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The Invasive Animals Cooperative Research Centre: An Australian Initiative of Relevance to North American Vertebrate Pest Management

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ABSTRACT: Following a successful bid to the Australian Government's Cooperative Research Centres Program, the new Invasive Animal CRC commenced its operations in 2006. The IA CRC will focus on helping to solve invasive animal (vertebrate) pest problems through the development of commercial outputs, integrated strategies, and a business partnership that brings together national and international skills in science, management, commerce, and industry. Comprising a large number of members (41), the IA CRC will assemble critical mass to address a national problem, and it will bring together private and public land managers to integrate approaches to invasive animal management. This unique partnership will deliver the means to deal with existing high-profile invasive animal pests as well as those that have the potential to cause catastrophic impacts in the future. Outcomes will help solve the prominent and costly impacts of invasive species on agricultural, environmental, and social values.

KEY WORDS: agriculture, Australia, environment, invasive animal, research

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THE IMPACT OF INVASIVE ANIMALS IN AUSTRALIA

Invasive animals include introduced and native animals that have or may become overabundant and pose threats to agriculture, the environment, or human health and safety. At least 80 species of non-indigenous vertebrate pests have established wild populations in Australia, and more than 30 of these species have become pests (Bomford and Hart 2002). Precisely costing the impacts of invasive animals on the Australian economy is difficult, particularly when trying to include environmental and social losses. Estimates of the different costs are incomplete, and those that have been made need refinement and further justification if they are to be used to prioritise and stimulate further action on invasive species (Agtrans Research 2005).

A recent conservative estimate was A\$720 million p.a. (McLeod 2004), although this only included data for 10 terrestrial and 1 freshwater species. Feral pigs, rabbits, foxes, and feral cats were estimated to account for 83% of losses, and agricultural productivity loss accounts for about half of total costs estimated. Most agricultural sectors suffer significant economic losses from invasive animals. Notably, these losses occur through predation of livestock, crop damage, competition for feed, and costs of control. Invasive animals have also markedly altered our landscapes, reduced our biodiversity, and through events such as mouse plagues, disrupted communities.

Invasive animals have been a major factor in Australia's unenviable record of having nearly half the known mammalian extinctions worldwide in the past 200 years (Short and Smith 1994). They are strongly implicated in the serious decline of Australia's native freshwater fish populations. Invasive animals are also identified as threatening 14 of Australia's 15 World

Heritage Listed areas and 13 of 15 "Biodiversity Hotspots", the latter identified by the Australian Government's Threatened Species Scientific Committee, with input from recognised experts in the field of biodiversity conservation from each Australian State and Territory (<http://www.deh.gov.au/biodiversity/hotspots/national.html>). The devastation inflicted by invasive animals on Australia's indigenous animals and fish has been massive, and despite the population's general support for wildlife protection, the threat is unabated. Australia is listed as having the sixth highest number of threatened and vulnerable combined mammal, bird, and fish species, out of 245 countries and territories (IUCN 2004).

Historically, management activities and much supporting government legislation have sought eradication of these animals, as demanded by their pest status. Some efforts (public and privately funded) to combat invasive animals have met with nation building success, such as the establishment of dingo fences and the release of myxomatosis (Rolls 1969). Despite these occasional successes and ongoing control efforts, many invasive animal pests continue to survive at densities sufficient to cause significant, ongoing damage to our agricultural production and conservation values. This reflects the inherent difficulties of dealing with such pests, the often poor cooperation and coordination among key stakeholders, and significant impediments to innovation and effective application of technology that still exists. Australian markets for invasive animal solutions are often restricted and the barriers to entry, particularly regulatory compliance, are prohibitively costly in relation to market scale. The cost of registering a new toxin, for example, is beyond the capacity of small to medium enterprises to deliver, yet the benefit to national industries such as grain

or wool might be measured in the tens of millions of (Australian) dollars annually. Further, despite the objectives of developing controls that are more humane and target-specific, regulations governing animal ethics and welfare hamper the research required for new product registration.

THE INVASIVE ANIMALS COOPERATIVE RESEARCH CENTRE

The Invasive Animals CRC (IA CRC) will address these issues by bringing together, for the first time, a national collaboration of skills in research, extension, training, and market development, industry providers, and key end-users to combat the most damaging of Australasia's invasive animal pests. It will also liaise with and inform important policy makers such as the Vertebrate Pests Committee, a national advisory group to governments. The partnership will concentrate its efforts on developing and putting the necessary tools and strategies in the hands of people who will utilise them for economic, environmental, and social gain. The IA CRC will seek to empower groups at the "coalface" to make a difference. This will bring about less reliance on government support, i.e., acceptance of ownership (regardless of land tenure) with appropriate tools and training to deal with invasive pest management issues at the local level.

Reducing the impact of invasive animal pests can only be achieved by a partnership between the public and private sectors. No individual land manager or agency carries the whole invasive pest animal problem, but all are responsible for making a contribution and a commitment to the solution. Invasive pests do not recognise land tenure and roam freely across the 23% of Australia under public control, the 14% in Aboriginal and Torres Strait Islander custody, and the 63% in private hands. Most research into controlling invasive animals is undertaken in public R&D institutions. State and federal agriculture and natural resource management agencies have played a significant role in managing public land and in supporting farmers, graziers, conservation managers, and foresters in their efforts to control terrestrial invasive animals. Individual land managers often work to reduce on-site impacts, but the mobility and stealthy nature of these animals makes their local eradication difficult, if not impossible. Similarly, river systems inter-connect as do their fish populations. Management of a pest fish in one catchment is meaningless if the pest quickly recolonises from adjacent, unmanaged catchments. Australia is particularly vulnerable to many exotic (and endemic) livestock diseases for which widespread populations of invasive animals are important potential sylvatic hosts. Our ability to develop appropriate contingency plans for exotic disease emergencies is directly influenced by the ongoing effectiveness of pest management strategies and knowledge of current distribution and abundance—key issues to be addressed by the IA CRC.

RESEARCH AND DEVELOPMENT PROGRAMS

The variety of species which nationally cause damage is large. Although focussing on primary invasive animal pest problems (rabbit, fox, wild dog, carp, feral cat, feral pig, house mouse), IA CRC will explore additional

significant problem species including feral goat, birds, feral deer, feral horse, feral camel, carp, tilapia, rat, and over-abundant macropods. Programs will also consider the detection and prevention of new or emerging invasive species from becoming significant economic pests, or existing problem species further expanding their range into previously non-impacted regions of Australia. IA CRC activities will also develop contingencies for protecting Australia's agricultural industries from suffering catastrophic losses by enhancing our capability to rapidly respond to outbreaks of exotic diseases where invasive animals are potential vectors.

Successful biological control methods deliver outstanding returns. More than half a century after its release, myxoma virus still kills almost half the rabbits born in Australia annually, for zero expenditure. We aim to deliver biocontrol solutions for the house mouse and carp based on new generation genetic technologies, and improve the effectiveness of Rabbit Haemorrhagic Disease (RHD), already estimated to have provided A\$5 billion in benefits. Currently, bait-based control technologies for invasive animals require registered toxicants. Most are dispensed by authorised agents, commonly state government agencies, or via rural merchants. Where commercially feasible, new projects in the IA CRC will include members from all parts of the delivery path and will establish clearly-defined routes to market application, thus increasing the commercial viability and adoption of new products. New target-specific baits and toxins, national approaches to policy development, and delivery to larger markets will help reduce long-term control costs and increase ease of management by providing more effective means for individuals and agencies to take cost-effective action.

Optimising control efforts will lead to improved outcomes at local and regional levels. IA CRC's research programs will focus on enhanced delivery through better information systems, development of 'best practice', policy and socio-economic analysis, removing impediments to adoption (policy, regulatory, legislative, social), and the use of large-scale demonstration sites that showcase practical solutions to pest control. Throughout, the programs in the IA CRC are designed to assist in the development of a more viable pest animal control industry in Australia.

The decision to make the IA CRC an international effort, rather than solely Australian, reflects the scale of the pest problems shared by other countries. The issue of high regulatory barriers applies internationally and can benefit by public-private partnerships, regardless of country of origin. As well, the differing systems of landscape management in various countries will stimulate an active exchange of ideas. The strategy for engagement of researchers outside of Australia has been undertaken with great care. International partners have been selected because of the specific skills they can contribute, and only where a clear mutual benefit exists. International cooperation will be a very strong part of the IA CRC and will operate at an active research level. Moreover, the opportunity to export products and services from Australia to other countries in the region will be encouraged. This will build on export potential from both

technology and skills in the field that have been developed by the private and public sectors over many years.

In North America, the University of Minnesota is a participant in the CRC, and the USDA's National Wildlife Research Center in Fort Collins, Colorado will be a major collaborator.

EXPECTED OUTCOMES

An ambitious program of activities has been planned to address the outcomes listed below:

- 1) Reduce impact of foxes and wild dogs by 10% (A\$27 million p.a.)
- 2) Reduce feral pig damage by 15% (A\$16 million p.a.)
- 3) Reduce rodent damage by 20% (A\$7 million p.a.)
- 4) Reduce spread and impacts of carp and other pest fish leading to improved water quality
- 5) Reduce impacts of feral cats over 5 million hectares
- 6) Improve integration of existing and new rabbit control options, increasing agricultural profitability
- 7) Develop at least one new tool for control of cane toads
- 8) Reduce risk of disease transfer from invasive animals to humans and livestock
- 9) Reduce the risk of economic losses, and environmental and social damage, by forecasting and responding to new and emerging invasive animal problems
- 10) Growth in the Australian invasive animal control industry through support of partners in addressing their problem species, registration, marketing, export, and uptake of products
- 11) Increase skills base in invasive animal management through education and training
- 12) Establish national and local benchmarks for invasive animal impact, density, and distribution from which performance can be assessed
- 13) Effectively manage resources to achieve the CRC's research, education, and technical transfer outcomes.

Discussion

These IA CRC outcomes will help solve the prominent and costly impacts of invasive species, and will benefit a range of Australian sectors and deliver these services at a continental scale. Key sectors include the grains, horticultural and viticultural industries (rodents and/or birds), extensive grazing industries (wild dogs, foxes, rabbits, and disease risk), water use in agriculture, tourism and fisheries (carp), and the environment (all species). The IA CRC will create a continuum of stakeholders from perception of a problem, through R&D and marketing, distribution, and on-ground application. It will also train scientists to continue the effort against invasive pests beyond the life of the CRC.

The Invasive Animals CRC welcomes interest and collaboration from outside Australia.

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