



Emerging wildlife diseases – impact on trade, human health and the environment

Introduction

Emerging wildlife diseases can occur anywhere in the world and the consequences can be severe. The recent epidemics of SARS, West Nile virus and avian influenza demonstrate the global importance of emerging pathogens and the important role of wildlife in initiating or maintaining such diseases. These recent epidemics and many other diseases have also highlighted the importance of creating new and more effective partnerships between government departments, animal industries and the community. It is important that a country has a system that is able to detect and identify emerging pathogens or diseases, rapidly analyse the situation, and, if necessary, disseminate the information and prompt a control response.

The term 'emerging disease' has a moderately broad definition and, in general, includes any one of three disease situations: 1) a known agent appearing in a new geographic area; 2) a known agent or its close relative occurring in a species previously considered unsusceptible and/or; 3) a previously unknown agent detected for the first time¹.

Examples

Cormorants and Newcastle disease

In the summer of 1992, morbidity and mortality in juvenile double-crested cormorants (*Phalacrocorax auritus*; DCC) attributable to Newcastle disease virus (NDV) was observed for the first time in seven northern USA states and one Canadian province, and recurred in three western Canadian provinces². An estimate of in excess of 20,000 DCC died, with mortality rates ranging from, <1% to 92% in the USA colonies.

The epidemiological factors that determined the occurrence of such epizootics is still unclear. However, large cormorant populations, high nesting densities, heavy contamination with

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excreta and older juveniles travelling in groups in and around the colonies, were all favourable conditions for the transmission of an infectious agent.

From pathogenicity studies in North America, the isolated viruses were an unequivocal threat to domestic poultry. Although the cormorants are not typically in contact with domestic poultry operations, other species, such as gulls, frequent both cormorant colonies and poultry operations. An outbreak of velogenic NDV occurred in a range flock of turkeys in North Dakota in August 1992 about 5.5 km from an affected DCC colony. Virus indistinguishable from the DCC virus was isolated from several infected turkeys in this range flock which was eradicated³.

In Australia these outbreaks caused the cancellation of a fertile turkey egg importation at considerable cost to the importer and frustration to the Australian government.

Lyssavirus

Australia has always been considered free of rabies apart from historic isolated introductions of the disease, none of which has led to establishment of a rabies cycle.

In 1996 an indigenous lyssavirus, subsequently named Australian bat lyssavirus (ABLV) was detected in Australian bats suffering from neurological disease. Lyssaviruses (of which some subtypes cause rabies) infect all mammalian species, although strains tend to be species specific, and therefore pose a risk to the public and to domestic and wild animals. At present the major perceived risk from ABLV is that of human infection caused by contact (biting and scratching) with infected bats. This risk can be managed by public awareness and provision of pre- and post-exposure vaccination where necessary. As ABLV has caused the death of two humans, it has to be assumed that, at least under some conditions, it can cause spill-over into other mammals, as with all other lyssavirus genotypes.

Lyssaviruses in Australia are presently confined to bats. However, if rabies or other lyssaviruses should establish in terrestrial animal species, the potential threat to public health could increase considerably.

There are two possible pathways for the appearance of terrestrial animal lyssavirus cycles in Australia: 1) the introduction of foreign lyssavirus variants, particularly rabies, via infected animals and; 2) the spread of ABLV into terrestrial hosts to establish new cycles of virus transmission.

Other significant examples that have occurred in Australia or in our region are presented in Table 1.

Discussion

To improve the capability of recognising emerging wildlife diseases better national surveillance systems are needed, as well as better integration and sharing of information. Efficient surveillance is dependent upon a laboratory system that is capable and adequately resourced to identify the suspected pathogens, regardless of the species of the host.



Table 1. Examples of some significant emerging diseases with wildlife as part of their epidemiology that have occurred in Australia or Australasia.

Disease	Key Species	When/Where	Comments
Leishmaniasis	Red kangaroo (<i>Macropus rufus</i>)	First suspected 2000 at two sites near Darwin, NT	Likely an incidental host out of their natural environment. Potentially a serious zoonosis ⁴
Erysipelas	Kakapo (<i>Strigops habroptilus</i>)	July 2004 Chalky Island NZ	Translocation of an endangered species to a new location
Hendra virus	Fruit bats (<i>Pteropus</i> sp.)	1994 Brisbane, QLD	First detected by fatal disease outbreaks in horses and humans. Has occurred on a number of occasions since
Kangaroo blindness (viral chorioretinitis)	Mostly prevalent in Eastern grey kangaroos (<i>Macropus giganteus</i>)	Autumn 1994. Spread from Northern NSW to Southern WA by 1995-6	It is believed that the cause was a Wallal virus (an orbivirus) that had not been recently introduced to Australia, but that was a specific viral mutant
Tasmanian Devil Facial tumour	Tasmanian devils (<i>Sarcophilus harrisi</i>)	First confirmed June 2001, but thought present in the mid nineties. Recorded to involve 65% of the state of Tasmania	Very high prevalence and mortality rates threatening the survival of the species. Cause still unknown
Systemic coccidiosis	Green turtles (<i>Chelonia mydas</i>)	October 2002 North East coast of NSW	Associated with environment changes due to drought conditions
Nipah	Fruit bats (<i>Pteropus</i> sp.)	1998-99 Malaysian peninsula	265 human cases and a number of other species involved. Deforestation and drought displaced bats into agricultural areas
Leptospirosis	Rats & mice	1998-99 North Queensland	A large increase in Leptospirosis notifications in Queensland during this period (>77%) was explained by high and consistent rainfall and reported increases in rodent numbers. The increase was especially associated with the banana industry ⁵
Chytridiomycosis	Forty nine species of wild amphibians	The causative fungus arrived in the mid 1970s into Queensland. Now in four zones -Eastern seaboard; Tasmania; around Adelaide and South West Australia	One species now extinct due to Chytridiomycosis. The fungus has also been found in 8 endangered and 5 vulnerable species ⁶



Australia needs to recognise, more and more, the need for meaningful collaboration between organisations and government departments. The examples above clearly highlight the need for close consultation, collaboration and commitment to develop among environment, human health and agriculture organisations. However, encouraging progress is occurring. Following a national workshop in 1999, a steering group was formed to review wildlife health surveillance in Australia. The accepted model, while a simple structure, allows for accessibility of a huge range of government and other organisations with whom it functions. In 2002, the Australian Wildlife Health Network (AWHN) became a reality. The aim of the AWHN is to promote and facilitate collaborative links in the investigation and management of wildlife health surveillance and diagnostic information. A database and website has just been released (www.wildlifehealth.org.au).

The founding principles of the AWHN guide the development, operation and management of the network. These founding principles include:

An organisation that has a major focus on human and animal health issues associated with free-ranging populations of wild animals; is based on scientific endeavour and scientific objectivity; encourages multi-organisational collaboration amongst federal, state, local government, and non-government agencies; is based on complementarity rather than redundancy or competition with current organisations, researchers and conservationists; is non-regulatory and; provides the basis for, and knowledge, of emergency disease response and preparedness.

The AWHN is hosted by New South Wales Agriculture and the Zoological Parks Board of New South Wales. It is based at Taronga Zoo (Sydney, Australia) and is supported by a full-time coordinator. Core funding comes through the Australian Wildlife Exotic Disease Preparedness Program administered by the Australian Department of Agriculture, Fisheries and Forestry.

Also newly established, is the Australian Biosecurity Co-operative Research Centre (CRC) which aims to enhance the national capacity to detect, assess and respond to emerging infectious diseases that threaten our national or regional biosecurity. More details can be found at www.abcrc.org.au.

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