organisation Agreement on the Application of Sanitary and Phytosanitary Measures (World Trade Organisation, 1995) – the SPS Agreement – has assisted in providing clear rules to help ensure fair, science-based market access conditions for Australia's agricultural exports.

On the import side, the SPS Agreement provides a framework to ensure imports do not pose an undue risk to agricultural production, public health or the environment. It provides a stable framework for Australia to consider requests from trading partners to import animals, plants and their products into Australia in a way that ensures the high standard of quarantine is maintained. The rules apply to food safety and animal and plant health, and allow countries to set their own standard or 'appropriate level of protection'. But these standards must be based on science, and should be applied only to the extent necessary to protect human, animal or plant life or health. Biosecurity Australia undertakes import policy reviews, including import risk analyses (IRAs), to assess the pest and disease risks associated with proposed agricultural imports and to develop quarantine measures to manage those risks.

Import risk analysis

Australia may address requests for the import of animals, plants and their products, where there are biosecurity risks, by extending existing measures for similar products with comparable risks. Where measures for comparable biosecurity risks do not exist, a risk analysis is performed to determine the import risk management measures needed to reduce those risks.

Import risk analyses are rigorous, science-based assessments, involving extensive research and consultation. We use expert panels consisting of members from Biosecurity Australia and other Australian Government agencies, State and Territory government agriculture departments, research and academic institutions, consultants and others selected based on the expertise needed for a particular analysis.

The risk analysis process conforms to Australia's international obligations, which derive from the SPS Agreement, and specific international guidelines and standards on risk analysis developed under the International Plant Protection Convention (IPPC) and by the Office International des Epizooties (OIE-the World Organization for Animal Health). Australian import risk management measures are based on international standards where they exist and where they deliver suitable protection from pests and diseases. Where such standards are not appropriate to Australia's level of biosecurity protection, or relevant standards do not exist, Australia imposes risk management measures supported by risk analysis.

Australia has a world-class reputation for import risk analysis. *The Import Risk Analysis Handbook* (Biosecurity Australia, 2003) describes the steps in Australia's IRA process—from receipt of an import proposal through the scientific risk analysis to deciding quarantine policy. The IRA process is open and consultative. Stakeholders (both in Australia and overseas)

have opportunities to comment and provide input at key points. Issues papers and draft IRA reports are circulated to seek scientific and technical input from all who wish to comment. Their input helps ensure all relevant information is brought to bear in developing quarantine recommendations. It is only then that the IRA report is finalised and the Director of Animal and Plant Quarantine may approve the new quarantine policy and associated import risk management measures.

Steps in import risk analysis

Initiation

- Submission of import proposals
- Policy development or review initiated by Biosecurity Australia

The first stage covers receipt of import proposals and initiation of import policy reviews by Biosecurity Australia

Scheduling and scoping

- IRA work program
- Consultation with States, Territories and other Commonwealth agencies
- Scope, approach and IRA Team membership
- Initial consultation with registered stakeholders
- Decision on scope, approach and membership
- Provision for stakeholder appeal
- Determination of appeal

This stage covers formulation of the work program, consultation with the States and Territories, and relevant Commonwealth agencies, decisions on the scope and approach of the IRA and membership of the IRA team, and relevant appeals provisions.

Risk assessment

- Initial work
- Consultation on the technical issues paper
- Preparation of Draft IRA Report
- Consultation with stakeholders on Draft IRA Report
- Notification to WTO
- Independent peer review

This stage involves conduct of the risk analysis work together with consultation with stakeholders, peer review and relevant international notifications. It is at this stage that the Draft IRA Report is prepared and issued for public comment.

Reporting

- Preparation of Final IRA Report
- Eminent Scientists Group considers draft final report[1]
- Consideration of Final IRA Report
- Consultation with States and Territories
- Release of Final IRA Report and recommendation for a policy determination
- Provision for appeals on Final IRA Report
- Appeal determination

This stage involves report finalisation, final consultations with States and Territories and the appeals process for this stage of the IRA.

Final policy determination

- Notification of final policy determination

The last step is determination and notification of the administrative policy.

Biosecurity Australia has recently circulated revised draft IRA reports on apples from New Zealand and bananas from the Philippines, as well as a final IRA report on pig meat. In each case, an IRA panel composed of recognised scientific and technical experts has thoroughly assessed all the available evidence and recommended quarantine measures to ensure that Australia maintains its favourable health status.

Example of an import risk analysis

Under the previous import policy, only Canada, Denmark and New Zealand were allowed to export pig meat to Australia. The pig meat import risk analysis (IRA) responded to pig meat access requests from Brazil, Canada, Chile, European Union (EU) Member States, Hungary, Korea, Mexico, New Zealand, South Africa, Taiwan and the United States of America (USA) (Biosecurity Australia 2004).

The IRA started in May 1998 and is 'generic' in that it is not restricted to specific exporting countries. The import conditions recommended as a result of the IRA are applicable to any country. The IRA examined the risks attributed to all significant disease agents the import of pig meat could introduce into Australia.

A Technical Issues Paper was released in January 2001 and a public meeting was held on 1 March 2001 to discuss the paper, which identified 28 disease agents including:

- Foot-and-mouth disease virus
- Vesicular stomatitis virus
- African swine fever virus
- Classical swine fever virus
- Rinderpest virus
- Swine vesicular disease virus
- Aujeszky's disease virus

The Draft Methods Paper was released in October 2002, and the IRA Draft Report was issued for comment in October 2003. The Final IRA Report was released in February 2004 and contained:

- background information to the IRA, Australia's quarantine policy, the international framework for trade in animals and animal

1 The Eminent Scientists Group inclusion in the IRA process was announced by the Minister for Agriculture, Fisheries and Forestry, Warren Truss, on 15 July.

products, and Australia's current policy for import of pig meat;
- the method and results of risk assessment;
- recommended quarantine conditions for imports of pig meat;
- further steps in the IRA process; and
- a summary of stakeholder comments received on the Technical Issues Paper, Draft Methods Paper and Draft IRA Report and the responses.

The new quarantine conditions for imports of pig meat are the most stringent in the past 13 years, but more countries will be able to export to Australia providing they meet the requirements specified in the new policy. Specific conditions will be established for countries wanting access to the Australian market, based on their animal health status and the ability of their veterinary services and other authorities to inspect and certify their pig meat. Australia's new quarantine conditions involve a number of risk management measures, depending on the exporting country's animal health status, including:

- country, zone or herd freedom;
- carcass testing;
- cooking, freezing, curing and canning; and
- removing certain tissues or parts of the carcass—the head, neck, bones and major lymph nodes.

Conclusion

Every import risk analysis that Biosecurity Australia undertakes reflects Australia's commitment to ensuring a consistent, conservative and consultative approach to quarantine policy, based on high-calibre science. Comment of a scientific or technical nature is sought from stakeholders at specific times during the IRA process as it helps Biosecurity Australia to develop the best quality quarantine policy for Australia.

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Australian quarantine arrangements at the border

Greg Fullam outlines the vital role of Australia's quarantine service

Introduction

The Australian Quarantine and Inspection Service (AQIS) provides quarantine inspection services for the arrival of international vessels, passengers, cargo, mail, animals, plants and their products into Australia. AQIS also undertakes inspection of and provides certification for a range of animals, plants and their products exported from Australia. In providing these services, AQIS works closely with other border agencies, industry stakeholders and the public to identify and intercept quarantine risk material.

Human quarantine arrangements

The objective of quarantine activities in Australia is to ensure that, as far as possible, diseases of human quarantine concern do not enter the country, and to control and eradicate these diseases if they are identified in Australia.

AQIS also administers human quarantine on behalf of the Department of Health and Ageing, primarily through surveillance of arriving passengers for quarantinable diseases. Human quarantine surveillance measures are administered by a range of means, including co-operative arrangements with airlines, shipping agents and state medical authorities.

The SARS and Avian Influenza outbreaks during 2003 and 2004, in Asia, Europe and North America, caused WHO, for the first time, to issue travel advice that warned prospective travellers against travel to some locations due to health risks. The outbreaks also caused major disruption to the international tourism and airline industries, with significant economic impacts.

Australia responded to these outbreaks by immediately with increased surveillance of the health of passengers and crew arriving on aircraft and ships from affected countries, increased screening of passenger luggage for poultry products, and enhanced surveillance of poultry and wild birds.

Quarantine inspections at an international mail centre

The human diseases that are currently prescribed diseases in Australia are:

- Cholera
- Dengue Fever
- Malaria
- Measles
- Plague
- Polio
- Rabies
- Severe Acute Respiratory Syndrome (SARS)
- Smallpox
- Tuberculosis
- Typhoid fever
- Viral haemorrhagic fevers of humans
- Yellow Fever

Recent amendments to the *Quarantine Act 1908* place greater responsibility on crew to report possible symptoms observed in passengers. The new Prescribed Symptoms are:

- Temperature over 38ºC. If a thermometer is available and able to be used, then only temperatures above 38ºC are notifiable. If a thermometer is not available, or cannot be used, any person suspected of having a temperature should be reported.
- Acute unexplained skin rashes or lesions and rashes or lesions caused by illness and/or exposure to hazardous agents. Heat rashes, dermatitis, eczema and other such common skin conditions are not reportable.
- Persistent and/or severe vomiting. Vomiting caused by inebriation or motion sickness is not reportable.
- Persistent, watery or profuse diarrhoea.

AQIS staff inspect the outside of containers for pests and diseases

- Bleeding from the eyes, ears, nose, mouth, anus and/or skin. People who are predisposed to nose bleeds and/or haemorrhoids, or who have cuts and abrasions are not reportable.
- Glandular swelling in the armpits or neck.
- Prolonged loss of consciousness where a person cannot be roused. Loss of consciousness caused by consumption of alcohol, drugs and/or other medications is not reportable. Temporary loss of consciousness from fainting is not reportable. This symptom does not include sleeping.
- Persistent coughing and difficulty breathing with no apparent cause and no history of similar symptoms. Persistent coughing and difficulty breathing due to asthma, heart disease, obesity, chronic bronchitis or emphysema is not reportable.
- Other symptoms or combinations of symptoms as declared in alerts issued by the Director of Human Quarantine. These alerts are only effective for as long as the Director decrees.

The introduction of prescribed symptom reporting allows medical staff to assess the passenger, determine if an illness of quarantine concern is present, and take action to protect the wider Australian population.

Quarantine as an integral part of Australia's border security

Australia's quarantine function has a long and effective history. Originally focusing on human health issues, quarantine now aims to prevent the introduction, establishment or spread of human, animal and plant pests and diseases in Australia. This benefits all Australians by protecting public health, safeguarding Australia's agricultural, trade and tourism industries, and protecting native flora and fauna.

The Australian Government takes bio-security very seriously, and conducts a range of simulations and planning exercises to maintain and improve preparedness.

In February 2001, there was a serious and widespread outbreak of foot-and-mouth disease (FMD) in Europe. The Australian Government responded to this serious economic and environmental threat to Australia by implementing increased quarantine intervention.

The Government committed an extra $596 million over four years to increase the capacity of DAFF and the Australian Customs Service (Customs) to respond to exotic pests and diseases, substantially strengthening Australia's quarantine border controls. These measures built on enhancements already in place as a result of the Government's commitment of $76 million to quarantine in 1996. Quarantine border intervention target rates increased to more than 80% at international airports and 100% at other border entry points.

The grave threat to Australia from an FMD outbreak was confirmed by the Productivity Commission's independent report into the potential impact of an outbreak of FMD on Australia, which estimated FMD would cost Australia between $8 billion and $13 billion.

What has increased quarantine intervention achieved?

The Government's Increased Quarantine Intervention (IQI) program, which greatly expanded resources available for quarantine at the border from May 2001, has increased both the levels of intervention at the border and the proportion of quarantine risk material being intercepted.

AQIS has recruited, trained and deployed over 1200 additional staff and 46 detector dog teams, and acquired 64 X-ray machines. These staff form an integral part of Australia's border protection and deal with very substantial volumes of approaching material (2003-2004 figures):

- about 10 million passengers and crew at airports;
- around 150 million mail items; and
- approximately 1.3 million sea containers, 420,000 air cargo containers, and 2.1 million consignments of High Volume, Low Value air cargo.

At airports, with the benefit of increased resources, over 90% of passenger baggage is screened. Similarly, 100% of international mail is now screened for material of quarantine concern, and 100% of sea containers are inspected. Continuing high levels of co-operation between AQIS, Customs and industry have assisted in achieving these results.

To put this performance in a practical context, after IQI rollout, each month AQIS staff seize significant volumes of quarantine risk material at airports and mail centres as shown in Table 1.

Much of this product is fresh, high-risk material, coming from FMD affected countries including China and southern African nations.

AQIS staff also regularly find items of interest to other agencies that pose a threat to Australia's border security. For example, in December 2003, AQIS staff found a shipment of 7kgs of drugs (23,500 tablets of MDMA with a street value of $1.6m) at Sydney airport.

While the outbreak of FMD in the United Kingdom is now controlled, there have been continuing outbreaks of exotic diseases around the world (such as the recent FMD outbreaks in Korea), and there remain significant and longstanding quarantine risks to Australia from other exotic pests and diseases.

Recent examples include the Severe Acute Respiratory Syndrome (SARS) outbreak, and the current avian influenza outbreak. Australia's rapid and effective response to the avian influenza threat has included increases in passenger surveillance and awareness campaigns.

Sniffer dogs form part of the front-line defences

Indeed, the ongoing threat from these exotic pests and diseases may in fact have increased, given the potential use of exotic pests and diseases as instruments of bio-terrorist attack. Quarantine is a critical part of Australia's defences against these forms of terrorist threats.

The effectiveness of Australia's enhanced quarantine activities was evaluated in ANAO Report 47, Managing for Quarantine Effectiveness, released in June 2001. The ANAO found that, as a result of actions undertaken in response to the Quarantine Review Committee report "quarantine operations were now markedly more effective across the board".

Following the commitment of the Increased Quarantine Intervention funding, an inquiry into Australia's quarantine effectiveness was undertaken by the Joint Committee of Public Accounts and Audit (JCPAA). In its report in February 2003, it noted:

"…the additional funds allocated to the quarantine function are being well spent. In general, the Committee believes Australia's quarantine function is in good shape and the additional funding is being appropriately used."

AQIS works with its stakeholders at the front line of Australia's defences against biological threats to ensure that effective and co-ordinated plans are in place to respond to potential quarantine threats. This maintains Australia's animal, plant and human health status and protects Australia's agricultural industries.

Table 1. Volume of seizures per month

Items	Airports	Mail Centres
Fruit/Plants	3.9t	150kg
Vegetables	3.9t	150kg
Meat	1.5t	350kg
Seeds	550kg	350kg
Eggs	500kg	350kg
Egg Prod.	500kg	350kg
Poultry	300kg	50kg

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Participatory emergency planning in AQIS—Integrated contingency planning, the AQIS experience

Greg Fullam outlines the practices and advantages of integrated contingency planning as used in AQIS

Australia's border is a highly dynamic operational environment, with many challenging events arising each year that require effective contingency planning and integrated emergency response arrangements. The Australian Quarantine and Inspection Service (AQIS) works closely with industry, stakeholders and other border agencies to ensure Australia's quarantine integrity is effectively maintained during emergencies.

AQIS successfully responds to a wide range of emergencies and special events demonstrating the critical role that participatory planning plays in this challenging atmosphere. AQIS has longstanding integrated arrangements based on close consultations with industry to ensure an effective contingency planning framework is in place at the border.

Broadly speaking, AQIS implements the contingency plans developed with these stakeholders in three broad circumstances:

1. responding to emergencies at Australian operating sites that affect normal border processing arrangements;
2. participating in special events and occasions of significance that require modification to normal processing procedures, often at short notice; and
3. responding to overseas incidents that impact on the flow of material and people into Australia.

In each case, the plans aim to allow AQIS to respond flexibly to incidents as they eventuate, while maintaining quarantine standards.

AQIS staff planning a pest and disease survey in northern Australia

Emergencies at Australian operating sites

A range of natural disasters, accidents or security incidents can lead to closure of operating facilities at normal border entry points in Australia. When this occurs, the impact on border agencies such as AQIS can be immediate and fundamental.

Border entry points are generally built around considerable physical infrastructure, with the economic pressure of modern trade and commerce. The infrastructure is specialised to maximise the speed and efficiency with which material can be processed into Australia.

When highly specialised infrastructure (such as airport terminals or container wharves) are shut down, border agencies are faced with the challenge of maintaining Australia's border integrity while also ensuring the continued entry of material and people into Australia, without the advantage of the specialised physical equipment integrated into the port infrastructure.

AQIS has worked with stakeholders to ensure that plans are in place to allow response to events in a way that maintains border integrity and is sensitive to the needs of other agencies and industry during such events. The operational plans implemented during such events are developed at a local level, working with the key field staff from industry and government partners. For example, formal agreements are in place with each airport and at international mail centres and are regularly tested with stakeholders. AQIS is a member of the top level emergency management committee at each airport and at international mail centres, and works with other stakeholders in incident response teams to implement the emergency

plans when necessary. Plans are regularly reviewed and updated to ensure they remain current, and to reflect learnings from exercises and actual occurrences.

Broadly speaking, the types of plans developed emphasize the use of flexible resources that can be deployed in alternative processing facilities. Depending on the specific event, this may include the deployment of additional dog teams, the use of mobile x-rays, or changes to staffing arrangements to alter the proportion of staff available to process incoming material.

The contingency plans also focus on maximising the application of risk management principles to ensure resources are available and targeted to the areas of greatest risk. By developing the emergency arrangements in concert with other stakeholders, it is also possible to maximise the extent to which each agency assists the other agencies in effectively processing inbound cargo or passengers in a constrained operating environment. The cornerstone of this approach is the effective referral of material of concern to appropriate staff from each agency, and the co-operative integration of available resources by on-the-ground managers to achieve maximum effectiveness.

Staff from agencies work together to determine what alternative processing arrangements can be put in place given the particular emergency, and liase with industry to ensure that information on the new arrangements is communicated in an appropriate and timely manner to all relevant stakeholders.

A critical aspect of these contingency arrangements is ensuring that decision-making processes to determine when incidents are escalated in seriousness (so that new phases of the emergency plans are activated) are clearly defined and well understood by all parties before any actual event. Having a clear hierarchy of authority and an integrated emergency management structure allows effective, co-ordinated responses to emergencies at border facilities.

Regular simulations and exercises test these contingency arrangements, and allow AQIS to evaluate and adjust the detailed plans in place for each facility and point of entry. Regular reviews and discussions with partner agencies and industry ensure all relevant participants have a sound understanding of the contingency plans, while ensuring appropriate security arrangements are maintained.

Special events and occasions of significance

Australia hosts a wide range of major events, including official visits, major conferences and meetings of international inter-government bodies. These occasions can involve significant disruption to normal processing arrangements for a wide range of reasons, including the need for additional security for dignitaries (as with the Commonwealth Heads of Government Meeting), unusual types of cargo, or large numbers of passengers travelling together. Perhaps the most challenging of these events are the major sporting tournaments, such as the Sydney Olympics and the Rugby World Cup.

As with emergencies at operating sites, AQIS relies on effective planning arrangements to ensure it can meet the challenges posed by these events. Many of these events involve significant numbers of overseas visitors bringing items of cultural significance (such as traditional costumes or food items) with them in large numbers, for use during the festivities. These items often pose very high risks to Australia's quarantine status and, as such, pose particular challenges for AQIS staff.

The lead-time involved in most of the major events and special occasions allows for dedicated planning task forces to be established, with representation from relevant agencies, community bodies and industry groups. For example, during the lead up to the Rugby World Cup 2003 ("the Cup"), AQIS participated in a Border Control Working Group established in August 2002 to facilitate information sharing between agencies and to address any issues arising in the context of contingency planning for the Cup. The group included representatives from the Department of Immigration and Multicultural and Indigenous Affairs (DIMIA), the Australian Quarantine and Inspections Service (AQIS), the Australian Customs Service, AirServices Australia, the Attorney General's Department, the Australian Federal Police, the Therapeutic Goods Administration, the Protective Security Co-ordination Centre, the Department of Defence, the Department of Transport and Regional Services and the Department of Industry, Tourism and Resources.

The experience gained during the Sydney 2000 Olympic Games, and the close working relationship between the border control agencies for that event, helped to ensure that arrangements ran smoothly during the tournament period. The group agreed that the English language version of the Visiting Australia website, which was developed for the Sydney 2000 Olympics, would be updated for RWC 2003. Links to the site were included

on the Australian Rugby Union's official tournament website and the Australian Government's dedicated Cup site.

The working group also met representatives from the ARU's Logistics Team and shared information to raise issues that were later pursued by agencies on a bilateral basis with the ARU. Information on Australia's entry requirements was disseminated to team managers at the Team Managers' Conference, which was hosted by the International Rugby Board from 27 April to 2 May 2003 in Sydney.

Representatives from Customs, AQIS and DIMIA were given the opportunity to provide a direct presentation to team managers. In addition, Customs, AQIS, the Bureau of Meteorology and the Therapeutic Goods Administration provided relevant information for distribution at the Conference. The forum was an effective means of disseminating information to key personnel from each of the competing nations.

The movement of cargo for the World Cup, including team training equipment, was facilitated by special measures enabling targeted importation arrangements to be used by arriving teams. The smooth handling of this issue was aided by early contact established between event organisers and border agencies. AQIS inspected or X-rayed all team equipment with the majority of clearances performed at airports as part of the passenger processing of accompanied baggage.

Experience from the World Cup reinforced the importance of a number of key issues when preparing contingency plans for the smooth transition of visitors and equipment across the border during major events. In preparing for similar major events, AQIS uses effective industry and stakeholder consultations to ensure:

- contact between the border agencies and event organisers is established early in the planning process;
- normal agency operational arrangements apply to the maximum extent possible;
- event organisers are encouraged to provide, at their earliest convenience, as much information as possible to the border agencies on the travel plans of teams and officials to enable risk profiles to be assessed and resources to be allocated to facilitate the processing of teams and their equipment across Australia's border;
- where possible, event organisers are encouraged to provide the border agencies with information on expected international visitor numbers, including a breakdown by country of origin. (In the case of the Cup, overseas ticket sales were able to provide an indication of potential visitor numbers); and
- communication strategies are used to explain Australia's entry requirements to prospective entrants into Australia well before the event, through the use of websites and targeted awareness material.

Overseas incidents impacting on movements into Australia

A wide range of overseas events can impact on the movement of goods or people into Australia in a manner that dramatically alters the challenges faced by Australia's border agencies. Examples of such events include outbreaks of disease (such as the recent SARS and avian influenza incidents), natural disasters or major international conflicts (such as the war in Iraq or the conflict in East Timor). In responding to such events AQIS uses contingency plans to allow a rapid and effective adjustment to normal arrangements. This ensures that quarantine services continue to be delivered while facilitating effective entry arrangements for inbound goods and passengers, including in many cases Australians being repatriated from conflict or disaster areas.

A recent example of the critical role of participatory planning in responding to external events was the activation of contingency arrangements during the aftermath of the Bali terrorist bombings. AQIS was required to be involved from the outset by ensuring that border processing arrangements were maintained without adding to the grief felt by those involved. This was compounded by the need for immediate and urgent clearance in many cases.

There were three main phases to the operational arrangements implemented by AQIS to deal with the Bali emergency. They were:

- Clearance of people returning to Australia who were physically injured in the blast and in need of urgent medical attention, or who were carers for the injured;
- People returning to Australia that were not directly involved but were emotionally affected or needed to be interviewed by Australian investigators; and
- Return to Australia of the bodies of those who died in the blast, and their families.

Charter aircraft were used to ferry those physically injured back to Australia. The prompt activation of effective contingency plans by experienced AQIS operations staff ensured that quarantine integrity was maintained while treating each situation with compassion and sensitivity. The contingency plans allowed AQIS to adjust normal operations so the charter aircraft were permitted to arrive at locations other than the international terminal.

In Perth this meant using an area at a small private company lounge on the domestic side of the airport. This allowed for family reunions, ambulance access, media areas, police checks, and inspection processes to be controlled.

AQIS staff worked alongside Customs and the Australian Federal Police to ensure speedy and compassionate processing occurred, while maintaining effective screening for material of quarantine concern. Emergency planning arrangements allowed AQIS to deploy staff members handpicked for these operations based on the special skills and training required for such events.

Even though visitor numbers to Bali dropped dramatically after the incident there were a significant number of people on the island who required quick repatriation. Although these people had not been directly involved they were traumatised by the incident. The Australian Federal Police implemented arrangements requiring all passengers arriving from Bali in the immediate aftermath of the event to be interviewed to ensure effective gathering of intelligence and evidence for future prosecution of the terrorists.

Given the nature of the circumstances faced by many of the returning passengers, special arrangements were implemented to modify normal arrangements to minimise inconvenience associated with paperwork normally applied to inbound passenger processing. For example, all fees for the treatment of imported goods were waived for all passengers arriving from Bali for three months after the incident, and staff were compassionate and sensitive in all interactions with affected passengers.

The most emotionally charged area was the return to Australia of the bodies of those who died in the blast. On many of these occasions family members accompanied the bodies. This process was a drawn out due to the difficulty of identifying the bodies when in Bali. Once again AQIS staff carried out the necessary processing requirements unobtrusively, diligently and with a very high level of compassion and sensitivity.

An AQIS scientist examines plant material collected from surveys to determine if it poses a risk to Australia

AQIS staff worked with staff from other border agencies, airlines and airports to co-operatively expedite all procedures, without compromising the integrity of border control procedures. The wishes of relatives and friends returning with the remains of loved ones were observed wherever possible, and bereaved family and friends afforded maximum privacy. The effective participatory planning in place for such events allowed border agencies to ensure all possible efforts were undertaken to ensure the utmost dignity was maintained at all stages of the process.

Throughout the Bali evacuation and response, AQIS carried out duties in a professional and compassionate manner, which has become a trademark of the whole organisation. During and after the Bali response operation, not a single complaint was received from any source. This process is a testament to the effective implementation of emergency arrangements, developed through integrated participatory planning.

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Avian influenza—ensuring preparedness for a rapidly emerging zoonosis

Mike Nunn outlines preparedness for avian influenza

Abstract

The recent emergence of avian influenza (AI) as a disease capable of infecting humans requires a multidisciplinary approach at local, national and international levels to ensure adequate preparedness for either animal or human outbreaks. It also requires regional co-operation and targeted development assistance, supported by applied research to provide optimal preventive and response options. Australia has experience with AI in poultry and has a strong capacity in research on both animal and human influenza. Sharing this experience and capacity with Asian countries helps them control the disease. It reduces the likelihood of further outbreaks in poultry and the possibility of the emergence of new influenza viruses capable of person-to-person transmission.

Introduction

Over the past few years, AI has emerged as the cause of an increasing number of outbreaks of disease in poultry, significant disruptions to trade, and a number of human cases of disease. Public health authorities are also concerned that AI might lead to a new virus capable of person-to-person spread, potentially causing a worldwide epidemic (pandemic) of influenza in humans.

Previous outbreaks

The AI viruses responsible for the disease originally called 'fowl plague' (and now called 'highly pathogenic AI', HPAI) were identified only in 1955, although fowl plague was first described in 1901. Since 2000, there have been more outbreaks of HPAI than in the preceding 45 years, and these have involved much larger areas and greater numbers of birds.

AI viruses are classified into subtypes on the basis of their molecular structure. For example, the 'classical' fowl plague virus is identified as H7N7 and the subtype that caused the 2003–04 epidemic of HPAI in poultry in several Asian countries is H5N1. Five outbreaks of HPAI have occurred in poultry in Australia. The first (1976: H7N7) involved three adjacent poultry farms in a Melbourne suburb. The second (1985: H7N7) and third (1992: H7N3) outbreaks both occurred near Bendigo. The fourth (1995: H7N3) occurred near Lowood, in south-eastern Queensland, and the fifth (1997: H7N4) near Tamworth in New South Wales. Each outbreak was eradicated by adopting a 'stamping-out' policy based on slaughter, disinfection and movement controls.

The current epidemic in Asia

The 2003–04 epidemic of H5N1 HPAI in poultry in Asia involved a larger geographical area and a faster rate of spread than any previous outbreaks of this disease and resulted in the death or slaughter of more than 100 million poultry. Its rapid spread across national boundaries demonstrates that H5N1 HPAI must be managed as a 'transboundary animal disease' through the co-operation of countries in the region. Outbreaks of H5N1 reported in China, Indonesia, Thailand and Vietnam in July and August are a reminder to Australia to maintain its vigilance for the disease.

Host range and clinical signs

All domesticated poultry and many species of wild bird are susceptible to infection with AI. Many species of wild birds and waterfowl carry the virus but generally show no signs of disease, which occurs most frequently in chickens and turkeys. The clinical signs include sudden death, a drop in egg production, loss of appetite, and diarrhoea. The signs vary depending on factors such as the strain of the virus and the age and species of the birds infected.

AI viruses can be brought into Australia by nomadic or migratory wild birds and then cycle through Australian wild waterfowl. Direct or indirect contact (through contamination of drinking water) with wild waterfowl is the most likely initial source of infection of poultry in Australia. Spread can also occur through movement of infected birds (e.g. at markets), contact of domestic poultry with contaminated eggs or equipment (crates, feed trucks etc.), or via humans (through contaminated footwear or clothing).

H5N1 AI virus can infect humans who come in close contact with affected birds. The World Health Organization (WHO) has confirmed 27 human deaths due to H5N1 in 2003–04. Although there is no

evidence of sustained transmission of this virus between people, public health authorities have expressed concerns that H5N1 AI might acquire the ability to spread from person to person, potentially causing a pandemic of influenza in humans.

Australia's response to H5N1 in Asia

Australian human and animal health authorities continue to monitor developments in the region and remain in regular contact with relevant agencies overseas. Australian Government Departments—including Agriculture, Fisheries and Forestry (DAFF), Environment and Heritage (DEH), Health and Ageing (DHA), and Foreign Affairs and Trade (DFAT)—are collaborating closely on a range of preparedness and response issues.

State and Territory agencies and industry groups were alerted to upgrade monitoring of any unusual signs in susceptible species so they can be immediately investigated. Regular information updates are provided to State and Territory agencies, poultry industry associations, veterinarians, wildlife carers and other special interest groups to keep them informed about the disease.

Border staff of DAFF's Australian Quarantine and Inspection Service (AQIS) screen all flights from high risk countries, paying particular attention to eggs, egg products, poultry meat, feathers and similar items. All international mail is also screened. Maximum use is being made of X-ray machines, detector dog inspections, and the physical opening and checking of luggage and mail items. AQIS continues to work closely with DHA on border controls and awareness, including appropriate extension materials in English and other languages. It also operates the Northern Australia Quarantine Strategy (DAFF 2004), which conducts targeted surveillance in northern Australia, the Indonesian province of Papua, Papua New Guinea, and Timor Leste.

To ensure Australia's preparedness, three government-industry working groups continue to progress work on occupational health and safety issues, risk assessment of potential spread in Australia, and a range of scientific issues. The development of biosecurity plans (AHA 2004a) is an important component of cost-sharing arrangements (AHA 2004b) that underpin any response. Public awareness activities aim to ensure poultry growers and bird-keepers are alert to any unusual signs of disease and report them immediately to local vets, agricultural agencies, or the animal disease hotline (on 1800 675 888).

If an outbreak were to occur in Australia, the response would follow AUSVETPLAN (AHA 2004c), Australia's well-rehearsed veterinary emergency plan. Australia's strategy (AHA 2004d) for HPAI is to eradicate the disease by immediate stamping-out and disposal of infected and in-contact birds to remove the major source of infection. This strategy would be supported by:

- strict quarantine and movement controls to prevent the spread of infection;
- decontamination to remove and reduce the virus;
- tracing and surveillance to locate the source of infection, locate other infected premises, and determine the extent of the infection; and
- zoning to define infected and disease-free areas.

Vaccination might also be an option in some circumstances. Such measures must be implemented in combination and supported by surveillance to ensure early detection and rapid response. Public education and awareness campaigns are important to help in controlling the disease and to safeguard public health.

Australia's Chief Veterinary Officer and its Chief Medical Officer, and their respective staff, are in regular contact about zoonotic diseases, including AI. If AI were to pose a significant threat (direct or indirect) to Australia's human population, the Australian Government would activate Australia's Action Plan for Pandemic Influenza (CDA 2004) Additional public health information about AI is available on the DHA website (DHA 2004)

International activities

At a meeting in Bangkok in late July, the Food and Agriculture Organization (FAO), in collaboration with the Office International des Epizooties (which is the world organisation for animal health), launched a new regional diagnostic and surveillance network for AI in South-East Asia. The approach adopted is similar to the successful co-ordination approach used in the OIE South-East Asian Foot-and-Mouth Disease Control and Eradication Campaign. The initiative was welcomed by WHO as it will strengthen surveillance in animals and should provide more rapid detection and diagnosis of the disease.

The Australian Government provided $1 million, through AusAID, to assist affected Asian countries. Of this, $350 000 was provided to DAFF to co-ordinate and manage targeted technical assistance in animal health. Assistance included diagnostic laboratory and veterinary epidemiological support (including a regional training course on surveillance and control of HPAI conducted in Singapore in conjunction with that country's Agri-Food and Veterinary Authority, and expert assistance on epidemiological surveillance in Indonesia). The AusAID-funded project supported the role of CSIRO's Australian Animal Health Laboratory (AAHL) as an OIE Regional Reference Laboratory

for AI, including provision of additional diagnostic reagents to other countries. It also supported a training course for regional veterinarians at AAHL on laboratory diagnosis of HPAI, and a total of four-weeks input on HPAI testing and associated quality control procedures by an experienced veterinary virologist at four diagnostic laboratories in Indonesia.

DAFF, the Australian Centre for International Agricultural Research (ACIAR), AusAID, AAHL and other agencies including the Australian Biosecurity Cooperative Research Centre (AB CRC) are collaborating on possible future technical assistance and scientific research on AI. There are opportunities for targeted assistance, particularly in enhancing human resource capacity in emergency animal disease preparedness, diagnostic laboratory capability, and epidemiological surveillance (including information systems and reporting). There are also opportunities for collaborative research to help to elucidate the epidemiology and ecology of AI viruses circulating in the region and to develop improved preventive strategies.

Through such collaborative international work, Australia can maintain its high level of preparedness against AI and help to ensure that Asian countries control the disease and reduce the potential for further epidemics in poultry and the possibility of the emergence of viruses capable of person-to-person transmission.

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The Northern Australia Quarantine Strategy

Sharee Glasson describes the Northern Australia Quarantine Strategy

Abstract

Australia, as an island nation, provides both risks and opportunities for the Australian Quarantine and Inspection Service. The Northern Australia Quarantine Strategy (NAQS) addresses quarantine risks such as the potential incursion of weeds, pests and diseases across the 'top end'. The strategy includes domestic monitoring; domestic surveys; quarantine at the border; overseas activities; and work with Indigenous and non-Indigenous communities.

Introduction

As the largest island in the world, and the smallest continent, Australia is presented with some unique quarantine opportunities and threats. The opportunities come in the form of not sharing a land border with other countries and, thus, being able to apply rigorous but fair quarantine at airports, seaports, and in international mail centres. The threats are due to Australia's enormous coastline, popularity of that coastline for boating and shipping, relatively sparse population, presence of extensive cattle herds and feral animals, and proximity to countries with agricultural pests and diseases exotic to Australia. Once established, exotic pests and diseases may be very difficult or impossible to eradicate and may seriously harm public health, the environment, and agricultural production.

One of the solutions to these threats is the Northern Australia Quarantine Strategy (NAQS), a series of intermeshed activities aimed at protecting northern areas from pest and disease incursions. NAQS activities depend on the co-operation of communities and organisations, and are led by the Australian Quarantine and Inspection Service (AQIS).

NAQS at a glance

NAQS was established in 1990 to:

- identify and evaluate quarantine risks to northern Australia; and
- provide early detection and warning of new pests through surveys and monitoring, border activities and public awareness.

The strategy underpins Australia's maintenance and expansion of export markets, protects plants and animals, and assists in the identification of new pests, weeds or diseases that enter Australia. It is the only quarantine program that combines pre-border, border and post-border activities.

As with most work in agricultural risks and emergencies, NAQS relies heavily on the support of Australian communities and industry. NAQS activities centre around staff in Broome, Darwin, Weipa, Bamaga, Mareeba, Cairns, Torres Strait Islands and Canberra, who are very active in the field. NAQS staff also work with neighbouring countries on quarantine activities of mutual benefit.

NAQS activities

NAQS activities include:

- domestic monitoring;
- domestic surveys;
- quarantine at the border;
- overseas activities; and
- working with northern communities.

Domestic monitoring

Early warning of disease or pest incursions into northern Australia is provided by NAQS monitoring activities and information that predicts the behaviour of introduced species. NAQS uses insect traps and sentinel animal herds to monitor for pests and diseases including:

- exotic fruit flies;
- screw-worm fly;
- species of Culicoides that are vectors of bluetongue virus and other arboviruses;
- Japanese encephalitis virus; and
- surra.

Domestic surveys

NAQS domestic survey areas are classified into risk zones, from very high to very low. Surveys are conducted regularly across regions of northern Australia most vulnerable to incursions of exotic pests, weeds and diseases. The frequency of surveys is determined by these risk ratings, with surveys ranging from once every five years for very low zones, to two or more times a year for very high risk zones.

Surveys are normally confined to a coastal strip from Broome on Australia's west coast across to Cairns on the east coast, including islands, with extensions into other high-risk areas (see map on following page). The surveys cover cultivated and naturalised plants, feral and domestic animals with a focus on target organisms, and specialised surveys for selected pests and plant hosts.

Quarantine at the border

Monitoring of dinghy traffic and light aircraft movements within and across the Torres Strait is carried out by NAQS in addition to the routine

NAQS conducts surveys for pests, diseases and weeds. Each of the regions shown in colour is surveyed at a frequency corresponding to the risk of entry. NAQS also conducts collaborative activities in agreed areas of East Timor, Indonesia and Papua New Guinea

inspection of all goods by AQIS at international ports. Recreational and fishing vessels sailing the far north coast of Queensland are the target of public awareness activities and inspection throughout the year. Goods on aircraft traveling south from the Torres Strait to the mainland, and south from Cape York, are also inspected.

Overseas activities

Australia, Indonesia, Papua New Guinea and Timor-Leste (East Timor) co-operate in quarantine matters. NAQS officers regularly visit neighbouring countries to share information on pests and diseases and to resolve matters of mutual concern.

Teams conduct surveys for quarantine pests and diseases in collaboration with their colleagues in neighbouring countries. The information is used by AQIS and Australia's agricultural industries to assess quarantine risks. The pest and disease status of neighbouring countries informs the kinds of quarantine checks in place at Australia's ports. It also informs the pests and diseases targeted during NAQS domestic surveys.

Working with northern communities

NAQS depends heavily on the existing level of support and co-operation from the very diverse range of northern communities in:

- compliance with quarantine restrictions on goods movements;
- permission to survey traditional and pastoral lands; and
- recognition and reporting of signs of exotic pests, weeds and diseases, or other potential quarantine threats.

Success stories

Some recent success stories from NAQS include:

- detection of fruit flies through routine monitoring;
- inspection of luggage and fishing vessels at the border;
- assisting Timor Leste to develop a quarantine service; and
- detection of Siam weed by a northern community.

A quarantine officer clearing a foreign yacht

NAQS monitoring

During 2003-04, as part of ongoing NAQS monitoring, major tropical fruit growing regions in north Queensland were protected from the potentially devastating Asian papaya and New Guinea fruit flies. Both flies were detected in the Torres Strait and subsequent control strategies put in place.

Quarantine officer clearing a fruit fly trap

Timor-Leste border inspection

At the border

During 2003–04, Torres Strait officers inspected and cleared luggage from more than 100,000 passengers moving between quarantine zones in the Torres Strait. Inspection of illegal fishing vessels and treatment for pests was also undertaken.

In Timor-Leste

Over the past few years NAQS staff have participated in a major project to help Timor-Leste develop a quarantine service. The involvement included extensive training, developing processing and procedures, and assisting with draft legislation.

Working with northern communities

During 2003–04, specimens leading to the detection and eradication of incidences of Siam weed were among samples submitted to NAQS officers by northern communities. In the Territory, Aboriginal rangers continued to collect and send samples to NAQS scientists for testing for a range of exotic pathogens. This co-operation from communities vastly extends the reach of NAQS monitoring work in these remote, sparsely populated and high-risk regions of Australia.

Conclusion

NAQS is an essential program in the protection of Australia from weeds, pests and diseases. The key to the success of NAQS is co-operation and partnerships with Indigenous communities and neighbouring countries.

Author
Sheree Glasson is a Canberra-based public awareness officer for the Australian Quarantine and Inspection Service. She has been working with *Top Watch Quarantine* – the public awareness arm of the Northern Australia Quarantine Strategy – since 1999.

National co-ordination during emergency animal disease incidents

Post, Walker and Lansdown outline the complementary roles of all levels of government in the co-ordination of national emergency animal disease incidents

Abstract

In Australia, responsibility for the eradication or management of an animal disease is spread across all levels of government, (including local, State/Territory and Australian government) as well as animal industries. Major animal disease outbreaks place heavy demands on animal health authorities. This article outlines the complementary roles of local, State/Territory and the Australian Government in the co-ordination of national emergency animal disease incidents.

Introduction

In Australia, responsibility for the eradication or management of an emergency animal disease is spread across all levels of government, (including local, State/Territory and Australian government) as well as animal industries. Major animal disease outbreaks, especially when it is an exotic or unknown disease, place heavy demands on animal health authorities.

Australia exports about two thirds of its agricultural products. Trading partners importing our animals or products are unlikely to accept that a physical border (such as a state border) stops the spread of disease, thus making a national approach vital to safeguard Australia's trade during animal disease emergencies.

National co-ordination means that participants are aware of developments and can meet their obligations. During an outbreak of animal disease:

- there can be consumer concerns about the safety of Australian food,
- there can be a high level of media interest and flow on socio-economic effects; and
- farmers may loose their livelihood while other industries, such as the tourism industry, can be damaged.

National co-ordination means there is a whole-of-government response to these problems and that all the participants have the opportunity to communicate and decide what is best for Australia collaboratively.

Australia's arrangements for national co-ordination

Consultative Committee on Emergency Animal Diseases (CCEAD) and National Management Group (NMG)

When an unusual incident or an outbreak occurs there are several avenues through which it can be reported, including a 24-hour emergency telephone number. The incident or outbreak must be reported to the nearest State or Territory animal health authority as soon as possible. State and Territory officers then report the situation to their Chief Veterinary Officer (CVO).

The State or Territory CVO investigates the situation and can place restrictions on movement of animals, people and vehicles to stop the spread of the disease. A quarantine area can be established where the disease is occurring. The CVO may also discuss the incident with the Australian CVO (ACVO) at the Australian Government Department of Agriculture Fisheries and Forestry (DAFF). Together they decide whether the incident requires a nationally co-ordinated response.

The Consultative Committee on Emergency Animal Diseases (CCEAD) is called to co-ordinate the national technical response to terrestrial and aquatic animal health emergencies in Australia. This committee was first formed in 1941 and reconstituted as CCEAD in 1968. CCEAD is a sub-committee under the Primary Industries Standing Committee (PISC).[1] CCEAD allows rapid consultation between technical experts in the States and Territories and the Australian Government. This helps a rapid national response.

The ACVO is the Chair of CCEAD. The ACVO calls the CCEAD together when there are major outbreaks of animal disease, especially where there may be an exotic or a new disease and where there may be problems for public health or trade.

Membership of the CCEAD varies for different diseases and with the species. As well

1 Members of PISC are the Chief Executive Officers or Directors of all the state and territory government primary industry departments

as the ACVO, regular CCEAD members are the CVO's of all the States and Territories, a member from Animal Biosecurity of the Department of Agriculture, Forestry and Fisheries, a member from the Australian Quarantine and Inspection Service (AQIS), and a member from CSIRO Australian Animal Health Laboratory.

For aquatic incidents, State/Territory Fisheries Managers or Directors of Fisheries may substitute for, or collaborate with, the CVOs. Other members of CCEAD may include livestock industry groups from affected and non-affected industries and Animal Health Australia.

For certain terrestrial animal diseases, CCEAD acts under the Government and Livestock Industry Cost Sharing Deed in respect to Emergency Animal Disease Responses (EADRA). The Australian Government, all State and Territory governments and major industry organisations are parties to the EADRA.

The EADRA sets out arrangements where the cost of a response to outbreaks of specified diseases is shared by all the parties. The EADRA currently covers 63 serious terrestrial animal diseases that have the potential to cause major socio-economic consequences for Australia, have significant public health or environmental consequences, could severely disrupt trade, and cause severe production losses.

CCEAD meets to plan the sharing of resources (both physical and financial) to manage and control animal disease outbreaks. This is very important when the emergency is significant and/or widespread. For example, when an outbreak of a new disease in horses in Queensland and several outbreaks of Newcastle disease in NSW occurred, CCEAD planned the best to use resources from all States and Territories.

The CCEAD also meets to discuss laboratory results, the pattern of spread of the disease, how best to control or eradicate the disease, and the best quarantine measures.

CCEAD provides advice to the National Emergency Animal Disease Management Group (NMG). Under the EADRA, NMG is responsible for invoking the cost sharing arrangements once CCEAD advises them of the Emergency Animal Disease Response Plan. NMG oversees resources for the Emergency Animal Disease Response Plan (EADRP) and management of the national policy. NMG members are the chief executives of Australian, State and Territory governments' primary industries departments and the chief executives of industry bodies affected by a particular outbreak. The Chief Executive of the Australian Government Department of Agriculture, Fisheries and Forestry is the Chair of NMG.

The NMG may be convened to discuss national co-ordination of a response to a disease which is a potential threat but has not yet caused an outbreak in Australia. The NMG can make recommendations so broader policy issues relating to animal disease prevention or control can be considered through formal inter-governmental structures such as the Primary Industries Ministerial Council (PIMC).

Other government involvement

In large-scale emergencies other government agencies providing health, employment and financial support and advice, may also become involved. These agencies play a key role in managing the flow-on effects such as social and economic disruption or possible human health concerns with the animal disease. Emergency management agencies may also be called to assist.

In readiness for a large-scale emergency, a whole-of-government committee structure has been developed. This means the response from all agencies can be co-

Table 1. National co-ordination arrangements in practice

Newcastle Disease 2002
CCEAD and NMG were convened following an outbreak of Newcastle disease near Sydney. Membership included representatives of the egg and chicken meat industries. CCEAD and NMG considered and agreed on a response plan prepared by the 'combat state'.CCEAD discussed technical issues relating to management of the outbreak and control in the future. NMG agreed to national cost-sharing arrangements and the budget and estimate of costs for eradication that had been prepared by NSW. CCEAD also considered whether a compulsory national vaccination program would assist long-term control of the disease. Finally the CCEAD discussed and developed a longer-term Newcastle Disease National Management Plan.
Avian Influenza 2004
When severe outbreaks of highly pathogenic AI occurred in Asia in 2003 and 2004, CCEAD and NMG were called together. Members of the CCEAD and NMG included primary industries agency heads, CVOs from around Australia and representatives of the poultry meat, ostrich, emu, duck and egg industries. Australia did not have an outbreak of avian influenza but CCEAD and NMG considered the risk posed to Australia by the outbreak in Asia and reviewed Australia's preparedness arrangements for this disease. Actions to improve preparedness were proposed and endorsed prior to a potential outbreak. Contingency plans were also reviewed and up-dated. The disease had new risks for human health and these were considered in Australia's response plans. Members were not called to make a decision on the eradication of the disease or to decide on a response plan. Nor was there a need to invoke cost-sharing arrangement for a response. However meetings of CCEAD and NMG in situations like this, enable Australia to prepare in case of an outbreak. Australia can then respond rapidly in response to an outbreak and control the disease as quickly as possible. It also ensures awareness around Australia of arrangements and everyone is ready in case of a potential emergency.

ordinated for an holistic national response to all aspects of the animal disease emergency.

Responsibilities

Industry groups

Animal industry groups are responsible for the development of plans to prevent any spread of disease between properties and to prevent any incursion of disease into their enterprises. They must also make sure that animal disease outbreaks are reported to State and Territory government authorities as soon as possible.

Local governments

Local governments fit into national agricultural emergency arrangements through State government departments and State emergency management arrangements. Their responsibilities can include preparedness, response, and recovery activities in their local areas.

State and Territory governments

State and Territory governments are responsible for disease control within their boundaries. This includes responsibility for interstate and local quarantine arrangements that include restriction of movement of stock and people on and off properties and around their State. They also undertake surveillance, investigation and response activities. States and Territories work to improve awareness about the situation and disease within their boundaries.

States and Territories report any occurrence or any suspicion of an emergency animal disease to the Australian Government and decide with the CVO if the CCEAD should be called together. Table 1 outlines national co-ordination arrangements in practice.

Animal diseases pay little heed to jurisdictional and legal boundaries. These boundaries do not stop the spread of animal diseases. Some diseases can be spread through the air as aerosol particles, others with animals as they move from place to place. Diseases can also be spread by people and vehicles carrying contaminated material across borders.

The Australian Government

The Australian Government has responsibility for quarantine at the Australian border and for surveillance for and intelligence on important animal diseases before they reach the border.

The Australian Government reports to the World Organisation for Animal Health (OIE) about disease status. It is responsible for maintaining access to overseas trading markets, including, where possible, during a disease outbreak. It makes sure that import and export requirements are aligned with international obligations. This maintains a reputation for excellent animal health while trade is facilitated.

The Australian Government also has a prime role to co-ordinate a response to an emergency animal disease and to co-ordinate communication arrangements. It has specific responsibilities under the EADRA.

Summary

Australia's arrangements for the management of emergency animal disease enjoy a long history of success. Australia has controlled and eradicated several diseases. Over time, key groups have gained experience in working together to reach an informed decision using the best information available from both government and industry. Decisions are made by consensus of the group so the best outcome for Australia can be achieved.

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Authors

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Philip Lansdown is the Secretary to the National Emergency Animal Disease Management Group (NMG) within the Australian Government Department of Agriculture Fisheries and Forestry. He is also Secretary to the Primary Industries and Natural Resource Management Ministerial Councils and their Standing Committee of Officials. In this capacity, he works closely with Australian Government, State and Territory agency heads responsible for primary industries policy, including animal health and emergency animal disease management. Philip has degrees in applied science and arts.

Book Review

World Health Organisation, 2002

Terrorist Threats to Food:

Guidance for Establishing and Strengthening Prevention and Response Systems

ISBN: 924 154 584 4

Book Review: Dr Ian McKay,

Australian Government Department of Health & Ageing

This publication highlights the susceptibility of the world's food supply to terrorist attacks. Unlike static structures such as airports and railway lines which are more tangible items to secure and identify security breaches, food is omnipresent and is something the world's population trustingly ingest numerous times a day.

The food supply is particularly vulnerable to terrorist attack because of the vast array of potential contaminants and the magnitude of the food distribution network from agricultural commodities through to processed food. Potential contaminants range from more exotic toxins such as ricin, laboratory pathogens and radio nucleides to common household and industrial chemicals. Each has the potential to sicken or kill many people, devastate trade and create a fever of high anxiety. The publication puts forward a useful framework to build upon existing prevention, detection and response mechanisms to address potential attacks on the food supply.

The size and nature of the food industry gives little opportunity for government intervention without considerable resource expenditure: something that is out of the reach of many countries. While initiatives can be more easily put in place at the borders, the publication identifies that it is the food industry itself that must maintain security along the food chain. To this end it notes that "all segments of the food industry could develop security and response plans for their establishments, proportional to the threat and their resources."

For many businesses though, terrorist attack on their premises, vehicles or product is not a tangible risk in a highly competitive corporate world. Such threats remain as threats alone. Nevertheless more and more businesses are moving to Hazard Analysis and Critical Control Point (HACCP) based food safety programs to help them identify potential hazards in their operations and the means to control them. Being mindful of the potential for deliberate contamination is something that businesses should consider when drawing up or updating a business food safety program.

Effective surveillance systems are at the core of detecting a terrorist attack on the food supply. However, even countries with the most effective national systems can struggle to identify the cause of a widespread outbreak of food poisoning and many weeks can intervene between cases being reported and a cause being identified: highlighting yet again the vulnerability of the food supply. Even then a terrorist link may not be immediately obvious. The WHO in this document provides useful advice on strengthening national systems for detection and response with the premise of augmenting existing programs.

Being a paper for all member states, it, by necessity, puts forward a framework that cannot be implemented by some countries at this time as the key infrastructure for both government and industry is lacking. However, there are good reasons for all member states to move to strengthen capacity by government and industry to prevent, detect and respond to all outbreaks of foodborne illness be they accidental or deliberate. This document is a most valuable tool in an ongoing process to secure the world's food supply from deliberate attack.

Full text available at http://www.who.int/foodsafety/publications/fs_management/terrorism/en/.

Book Review

Food Safety Department, World Health Organization, Geneva, 2003

The present state of foodborne disease in OECD countries

J Rocourt, G Moy, K Vierk and J Schlundt.

ISBN: 92 4 159109 9

Book Review: Luba Tomaska,

Food Standards Australia New Zealand

Foodborne illness is a globally recognised public health issue, with many governments, as well as international organisations such as the WHO and FAO, placing increasing focus on reducing its occurrence and extent. A good understanding of the burden of foodborne illness in the community is a cornerstone of any public health policy aimed at its effective management.

"The present state of foodborne disease in OECD countries" broadly examines some of the causes of foodborne illness in Organisation for Economic Co-operation and Development member countries, ascribed to microbiological and chemical agents. It also reflects on the causes of the emerging patterns over the last couple of decades and draws together information about the extent of the major foodborne illnesses.

In trying to estimate the extent of the problem, the paper addresses the difficulties in comparing data collected for different purposes, using different methods, and using disparate health information systems. Different purposes include

information collected to detect early outbreaks to those collected to estimate the extent of foodborne illness. Problems also occur with information collected from disparate surveillance systems, both active and passive. The ever-present problem of the vast underreporting of sporadic cases as opposed to outbreaks is also visited.

The paper suggests the incidence of foodborne illness in OECD countries is increasing. But there are several confounders such as increasing investment in surveillance networks and systems, changes in the patterns of food production, distribution and consumption, and new food safety management systems. These make attempts at estimating the extent of the burden a movable feast.

The paper concludes that it is difficult to produce numerical comparisons of foodborne disease in OECD countries. However, the collated data suggests that a higher number of cases are reported for bacterial agents than viral agents in food, with campylobacteriosis as the most frequent bacterial foodborne disease. Incidence rates for other foodborne pathogens are provided. The authors do, however, raise questions about the vast underreporting of viral diseases of foodborne origin. While the paper visits chemicals as a cause of foodborne illness, clearly the long-term nature of the cause and effect makes this issue difficult in terms of direct evidence in most cases.

In its conclusions, the paper addresses the much-needed research necessary to underpin future quantification of the burden of foodborne illnesses. This includes better surveillance, more extensive epidemiology and more extensive case studies that link foodborne disease-causing agents to a specific food commodity. This is a paper that collates and digests useful data and addresses some of the difficulties in making sense of it, as well as outlining the future needs of estimating the burden of foodborne illness. It provides valuable and thorough examination of existing available information in OECD countries.

Full text available at http://www.who.int/foodsafety/publications/foodborne_disease/oecd/en/.

Book Review

World Organisation for Animal Health, 2003.

Sydney Olympic Games and Paralympics: Australia's biosecurity measures.

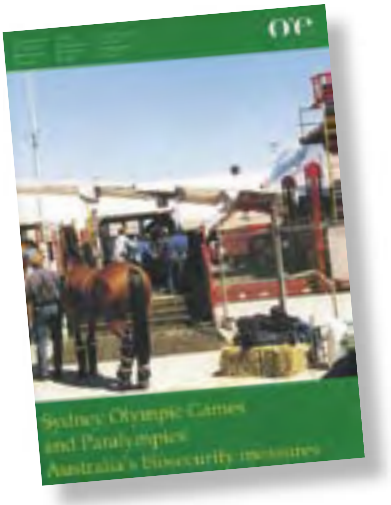
ISBN 92-9044-578-5

Reviewer, Peter Koob

Department of Agriculture, Fisheries and Forestry

Hosting the Summer Games of the XXVII Olympiad was an honour for Australia, but posed very significant risks to Australia's unique biosecurity status. An enormous number of people and animals entered Australia from all four corners of the world, with the accompanying risk of the introduction of pests or diseases that could seriously harm industry or environment.

To ensure that Australia's biosecurity was not compromised, a risk management approach was adopted leading to measures being implemented by governments, industry and the community. These measures included a carefully planned enhancement of border controls, the appropriate management of horses imported for equestrian events, and the establishment of specific emergency management arrangements.



Nearly 750,000 people arrived at Sydney airport in two months and more than 15,000 prohibited items such as food and plant products were seized, with over 3,500 not declared. 270 yachts and eight cruise ships visited Sydney Harbour, each requiring quarantine clearance as well as special monitoring and disposal of waste materials.

Over 200 horses were imported into Australia, with 160 grooms and 100 tonnes of equipment. Given that Australia is free from most serious diseases that may affect horses, and from diseases that horses and equipment may carry, strict precautions were required. These included screening of animals prior to departure and placement in pre-embarkation quarantine for 14 days, monitoring of health and welfare during transport and on arrival, and disposal of all waste products in Australia by deep burying.

The Sydney Olympics created a number of emergency risks relating to public health, animal health, and terrorism. Emergency plans and procedures to manage the likely range of contingencies were documented, with attendant training and exercising. This required very close co-operation between Olympics organisers, emergency services, public and animal health professionals, and intelligence agencies.

This booklet concisely documents the measures put in place to protect Australia's biosecurity before, during and after the Sydney Olympics, and provides a number of blueprints for how such large international events can be conducted in the future.

Available at http://www.oie.int/eng/publicat/ouvrages/a_113.htm.

Book Review

Food and Agriculture Organization, Rome

Preparation of foot-and-mouth disease contingency plans.

W.A.Geering and J.Lubroth, (2002)

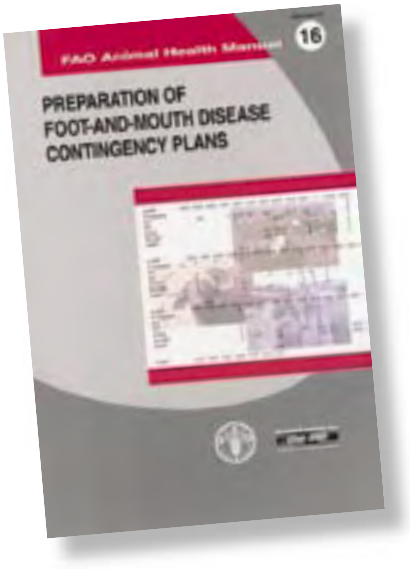
FAO Animal Health Manual, No. 16, ISSN 1020-5187

Reviewer: Peter Koob

Department of Agriculture, Fisheries and Forestry

This manual is one of a series entitled 'FAO Animal Health Manuals'. While many of the documents in this series deal with technical and veterinary aspects of disease control, a number cover emergency management, both generically and for some of the most serious epidemic livestock diseases such Rift Valley fever, contagious bovine pleuropneumonia and African swine fever.

The manual deals with FMD, a highly contagious disease of cloven-hoofed animals that is the *bête noire* of animal industries worldwide, occurring throughout most of Africa and Asia, and much of South America. Caused by a small RNA virus of which there are more than 60 subtypes or 'strains', FMD is not usually lethal in adult animals. It causes serious production losses and often kills young animals. This is of grave concern for developing countries because of the impact it has on farmer livelihoods through reduced milk production, drops in animal growth rates, reduced survival of young animals, and a reduction of the utility of beasts of burden. The most serious aspects of the disease from Australia's point of view is the devastating effects it would have on trade, the economy and rural societies.



The manual covers a wide range of issues in relation to FMD, including the format of a national FMD contingency plan, nature and risk analysis of the disease, prevention, organisation, and preparedness. While quite sweeping in its subject matter, from the perspective of Australia in 2004, this manual seems a little dated.

It concentrates on the roles of national veterinary services to the near exclusion of other government agencies, and does not consider a whole-of-government approach. Given the rapid potential spread of FMD, and the resource-intensive measures required to control or eradicate it, it is clear that veterinary services alone will not succeed in managing an outbreak. Thus, all relevant, available government and industry resources must be brought to bear in a suspected or actual FMD outbreak.

There are a number of types of plans mentioned without any clear articulation of the connection of these plans. In particular, it is recommended that the national contingency plan contain a number of contingency, support, and action plans. This is probably due to confusion between preparedness and planning; the former being broader and defined as "Arrangements to ensure that, should an emergency occur, all those resources and services which are needed to cope with the effects can be efficiently mobilised and deployed" and the latter being defined as "A documented scheme of assigned responsibilities, co-ordination arrangements, actions and procedures, required in the event of an emergency". This could have been cleared up if the manual was entitled 'Prevention and Preparedness for Foot-and-Mouth Disease Outbreaks'.

Another potential difficulty with the manual, and the other contingency planning manuals in this series, is that they appear to advocate the development of a contingency plan for each specific disease. This, if followed to the letter, would create a series of repetitive plans as many of the issues regarding the management of resources, communications, co-ordination and so on will be the same. It is wiser to develop a basic emergency animal disease preparedness system, and have specific policies and strategies for dealing with specific diseases.

Nevertheless, this manual is extremely comprehensive, and will assist many countries to ensure that their livestock industries remain secure from emergency animal diseases.

Full text available at http://www.fao.org/DOCREP/006/Y4382E/Y4382E00.HTM.

NOTES FROM THE FIELD

A brief history of the red imported fire ant eradication program
by Craig Jennings

Introduction

The discovery of the Red Imported Fire Ant *(Solenopsis invicta Buren*—RIFA) in Brisbane on 22 February 2001 led to an emergency response that ultimately resulted in the implementation of the Red Imported Fire Ant Eradication Program and the formation of the Fire Ant Control Centre (FACC).

The Eradication Program is funded through a national cost sharing arrangement under the control of the Natural Resource Management Ministerial Council. It is an intensive whole-of-government response led by the Queensland Department of Primary Industries and Fisheries (DPI&F). The DPI&F has received strong support from the Department of Natural Resources, Queensland Mines and Energy, Department of State Development and Innovation and the Environmental Protection Agency.

The Fire Ant Control Centre

The FACC is made up of a number of sections including Operations (treatment and surveillance); Risk Management and Security (managing quarantine issues); Public Relations, Community Engagement and Industry Liaison (ensuring community and industry support and participation); Information Services (data base management and mapping) and Scientific Services (diagnostics, ecology and research and development) that work together to deliver the Program.

The FACC is an amazing organisational accomplishment. Between the date when the ant was discovered in February 2001 and the first treatment in September 2001, an eradication plan was developed, funding was secured, over 500 people were employed, a base was found and equipped, and all resources and vehicles were purchased.

Figure 1. A worker Red Imported Fire Ant, Solenopsis invicta

The infestation

The initial discovery resulted from two separate samples of RIFA submitted for identification on the same day from a resident at Richlands, a southwestern suburb of Brisbane, and from gardeners at Fisherman Islands, Port of Brisbane. The immense impact that RIFA had in the USA led to the approval of a scoping study to delineate the extent of the infestation and the potential risk to Australia. A decision was made to attempt eradication based on the study and modelling predictions that RIFA could spread throughout the majority of Australia.

In addition, a cost analysis by Australian Bureau of Agricultural and Resource Economics ABARE based on the potential spread of the ant, indicated that if left unchecked RIFA would cost more than $8.9 billion over the next 30 years. This analysis did not take into account the loss of social and environmental values, which are the major impacts of this ant.

The initial scoping study found a radial spread of infestation out from two major epicentres of infestations. An area of 27,807 ha was enclosed in the initial treatment area. Given that the initial delineating survey was conducted with limited resources it was expected that the infested area would grow following intensive active surveillance by FACC field staff and increased public awareness.

In recognition of the potential environmental impacts of RIFA, it was declared a 'Key Threatening Process' by the Australian Department of the Environment and Heritage.

Figure 2. A typical dome shaped nest. Note the lack of entry hole on the dome and the lack of vegetation

Figure 3. This photo was taken 24 hours after the person was stung and shows the characteristic pustules from multiple Red Imported Fire Ant stings

RIFA is a native of South America introduced to the United States in the late 1930's where, in the absence of natural parasites and predators, it has become a major environmental and economic pest in the southern states. The ant has spread to at least nine southern US States with estimates of a total spread of 275 million acres. For urban areas alone in Texas, the cost from RIFA is estimated at more than $US 581 million a year. In over nine heavily infested states in the USA losses are estimated at $US2.77 billion annually.

RIFA are small ants, reddish-brown in colour on the head and body, with a darker abdomen and come in a variety of sizes within one nest, ranging from 2mm to 6 mm. Overall they are similar to many native species and this is probably why they were in Australia for at least five years before they were reported. The major distinguishing features of the ant are their nests that usually appear as dome-shaped mounds up to 40cm high, and their aggressive behaviour.

It has a sting like a bee or wasp, which causes blisters and allergic reactions leading to death in some instances. RIFA is predominantly an issue for public health and the environment, but also has impacts on agricultural systems by virtue of its attacks on animals, seed harvesting, soil nesting habits, and the indirect impacts on markets from quarantine measures that are implemented to restrict the spread and aid the eradication of infestations.

Apart from its sting, its nuisance value arises from interference with urban infrastructure. This includes severely limiting the use of private and public recreational and sporting areas with a consequent significant impact on real estate and tourism. Fire Ants also invade electrical components such as domestic fuse boxes, traffic light signal boxes and underground cableways, often causing short circuits or other malfunctions. The building of nests under roads and footpaths may lead to collapse and/or potholing.

RIFA is particularly aggressive in the environment, out-competing other ant species, attacking invertebrate and vertebrate animals, and wiping out bird life (especially ground nesting birds). It has been observed to affect most animals, from other ants to crocodiles.

The eradication plan

The five-year eradication plan was developed with the aid of experts from the USA and involved baiting the entire infested area three or four times a year for three years. The infested area was delineated by drawing a boundary 2 km out from all known infested properties. Another boundary was drawn at 5 km and all of the area between the 2 km and 5 km boundaries received surveillance once a year. Following the three years of baiting, the treatment area received two rounds of surveillance over two years to confirm that eradication had been successful.

The baits consist of oil soaked corn infused with one of two insect growth regulators (methoprene or pyriproxyfen) or a metabolic inhibitor (hydramethylnon). These are delivered by granular spreaders that are hand held, mounted on ATV quad bikes, or on helicopters for large areas.

The total area to be baited during the Eradication Program is 71,000 ha, centred on three major epicentres. Within this area, 1,236 properties were found with RIFA infestations.

Since September 2001, an enormous amount of effort has occurred to eradicate RIFA from Australia with over one million property treatments occurring over the three treatment seasons. There have been approximately 350,000 inspections completed in the surveillance buffers throughout the life of the program and an

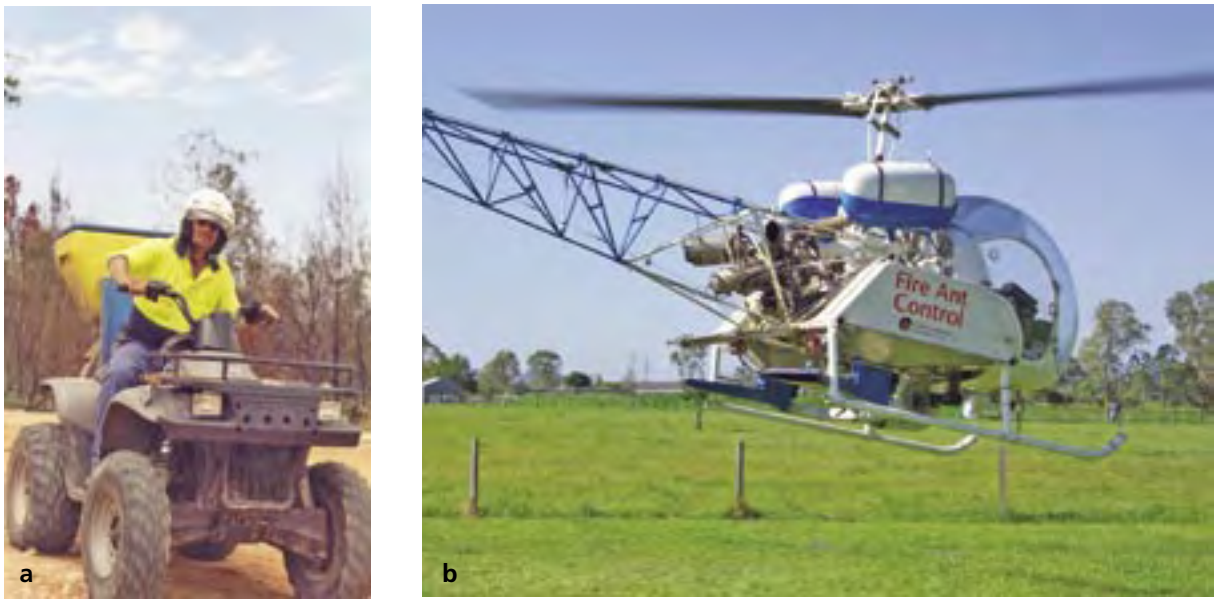


Figure 4. Treatment methods used by the Fire Ant Control Centre include a) ATV quad bikes, b) Helicopters, and c) rotary hand held spreaders

additional 10,000 ha surveyed beyond these buffers during targeted surveillance. There has also been extensive active and passive surveillance across Australia and with no infestations detected; it appears RIFA are confined to southeast Queensland.

Progress towards eradication to date has been excellent. Monitoring results from the core treatment zone show that after two years approximately 97.6 percent of previously infested properties no longer have viable nests. This is an increase from 75 percent following the first year of treatment and large areas of the original infested area now appear to be free of RIFA. A further survey of the infested properties is currently being conducted and it is expected that few if any infested properties will remain.

Compared with February 2001, the threat from fire ants has been significantly reduced, but the risk to the Australian lifestyle and environment could rapidly re-establish if the program is not continued. At this point in time, total eradication is within striking distance.

Community support

Community and industry acceptance of the eradication program has been essential to its success. Following the fourteen initial community meetings conducted within the treatment area before the start of baiting, there was extensive public relations and industry liaison campaign. These campaigns have aimed to keep the public and industry well informed and to maintain support for the program.

Community involvement in the program has continued at an exceptionally high level with latest survey results showing 99.5 percent of people in Brisbane have heard about RIFA and 74 percent of people checked their yard in 2003. Public submissions of suspect ant samples to the FACC have remained high throughout the program with approximately half of the outlying infestations reported by the public.

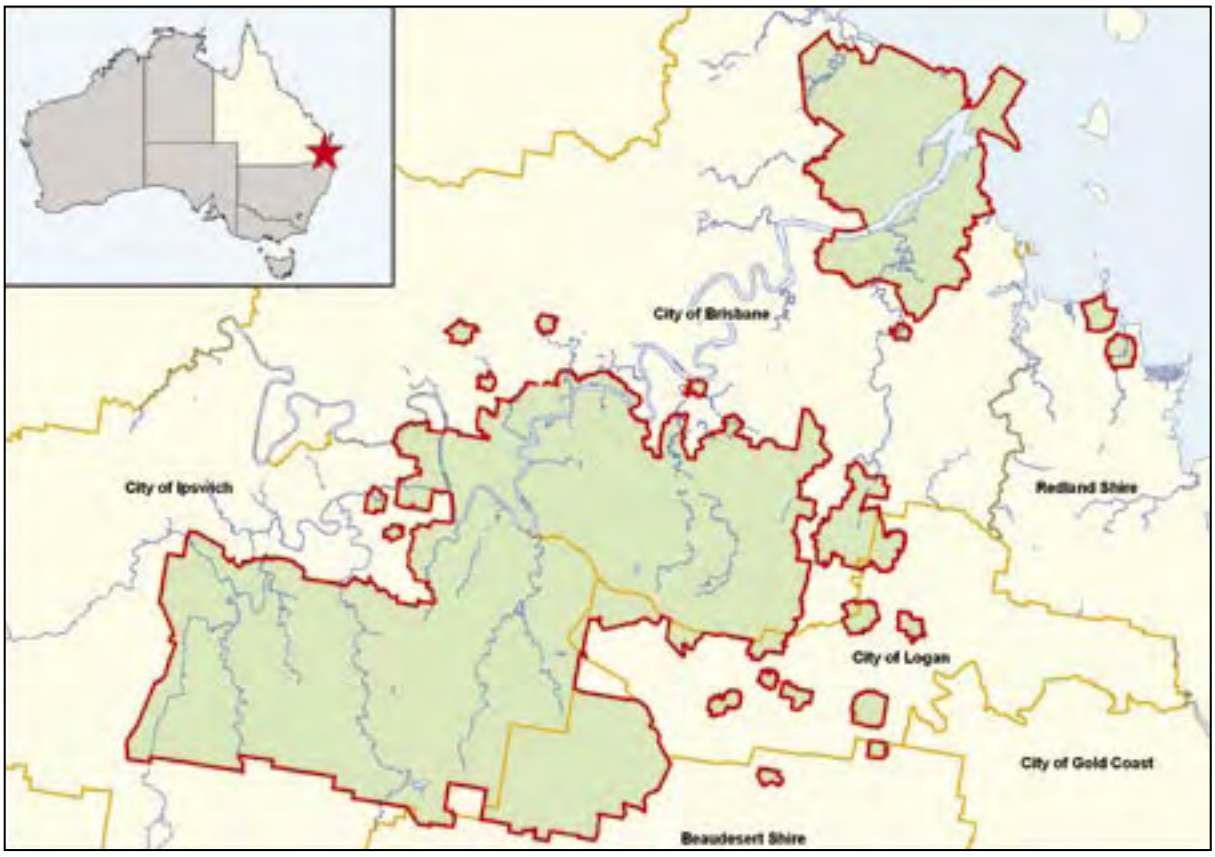


Figure 5. This map shows the total area (in green) that will be baited for red imported fire ants

The future

The Program is about to conclude its third year of treatment. While there have been changes to the initial Program, the concept of three years of treatment followed by two years surveillance remains the same. Changes include the addition of a sixth year to the entire program and treatment throughout the fourth year of the program for some areas. These changes became necessary following the discovery of a third epicentre of spread that was found at Swanbank in June 2002. The Swanbank epicentre most likely occurred because of an historic concentration of waste from disposal and recycling industries that used the abandoned coal-mining area. Flights from the Swanbank epicentre have resulted in a number of infestations to the southwest of the treatment area and were discovered in winter 2002.

Conclusion

The Red Imported Fire Ant Eradication Program was an audacious plan that has been a superb example of government co-operation at both national and state level. The speed of the response and the success to date, despite a program of this type not being attempted before, highlights the processes that are in place for dealing with invasive species. Many lessons have been learned thus far and it is essential that the knowledge and systems that has been developed through the management of the Program be maintained for future use.

For further information on the eradication program, see www.dpi.qld.gov.au/fireants

Author
Craig Jennings is the Principal Policy Officer at the Fire Ant Control Centre. Having started at the Centre as the environmental scientist he has now been there for three years. Craig's role with the Centre is to engage environmental groups to ensure support of the program, dealing with concerns about the chemicals in the baits and investigation of all outlying infestations. In addition, he performs policy duties and runs the Quality Assurance for the Treatment and Surveillance Program.
Before starting with the Fire Ant Control Centre he worked in local government designing and managing pest plant and animal control programs with an emphasis on mosquito control.

Attorney opens EMA's new offices

Attorney-General Philip Ruddock officially opened the new head office of Emergency Management Australia on 22 June 2004

EMA staff moved from their original Northbourne House premises in Dickson to the purpose-built complex located in the University of Canberra's new Innovation Centre in May this year.

EMA had occupied the former premises since 1974 when EMA was known as the Natural Disasters Organisation (NDO).

The new facility provides enhanced operational aspects to EMA's National Emergency Management Co-ordination Centre and a more appropriate working environment for Emergency Management Liaison Officers.

Local Ngunawal elders, Ruth and Don Bell, conducted a welcome to the country and congratulated EMA on naming one of the conference rooms The Ngunawal Room.

During the official opening, Mr Ruddock commended EMA's staff on their contribution, particularly in more recent times, in crises including bushfires, the aftermath of Bali, and help given to Australia's neighbours.

Mr Ruddock said, "You have a very important role as the lead Australian agency in responding to catastrophic events, be they natural disasters or terrorist attacks. Your work involves an extraordinary degree of co-ordination and co-operation at all levels of government to be prepared at all times for an emergency.

"EMA has met requests under very challenging environments. I'm impressed with the way EMA comes up with a range of creative ideas. You expand your vision in a way that acknowledges the role of others.

Major-General (Ret) Alan Stretton

"You have learnt the hard way, refining our national capacity across emergency and consequence management," said Mr Ruddock.

The inaugural Director General of the NDO, Major-General Alan Stretton AO CBE (Ret) participated in the opening. He entertained guests with anecdotes from Christmas 1974 and his experiences during the aftermath of Cyclone Tracy in Darwin, including the evacuation of 35,000 of its residents. EMA's main conference room was chosen by staff to be named after him.

General Stretton said, "When disaster occurs in Australia, this great nation seems to forget all the things that pull us apart. At the time of *Tracy* politics was thrown out the window, with all departments – commonwealth and state – working together to ensure the safety of the citizens of Darwin."

EMA's Director General, David Templeman, acknowledged the efforts of Human Resources Manager, Nardine Morish and her team, the Attorney-General's Department's Support Services Manager, Nan Lecompte, the General Manager of AGD Information and Knowledge Services, Graham Fry, and HBO, the company responsible for the fit-out of the new premises.

Mr Templeman said, "HBO's development of a fit-out plan to suit staff needs and the requirements for a new National Emergency Management Co-ordination Centre, and to move everyone in such a short time period, was a remarkable achievement.

"Further, the provision of this facility for EMA is a clear reflection of the Government's strong support and recognition of the role played by EMA in national community safety and security. The Attorney's and Secretary's confidence in EMA's need for this new facility are also evident," said Mr Templeman.

Other official guests included the Attorney-General's wife, Mrs Heather Ruddock, Attorney-General's Department Secretary, Robert Cornall, Andrew Metcalfe and Miles Jordana from Prime Minister and Cabinet, AGD Deputy Secretary Ian Govey, and Protective Services Co-ordination Centre head Ed Tyrie.

Research fellowship for safer sustainable communities

One of Australia's most experienced emergency management executives has won a Churchill Fellowship to research safer sustainable communities in the UK and America

Ms Jo Harrison-Ward is Executive Director of Emergency Management at Fire & Emergency Services Authority (FESA) in Western Australia. She is responsible for ensuring there is an effective emergency management structure for the broad range of natural and human caused emergencies faced in that State.

One of 83 Australian recipients of Churchill Fellowships in 2004, Ms Jo Harrison-Ward will study overseas for nine weeks later this year and receive around $20,000 to assist with her research. She will study affiliated projects in community engagement, particularly those that benefit community disaster management.

Ms Harrison-Ward said, "I will be focussing on practices suitable for Western Australia's unique isolated and remote communities. Then I plan to prepare a program and model to distribute to more than a hundred local government councils across WA."

In congratulating Ms Harrison-Ward's study award, the Director General of Emergency Management Australia, David Templeman, said he was highly supportive of her interest in researching community engagement in relation to disaster management.

Mr Templeman said, "Effective community engagement is an issue constantly facing emergency managers who are endeavouring to ensure that messages on disaster management and mitigation are accepted and understood at the individual and household level as well as the wider community level.

Jo Harrison-Ward's Churchill Fellowship will take her to several emergency management agencies in the UK and the USA

"The importance of community engagement has been recently recognised by the Council of Australian Governments (COAG) and is a key theme on the national emergency management agenda."

A major function of Ms Harrison-Ward's work with FESA involves ensuring there are plans, structures and arrangements in place to bring together government, voluntary, and private organisations in a co-ordinated way to deal with all phases of an emergency —mitigation, prevention, preparedness, response and recovery. Her ongoing investigation into emergency management and community engagement prompted an application for a Churchill Fellowship to further her research work and see it turned into real solutions for communities.

Ms Harrison-Ward said, "In any crisis the community looks to emergency services' organisations for direction, but there are never enough people to do the job. This is even more so in rural and remote communities where isolation and limited population becomes a factor. Often they want to take responsibility and ownership of their own emergency plans but they don't have the techniques or tools to do this.

"Our fundamental challenge when trying to build safer sustainable communities, is how we effectively develop the conditions to create

a movement for change and for community leadership in emergency management activities to emerge.

"Engagement is based on community support so we need to develop ways that enable people to champion the cause with our support. The key to engaging the community is ultimately to strongly support community driven action that includes developing long-term commitment to community partnerships rather than taking a dictatorial approach," said Ms Harrison-Ward.

Acting FESA Chief Executive Officer, Bill Forbes, said that the Fire and Emergency Services Authority of WA was extremely proud of Ms Harrison-Ward's selection as a 2004 Churchill Fellow.

"This honour is a well deserved recognition of Jo's outstanding contribution to the safety of Western Australians in the area of emergency management.

"In particular, much of her energies have been directed at further developing the preparedness and sustainability of people in remote and isolated communities during natural disasters like cyclones and floods.

"A valued and highly respected member of the FESA executive team, Jo is also a keen advocate of 'best practice'. I am sure she will return home from her overseas study trip armed with a wealth of experience and information that will prove of great benefit to both FESA and the wider community of this vast State," said Mr Forbes.

Among the several agencies she plans to visit is the Federal Emergency Management Agency in Washington, which has extensive disaster and counter terrorism knowledge, and the Effective Interventions Unit at Edinburgh in the UK.

"I would like to look at their programs, assess them and use that information to formulate a holistic approach using the techniques and tools from other organisations around the world. This is the kind of information that Local Government and communities can use," said Ms Harrison-Ward.

Pacific prepares for the second world conference on disaster reduction

The South Pacific Applied Geoscience Commission (SOPAC) is the Pacific regional representative on the International Strategy for Disaster Reduction (ISDR) Taskforce. In that capacity it is co-ordinating the Pacific preparations for the Second World Conference on Disaster Reduction to be held in Kobe, Japan 18–22 January 2005.

The co-ordination process, funded by AusAID, EMA and NZAID, has involved the following activities.

A review of the 1994 Yokohama strategy and plan of action

The State Members of the United Nations and other States held the first World Conference on Natural Disaster Reduction in Yokohama, Japan in May 1994. Held in partnership with non-government organisations and with the participation of international organisations, the scientific community, business, industry, and the media, it deliberated the framework of the International Decade for Natural Disaster Reduction (IDNDR).

The outcome of the conference was an agreed Plan of Action specifically designed to address activities at community and national levels, at regional and subregional levels, and at international levels, particularly through bilateral arrangements and multilateral co-operation.

A review of the progress made by the Pacific Island countries as well as Australia and New Zealand has been completed and will contribute to the discussions at the Kobe conference.

Pacific regional stakeholders workshop

A regional workshop, conducted in Fiji 28–30 June 2004, was attended by delegates from 15 Pacific Island countries including Australia and New Zealand and a number of international and regional organisations including the donor community.

The workshop participants considered the initial outcomes from the Yokohama Strategy and Plan of Action review process and addressed the five thematic areas agreed for discussions in Kobe. These are:

1. Governance: institutional and policy frameworks for risk reduction;
2. Risk identification, assessment, monitoring and early warning;
3. Knowledge management and eduction: building a culture of resilient communities;
4. Reducing the underlying risk factors; and
5. Preparedness for effective response.

After due consideration it was decided that for application in the Pacific region the following amendments would be recommended to the global thematic areas:

- Thematic area two—Hazard identification, assessment, monitoring and early warning.
- Thematic area four—Development of risk reduction tools.

Draft Pacific regional position paper for the second world conference on disaster reduction

This document was developed at the regional stakeholder's workshop and incudes a draft *Pacific Action Plan for Disaster Risk Reduction 2005–2015.*

The draft plan has addressed the five thematic areas identified for discussions in Kobe with key objectives, suggested actions, and expected outcomes for national governments to use as a planning framework to build capacity to ensure safer and more resilient Pacific Island communities.

The draft action plan is available at the Community Risk Updates page of the SOPAC website www.sopac.org.

Following the Kobe Conference the *Pacific Action Plan for Disaster Risk Reduction* will be updated and promoted for adoption throughout the region.

Alan Mearns
Manager
SOPAC Community Risk Programme

EMA Update

Emergency Management Australia provides national leadership in the development of measures to reduce risk to communities and manage the consequences of disasters. EMA Update keeps AJEM readers abreast of the courses and activities that assist in this aim.

KNOWLEDGE MANAGEMENT & BUSINESS

Community Awareness

The Shore Safety – A3 fold out colour pamphlet – developed by Geoscience Australia in partnership with EMA, has been revised. It features a complete new look comprising layout, images, and a focus on coastal hazards such as cliffs and overhangs. Copies of this pamphlet are available from State and Territory emergency services.

The review of the *Action Guide* series in conjunction with States and Territories is now complete. The series contains five guides including cyclones, floods, earthquakes and storms while a new guide titled *Pets in Emergencies* is the fifth guide. This contains handy information on how to keep pets safe during an emergency.

Each guide is DL (1/3 A4) size and printed on self-adhesive card. Copies of the guides are available from State and Territory emergency services.

For further information contact: Cate Moore
Phone: 03 54 21 5296; email: cate.moore@ema.gov.au

Library

EMA library staff have developed a separate collection within the library from each of the winning submissions to the annual EMA Safer Communities' Awards. Copies of the winning submissions are available for loan.

To provide support to the new Graduate Certificate in Emergency Management the library has purchased a substantial amount of new material relating to management and leadership. In addition new material has recently been purchased on critical infrastructure, sustainable communities and community consultation. Please contact library staff for further details and assistance in borrowing this material.

EMA library staff now number three with Troy Watson joining the team as Information Services Librarian. Troy will be happy to assist with reference or research tasks.

For further information contact the library.
Phone: 03 54 215 246; email ema.library@ema.gov.au

Websites

EMA's website continues to grow and has a daily average of 12,000 hits. Approximately 40% of all visits come from overseas, including 30% from USA and Canada. This indicates that the EMA website continues to strongly represent Australian emergency management to the world.

Disasters Database

EMA has enhanced and upgraded the EMA Disasters Database to include report generating and advanced search functions. Usage has increased over the year to an average of 40,000 hits and 450 reports generated per month. Schools, researchers and emergency management professionals use the site extensively.

Australian Disasters Information Network (AusDIN)

KM&B has worked effectively with Information and Knowledge Services to progress the development of the AusDIN Portal through the Portal Group with significant results.

In conjunction with the Attorney-General's Department, KM&B has successfully managed the AusDIN *QuickPlace* forum. Groups using this facility include AusDIN Working Group, AusDIN Portal Group, Emergency Management Spatial Information Network Australia, National Community Safety Working Group, and Australasian Libraries in the Emergency Sector. It is used for out-of-session work, discussions, posting of documents, and group emails.

John Laurie recently presented on emergency management issues to the Human Factors & Ergonomics Society.

For further information contact: John Laurie
Phone: 03 54 21 5280; email: john.laurie@ema.gov.au

EDUCATION & TRAINING

Review of the ERM Applications Guide

The Risk Management Standard AS/NZS 4360 is currently under review by Standards Australia is scheduled for release in September 2004. To ensure that the *ERM Applications Guide* is up to date a review has been underway since late 2003 and will reflect changes to AS/NZS 4360 and experience gained in the use of the ERM process over the past five years. A draft for consultation is nearing completion by a national committee representing the States and Territories. The draft will be circulated by States and Territories to their stakeholders and placed on the EMA website. Comments will be consolidated and reviewed by the national committee.

Competencies for working with CBR incidents and emergencies

To ensure nationally recognised training is available for those working in CBR incidents and emergencies in Australia, EMA is working with stakeholders to identify relevant competency standards. Evidence to date is that the competencies required for managing CBR incidents and emergencies are consistent with the national all-hazards approach to emergency management. A range of appropriate competency standards is already in the *Public Safety Training Package* but require amendments to the range of variables to accommodate the CBR context. An extensive mapping project is currently underway to identify the full range of appropriate national competency standards available in the *Public Safety Training Package* and other relevant industry training packages (for example health and laboratory operations). EMA is currently developing CBR scenarios for programs to support achievement of the following units of competency:

- Undertake emergency planning, and
- Co-ordinate resources within a multi-agency emergency response.

The need for a CBR awareness program suitable for delivery in face-to-face and distance mode was also identified through this project. EMA is currently developing a proposal to work with stakeholders on this program.

IERM CDROM

The EMA Introduction to Emergency Risk Management CDROM developed earlier this year is currently being reviewed and enhanced. The new version will include video clips featuring three leading ERM experts discussing projects they have been involved with, examples of ERM tools, and a facilitator's guide.

Emergency management for local Government

The EMA Program Emergency Management for local government has been well received and successfully delivered for some time. The course will shortly be assessed for accreditation through the Victorian Qualifications Authority to achieve national recognition. Graduates will be eligible to receive a nationally recognised statement of attainment.

DEVELOPMENT

2004 Australian Safer Communities Awards

The Australian Safer Communities Awards recognise best practice and innovation by organisations and individuals that help to build safer communities across Australia. The Awards work on two levels. State and Territory winners are decided first and become finalists for the national awards.

State and Territory brochures containing information and entry forms have been distributed by State and Territory co-ordinators. The brochures have also been posted to EMA's website.

Awards entries for projects undertaken between January 2003 and the end of April 2004 have been received. The closing date for entries was 20 August 2004. State and Territory winners will be announced in September 2004 and the National Awards will be announced on 10 November 2004 at a ceremony in Parliament House, Canberra.

For further information contact Li Peng Monroe or Alastair Wilson Phone: 02 6256 4610 or 6256 4630; email: lipeng.monroe@ema.gov.au or alastair.wilson@ema.gov.au website: http://www.ema.gov.au

DEVELOPMENT CONT

Emergency Management Volunteers Summit 2005

Planning is well underway for the *Emergency Management Volunteers Summit 2005* to be held 6 and 7 April 2005 at the National Convention Centre in Canberra. The Steering Committee established to assist with planning for the Summit, met again in August 2004. Letters have been sent to organisations requesting liaison officers to assist in the nomination process. The major change from the 2001 Summit format is that the participants will not be attending on a self-registered basis. They will need to attend as nominees of their organisation. The registration form must be submitted by their agency and include approval from their agency head, along with a reason for the nomination.

A graphic designer has been chosen and has commenced work on the required products for the Summit material. EMA will use an online learning facility for Summit attendees to participate in the various sessions. Paul Mitchell has been chosen to facilitate the Summit.

The objectives and themes chosen for the Summit are:

1. Developing or managing your community, government and business support into the future; and
2. Developing or managing cultural changes into the future.

Regular updates on the Summit will be provided through the AJEM.

For further information contact: Justine Rixon
Phone: 02 6256 4612; email: justine.rixon@ema.gov.au

Emergency Management 'Volunteers in Action' Photographic Competition

Based on the adage that a "picture is worth a thousand words", EMA is searching for the very best photographs to recognise emergency management volunteers in action. This unique photographic competition for professional photographers and emergency management volunteers is focusing on photographs taken between 1 July 2003 and 31 January 2005. The competition will run from August 2004 with entries closing in February 2005. The winning entries will be announced at the Awards Presentation at *Emergency Management Volunteers Summit 2005* in Canberra 6–7 April 2005.

The competition has two streams:

- The first stream is for professional photographers either employed by media organisations or who contribute on a freelance (paid) basis to publications; and
- The second is for emergency management volunteer organisations and/or individual volunteers who have taken photographs that have (1) been published, or (2) are unpublished.

For further information contact: Susan Stevens
Phone: 02 6256 4611; email: susan.stevens@ema.gov.au

PLANNING & OPERATIONS

Emergency Services Sector Infrastructure Assurance Advisory Group (ES IAAG)

The Emergency Services Sector Infrastructure Assurance Advisory Group (ES IAAG), part of the national critical infrastructure protection Trusted Information Sharing Network (TISN), met in Melbourne on 28 May 2004. Emergency services representatives from States and Territories, emergency services peak bodies, the Australian Red Cross and relevant Australian Government representatives attended the meeting.

The focus of the group's activity centred on issues to ensure continuity of service provision by emergency services, which constitute an important element of critical infrastructure

Member agencies shared information on a range of issues including identification of critical emergency services infrastructure, risk assessment tools and methodologies, threats and vulnerabilities, mitigation strategies, treatment options and interdependencies with other industry sectors. A work program aimed at furthering these issues was agreed. An important initiative recommended by the group was the establishment of an emergency management expert advisory group (EAG) to co-ordinate the provision of specialist emergency management advice to other industry sectors and the Critical Infrastructure Advisory Council (CIAC).

The next meeting of the ES IAAG is in Adelaide in September 2004.

For further information contact: David Morton
Phone: 02 6256 4617; email: david.morton@ema.gov.au

PLANNING & OPERATIONS CONT

Tropical Cyclone Ivy in Vanuatu

In February 2004 Tropical Cyclone Ivy impacted on several islands in Vanuatu. Damage was widespread and varied from light damage to total destruction. In response to this emergency the Government of Vanuatu requested assistance from Australia in the form of basic relief stores (tarpaulins, water containers and water purification tablets) and technical assistance to develop an information management system.

EMA despatched two officers within 24 hours to work within the Vanuatu National Disaster Management Office and develop a system that would manage the influx of damage assessments from affected provinces, allowing the big picture to be captured and priorities set. The system was developed by the second day and the officers then assisted by inputting and collating information and providing policy development advice.

For further information contact: Joanne Laurence
Phone: 02 6256 4621; email: joanne.laurence@ema.gov.au

Pacific Regional Disaster Risk Reduction Stakeholders Workshop

In June EMA contributed funding to and participated in a workshop held in Fiji which brought together National Disaster Management Officers, Pacific Government representatives, donor agencies, international and regional organisations and technical specialists to develop an action plan for risk reduction in the Pacific over the next ten years. The workshop was put together by the South Pacific Applied Geoscience Commission in Fiji, which has been given the mandate for disaster management issues by the Pacific Forum. The Action Plan will be presented at the World Conference on Disaster Reduction in Kobe, Japan in January 2005.

For further information contact: Joanne Laurence
Phone: 02 6256 4621; email: joanne.laurence@ema.gov.au

South Pacific Tsunami Awareness Workshop

The South Pacific Tsunami Awareness Workshop held on 1–3 July 2004 was co-sponsored by the South Pacific Applied Geoscience Commission (SOPAC) and the International Tsunami Information Centre of UNESCO/IOC.

The objective of the workshop was to raise awareness on tsunami hazards and the needs of users of tsunami information. The workshop brought together Pacific Island users to present their needs, learn and hear about operational tsunami warning systems and successful tsunami mitigation projects around the Pacific. They also discussed and developed appropriate tsunami mitigation plans for their countries and the region.

EMA played a significant role in the workshop, presenting current emergency management arrangements and standing operating procedures that exist within Australia and the region with emphasis on how they relate to tsunami hazards. EMA also chaired a working group focused on education and awareness programmes.

Some of the outcomes of the workshop can be included immediately into the workplan of the SOPAC Community Risk Programme and there will be an effort to develop, on a regional basis, awareness materials for distribution at the next SOAPC Disaster Managers Meeting in Papua New Guinea in 2005. Another expected outcome is the development of a framework for national tsunami response plans for South Pacific islands.

For further information contact: Matthew Smith
Phone: 02 6256 4627; email: matthew.smith@ema.gov.au

National Registration and Inquiry System (NRIS)

The policy manual for the National Registration and Inquiry System (NRIS) has been published and distributed to State Red Cross agencies. The manual reflects the collaborative work of the NRIS Committee over the last two years and outlines NRIS policies and procedures. It makes provision for inclusion of procedural manuals for local and national systems.

Updates for the manual will be available from the NRIS password protected web site. Arrangements are underway for the transfer of the NRIS server from Department of Health and Ageing to the Australian Red Cross. This process is likely to take 15–18 months to complete. NRIS users should note that the current system will be maintained by Department of Health and Ageing until the new installation has been tested and 'bedded in' with Australian Red Cross.

For further information contact: Don Patterson
Phone: 02 6256 4625; email: don.patterson@ema.gov.au

National response plan for Mass Casualty Incidents involving Australians Overseas (OSMASSCASPLAN)

EMA has been co-ordinating development of a national planning framework for response to mass casualty incidents overseas. The current draft of the plan has been circulated to relevant Australian, State and Territory agencies, and to the Australian Red Cross. EMA plans to hold a two-day discussion exercise later this year to test, refine and finalise the plan.

For further information contact: Rob Cameron
Phone: 02 6256 4616 ; email: robert.cameron@ema.gov.au

CONFERENCE DIARY

INTERNATIONAL
2004 October

4–5 October

Location: Oakland, California

Title: Pacific Homeland Security and Natural Disaster Conference.

Details: Conference topics and exhibits will address bioterrorism and the healthcare system, shipping and transportation security, infrastructure vulnerability, corporate programs and business recovery, role of local governments and special districts, the tools of technology, legislation, funding and insurance, natural hazard mitigation, effective disaster response, and preparing and coordinating the players.

Enquiries: Complete information is available from ABAG, P.O. Box 2050, Oakland, CA 94604.
tel: (650) 494-1613;
email: exhibits@pacificsecurityexpo.com;
web:http://www.pacificsecurityexpo.com/.

Sponsor: Association of Bay Area Governments (ABAG) and Bay Area Economic Forum.

13–16 October

Location: Calgary, Canada

Title: SARSCENE 2004.

Details: SARSCENE attracts about 700 participants including federal government representatives (Canadian Coast Guard, Canadian Forces, Meteorological Service of Canada, Parks Canada, RCMP and Transport Canada); provincial and municipal police force members; volunteers from ground, air and marine search and rescue; international search and rescue providers; canine handlers; weather specialists; and related emergency services personnel.

Enquiries: Web: http://www.nss.gc.ca/site/ss/workshop/2004/index_e.asp.

14–15 October

Location: Moreton-in-Marsh, England

Title: Fifth Annual International Disaster and Emergency Readiness Forum (IDER).

Details: With the increasing concern over national and international security due to the heightened threats of global terrorism, as well as natural and human-made disasters, it is essential for the international community to work together to share information and good practices and integrate disaster response.

Enquiries: Conference details can be obtained from Simon Langdon, Insight Consulting Ltd., Churchfield House, 5 The Quintet, Churchfield Road, Walton-on Thames, Surey KT12 2TZ UK.
tel: +44 1932 241000;
email: simon.langdon@insight.co.uk;
web:http://www.andrich.com/ider/.

Sponsors: United Nations, International Aviation Transport Association, International Training and Simulation Association, Institute for Civil Defense and Disaster Studies.

25–27 October

Location: Southbank University London, UK

Title: Tunnel Fires Fifth International Conference.

Details: This fifth Tunnel Fires conference looks at what has been achieved, in practical terms, during recent years. It is designed to share knowledge and exchange information on the commonalities and specifics in all types of tunnels including road, rail and metro, small transport, water, power, cable and service tunnels. It will especially highlight human behaviour and responses in a dedicated one-day seminar on the last day of the conference.

Enquiries: For further information, or if you wish to submit an abstract, please contact: Stephanie Whitham, Tunnel Management International Ltd. PO Box 452, Kempston, Bedford, MK43 9PL, UK.
tel: +44 (0)1234 764630;
fax: +44 (0)1234 764784;
email: info@itc-conferences.com
web:http://www.tmi-intelligence.com/conferences.asp.

Sponsor: Organised and Sponsored by Tunnel Management International

2004 November

13–17 November

Location	Miami Beach, Florida
Title	NFPA Fall Education Conference.
Details	This conference focuses on fire and life line safety through accredited training and other sessions.
Enquiries	Complete information can be obtained from Linda Baily, NFPA, One Batterymarch Park, Quincy, MA 02169. tel: (617) 984-7030; email: lbailey@nfpa.org; web: http://www.nfpa.org.
Sponsor	National Fire Protection Association (NFPA).

15–17 November

Location	Warsaw, Poland
Title	Ninth International Conference of Directors of Civil Protection Schools.
Details	The changes in the area of safety since 2001 put more responsibility for educational activities on civil protection schools at the same time proving the necessity to organise the next conferences as platforms for sharing experiences. The working language of the conference will be English and French (interpretation will be provided).
Enquiries	More detailed information is available at http://www.sgsp.edu.pl.
Sponsor	Hosted by the Main School of Fire Service.

16–19 November

Location	Mesa, Arizona
Title	ASFPM Arid Regions Flood and River Restoration Conference.
Details	The focus of this year's conference will be on river management and restoration techniques for arid watercourses, and on technical, administrative and political floodplain management issues.
Enquiries	Conference details are available from Tom Loomis, Arizona Floodplain Management Association, P.O. Box 18102, Phoenix, Arizona 85005. tel: (602) 506-4767; email: trl@mail.maricopa.gov; web:http://www.azfma.org/main.php3?primNavIndex=4&
Sponsor	Association of State Floodplain Managers (ASFPM).

24–25 November

Location	Moreton-in-Marsh, UK
Title	Fire Related Research and Developments: Annual Conference.
Details	This conference will be held at the National Training Center and will include a special session on emergency management.
Enquiries	For further information contact Anne Eyre, Trauma Training, P O Box 2590, Leamington Spa, Warks CV31 1GQ, UK. tel:+44(0)1926-427939; email: anne.eyre@traumatraining.com; web: http://www.fireservicecollege.ac.uk/.
Sponsor	Fire Service College.

28 November – 3 December

Location	Ascona, Switzerland
Title	Coping with Risks Due to Natural Hazards in the 21st Century.
Details	Risks due to natural hazards have continuously increased during the last decades. To address this situation there is a prioritized need for integrated risk management strategies including prevention, intervention, recovery, and insurance measures. This workshop also focuses on those aspects in risk management related to understanding risk perception, risk aversion, acceptable levels of risk and risk dialog.
Enquiries	Information is available from Centro Stefano Franscini, Monte Verità, Via Collina, CH-6612 Ascona, Switzerland. web: http://www.cenat.ch/index.php?userhash=1300501&nav=672,814,814,814&l=e
Sponsor	Swiss Natural Hazards Competence Center.

AUSTRALIA
2004 October

7–9 October

Location: Perth

Title: Australasian Fire Authorities Council (AFAC) 11th Annual Conference.

Details: The theme of the AFAC Conference "Are we Prepared for Future Challenges" will examine a wide range of key issues related to fire and emergency services and land management agencies, all within a prevention, preparedness, response and recovery context. We are also pleased to announce that the 11th Annual AFAC Conference will be run in conjunction with the Inaugural Bushfire CRC Conference. (Please note: the CRC Conference will be developed through nomination of speakers directly related to the specific programs, not through a call for papers). Both conferences aim to challenge delegates through a high quality program and to ensure continued communication between AFAC and CRC stakeholders.

Enquiries: Lisa King, 11th Annual AFAC Conference and Exhibition, Congress West Pty Ltd
PO Box 1248, West Perth WA 6872, Australia.
tel: +61 8 9322 6906;
fax: +61 8 9322 1734;
email: AFAC@congresswest.com.au;
web: http://www.congresswest.com.au/AFAC/.

11–15 October

Location: Perth, Australia

Title: International network for Fire Information and Reference Exchange – A safe community: the information network.

Details: This conference will bring together information professionals from around the world to provide a forum for sharing current information on fire and emergency services. It will look at the impact the information network has on the wider community, through technical presentations and workshops. This forum will also strengthen the information networks between information professionals working in the field. This annual international workshop will present the most recent innovations relating to information in the fire and emergency community.

Enquiries: Please contact Jill Don, Department of Emergency Services, GPO Box 1425, Brisbane, Queensland 4001.
fax: 07) 3247 8668
email: jdon@emergency.qld.gov.au
web:http://www.infire.org/Conferences/2004/.

15–17 October

Location: Darling Harbour, Sydney

Title: TraumaCare 2004.

Details: A joint meeting between the Australasian Trauma Society (ATS) and Trauma Care International (ITACCS).

Enquiries: For more information please contact Ms Emma Waygood, TraumaCare 2004 Secretariat, Conference Action Pty Ltd, PO Box 576, Crows Nest NSW 1585 Australia.
Tel: +61 2 9437 9333;
fax: +61 2 9901 4586;
email: emma@conferenceaction.com.au;
web: www.traumacare2004.com.

2004 November

1–5 November

Location: Adelaide

Title: International Policing Conference 2004– Safety and Security in a Hi-Tech World

Details: The conference aims to attract between 600-800 delegates world-wide from police services, the military, corrections, emergency services, the IT industry, law and policy makers. The conference is the first of its kind in Australasia and has guest speakers from the FBI, ex-Whitehouse advisors, the UK and several high profile locations. The conference will include one of the largest industry exhibitions held in this country. The conference also includes a less than lethal resolution and tactics forum, specifically aimed at tactical officers and para-military organisations.

Enquiries: South Australia Police, GPO Box 1539, Adelaide, South Australia 5001.
tel: +61 8 8463 3726;
fax: +61 8 463 3722;
email: sapol.ipc2004@police.sa.gov.au;
web: www.ipc2004.com

Sponsor: The South Australian Police Service (SAPOL).

interesting websites

National Pest and Disease Outbreaks

http://www.outbreak.gov.au

A national website to keep Australians informed in the event of a pest or disease emergency. This user-friendly website provides users with access to local, state and national information including specific information for producers, travellers, non-English speakers and details for media. It also features a subscription list for those who want to be kept in the know as information becomes available.

Animal Health Australia

http://www.aahc.com.au

Animal Health Australia is an organisation dedicated to advancing issues of collective interest to stakeholders associated with the health of livestock. Their mission is to ensure that Australia's national animal health system delivers competitive advantage for Australia's livestock industries.

Plant Health Australia

http://www.planthealthaustralia.com.au

Plant Health Australia is a peak body responsible for working with industry, government and associate partners to manage projects and coordinate development of national plant health policy and capability in Australia.

Fisheries Research and Development Corporation

http://www.frdc.com.au

The FRDC's mission is to increase economic and social benefits for the fishing industry and the people of Australia, through planned investment in research and development, in an ecologically sustainable framework.