

Invasive Animals Cooperative Research Centre

# Annual Report 2005-2006



Invasive Animals CRC



Established and supported under the  
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Research Centre Programme





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## Purpose

### **Invasive Animals Cooperative Research Centre has the following operational targets for the period 2005 – 2011:**

#### **Improving the environment for business and biodiversity**

1. A benefit of \$29 million p.a. by reducing the impacts of fox and wild dogs by 10%\*;
2. A benefit of \$16 million p.a. by reducing feral pig damage by 15%;
3. A benefit of \$7 million p.a. by reducing rodent damage by 20%;
4. A capacity to deliver improved quality and availability of inland water through reduced impacts and rates of spread of carp and other pest fish species;
5. Deliver innovative, practical control measures against cane toads;
6. Reduced impact of feral cats over five million hectares; and
7. Increased agricultural profitability through improved integration of existing biological, conventional and newly developed control options for rabbits.

#### **Reducing risk**

8. Reduced risk of disease transfer from invasive animals to livestock and humans; and
9. Reduced risks of economic losses, environmental damage and social stress by forecasting and responding to potential, new, expanding or emerging invasive animal problem.

#### **Building capacities and new industries**

10. Growth in Australian invasive animal pest control industries. Through industry collaboration on the registration, marketing, export and community uptake of new products the CRC will enhance control of problem species;
11. Increased professional and practical skills base in invasive animal management through education, training and community awareness;
12. Established national and local benchmarks for invasive animal impact, density and distribution from which performance on delivery of all outcomes can be assessed; and
13. Efficiently manage resources to achieve the CRC's research, education, commercialisation and technology transfer outcomes.

\* Percentage improvements refer to Australia; benchmarked against McLeod (2004) "Counting the Cost: Impact of Invasive Animals in Australia".

# 1 Executive Summary

This is the first annual report of the Invasive Animals Cooperative Research Centre which was established following the successful round 9 bid in 2004. Our motto is “together create and apply solutions” which indicates the Board’s direction for all activity within the CRC. Directors were delighted that such a large number of participants chose to join the CRC, bringing together a unique combination of skills that ranges across the conception of ideas through development and into commercialisation and/or application of new products and strategies. The large and diverse partnership is of itself a major innovation in the pest animal arena in Australia. Never before have all the States and Commonwealth joined together in such a comprehensive R & D portfolio that includes centres of knowledge and business on the scale represented by the Invasive Animals Cooperative Research Centre. Directors of Invasive Animals Ltd, the management company for the CRC, were delighted that organisations were able to join despite some significant barriers such as the assignment of intellectual property to the CRC and a long term commitment both cash or in-kind beyond organisations’ normal planning cycles. The indications so far are that the effort involved will be extremely worthwhile with new linkages formed and obvious already and many new projects up and running.

In the initial year of operation the CRC has hosted numerous workshops to bring together expertise from across Australia and indeed internationally. These included a workshop on the socio-economics of pest animal control which will assist us in establishing benchmarks across the triple bottom line of economics, social, and environmental measurements which span the interests of our members and a workshop on feral deer control pointed to the varying interests in the community on control of that species with land managers, hunters, farmers and others joining together to put their points of view on management of the five species of deer currently in the wild in Australia. A smaller workshop brought together researchers from across Australia in wild dog management to ensure research activities are carried out with the greatest degree of efficiency possible and that opportunities for advancement are garnered from all the states. Late in the year a major workshop on the science of cane toad control set out the developments and current progress in cane toad research with very clear leads for future work.

One of the developing areas of new information is that the cane toad does not seem to move as a massive front across the north of Australia but instead is a highly selective species when it comes to breeding areas and is only breeding successfully in relatively limited types of waterholes. This work by Professor Rick Shine’s laboratory at the University of Sydney has parallels to New South Wales Fisheries researcher Dr Dean Gilligan’s findings in relation to the breeding habits of the common carp. These significant advances in ecological knowledge allow us to look at local control of both the cane toad and carp in “hot spots” of breeding activity and reinforce the need for ecological investigations to understand invasive animals.



Australian Wool Innovation, a major supporter of the CRC, also indicated the importance of long term research by implementing a new round of rabbit research looking at the possibility of genetic resistance to the rabbit haemorrhagic disease virus (RHD) which has garnered a benefit in the order of 5 billion dollars to the nation. We are delighted that Dr Brian Cooke has joined the CRC's head office at the University of Canberra to implement this important new development.

Wild dog, fox and possibly feral cat control will make a major leap forward if the CRC's partners are successful in developing Para-Aminopropiophenone (PAPP) as an additional poison for control of these species. Carried over from the previous Pest Animal Control CRC, the development of PAPP as an additional toxin to those currently available will increase the range of baiting opportunities to control these important species. It is gratifying that the Pest Animal Control CRC spin-off company, Pestat Ltd, is successfully managing this project for Australian Wool Innovation through the IA CRC and has become a fully-fledged member of the new CRC.

Significant application of products and services has already begun under the banner of the Invasive Animals CRC. The handing down of the CRC's commissioned independent review of the Tasmanian fox incursion has already guided control measures in that state. The Bureau of Rural Sciences through the National Feral Animal Control Program has supported short term rabbit control measures for development of a CO<sub>2</sub> fumigator and to improve the shelf stability of the RHDV in bait format which will be delivered in the short term.

Animal Control Technologies Australia with the University of Queensland had a significant early achievement in their project delivering additional rodent control measures for horticultural situations. Within a single teak plantation in far north Queensland some 3.5 million dollars worth of trees were saved with application of existing technology developed by ACTA.

A major development during the year has been the development of the registration package for PIGOUT® a new bait for feral pig control. Requested in 2003 during the feral pig workshop by IA CRC members the Australian Veterinary Association and the Cattle Council of Australia, we are delighted that this product will be an early delivery for the CRC during 2006-2007. Funded by Meat & Livestock Australia and the National Feral Animal Control Program, PIGOUT® will make a significant difference to control of feral pigs in many situations and make a direct contribution to reducing the damage from that important species.

Despite some minor setbacks, there has been very good progress during the year and the strong media and political interest in the CRC has captured the public interests. During the year reviews were conducted on three of the six program areas and annual reporting cycle established. The CRC has implemented a central web based project management system that will assist with the management of the widely dispersed projects. While some adjustments may be needed to milestones in years two and three, the Directors believe the progress against all milestones established in the initial contract has been adequate.

An important development late in the year has been a review of the CRC's investment by the Grains and Research Development Corporation in rodent immuno-contraception. The CRC has decided that investment in this area should wind down. Important milestones were established late in the life of the Pest Animal Control CRC to ensure that the immuno-contraceptive virus was effective in conferring infertility in populations of mice. While the virus is causing infertility in directly infected mice, it must transmit to other mice without weakening to be truly effective. Research has shown that transmission does not result in infertility in exposed mice. We need to understand whether this barrier can be overcome and more importantly, our understanding of why transmission is attenuated following modification of the virus is poor. Under these circumstances the CRC could not expect Australian grain farmers to foot the bill for investing in this area when the timeframes for a breakthrough are unknown. Research at the University of Western Australia will continue with funding from the National Health & Medical Research Council and Australian Research Council directly to the University, focussed on fundamental work. The CRC will rely more heavily on shorter term rodent control measures to fulfil our operational target in that area.

The Directors of the CRC would like to formally thank participants and acknowledge the excellent work of the staff of the Department of Education, Science and Training who have helped us during this establishment phase. Our researchers are grasping every opportunity that the Board is able to provide and we are very grateful for their enthusiasm and creativity. The staff of the CRC also deserve recognition for their hard and persistent work during the year. We look forward to reporting significant advances in the years to come.

# 2 Governance, Structure and Management

## 2.1 Membership of the Board and its various Committees, plus outline of the key skills of Board Members.

The CRC's Board is selected against the following range of skills: primary production; conservation; pest animal control; social sciences; communication; corporate governance; business and commercial skills; research and development management; and risk analysis.

### Initial Board of Directors:

Dr. Peter Allen AM (Chairman), Adelaide, SA. Retired senior executive, state and national animal control agencies.

Mrs. Helen Cathles, (Deputy Chairman) NSW. Primary producer and community-based invasive pest management leader.

Prof. Joan Dawes, NSW. Biotechnology commercialiser and wildlife program advisor.

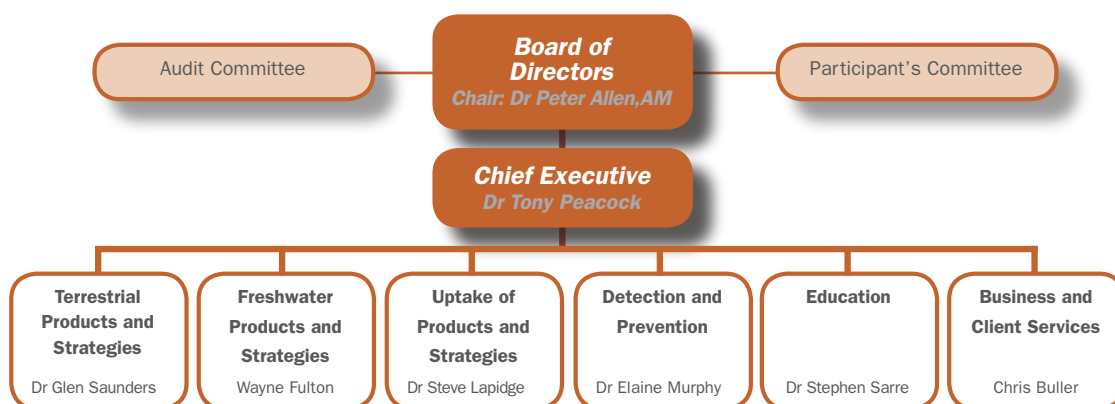
Mr. Atticus Fleming, WA. Lawyer and CEO of Australian Wildlife Conservancy Ltd, Australia's largest private provider of nature reserves.

Mr. Chris Hancock, NSW. CEO of Aarnet Ltd, provider of internet services to Australia's Universities and CSIRO.

Dr. Mark Lonsdale, ACT. Researcher, Chairman of the Global Invasive Species Programme and Assistant Chief of CSIRO's Division of Entomology.

Dr. Dedee Woodside, NSW. Wildlife ecologist and private sector executive, dedicated to integrating conservation and development.

### Organisational Chart





## 2.2 Function and frequency of meetings.

**Governing Board** – manages and governs the CRC and Invasive Animals Ltd.

The Board meets quarterly.

**Participants' Committee** – an Advisory Committee to the Governing Board, consulted annually, providing advice on strategic matters detailed in the Participants Agreement.

**Audit Committee** – a committee of the Board. The Audit Committee meets periodically, normally quarterly. Its role is to assist the Board in managing the CRC and fulfilling its responsibilities of the CRC relating to accounting, compliance and reporting practices. Also to ensure appropriate procedures and checks and balances that support good governance and best practice in finance, corporate strategy and governance.

## 2.3 Extent of private sector representation on the Board and Committees.

Five of the Governing Board's seven members are employed in the private sector.

## 2.4 Information on any changes to Participants and whether these changes have been approved by the Commonwealth.

There have been no changes to Participants in the 2005/6 year.

# 3

## Context and major developments during the year

Although the CRC's formal establishment was not finalised until January 2006, many projects commenced earlier, supported by Participants' resources. By the end of the first year all four research Programs and the Education Program had a full suite of projects in place. It is one of the CRC's principles that all research projects involve at least two members, one of whom will be a user of the research. By this the CRC will both cultivate cooperation and help direct research to practical outcomes.

### 3.1 Outline of business context.

Invasive animals cost Australia at least \$720 million p.a. through environmental, economic and social damage. Most agricultural sectors suffer significant economic losses, through predation of livestock, crop damage, competition for feed and costs of control. Invasive animals have been a major contributor to Australia's unenviable environmental record – nearly half the global mammalian extinctions in the past two centuries.

Historically, management activities sought eradication of invasive animals, as demanded by their pest status. Despite some large-scale efforts, such as the Intercolonial Rabbit Commission of the 1890s and the establishment of the dingo fence in the 1930s, many pests continue to survive at densities sufficient to cause significant, ongoing damage. This underscores inherent difficulties – poor cooperation and coordination among key stakeholders and the significant impediments to innovation and effective application of technology that still exist. Australian markets for solutions are restricted and the barriers to market entry, including regulatory compliance, are often 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 (SMEs) to deliver, yet the benefit to industries such as grain or wool might be measured in the tens of millions of dollars annually.

At present, adoption of innovation is hampered by:

- \* Responsibility and 'ownership' for pest animal control is diffuse and often not clear cut. Land managers, for example, often see pest animal control to be the domain of national or state authorities. However, pest animals don't respect borders or management units.
- \* Restricted markets, low return on investment and high registration costs limit development of new products and tools, even though these may provide massive returns to users in relation to whole of industry and government investment.
- \* Biocontrol can be exceptionally cost effective, but R&D and delivery costs are beyond a level that can be borne by a single company, or even a single industry or government agency.

- ❖ Prevention and early intervention best limit emerging invasive pest problems and provide strong return on investment, however control measures frequently commence only when problems are well entrenched.
- ❖ Regulatory and compliance complexity and cost provide significant barriers to many land managers becoming involved in invasive animal pest management.
- ❖ The short-term nature of many invasive pest control programs (commonly measured in years rather than decades) leads to instability and failure to fully prosecute and secure initial gains.

The CRC's business approach is to create a national collaboration of skills in research, extension, training and market development, industry providers and key end-users to combat the most damaging of Australia's invasive animal pests. The CRC concentrates on developing new tools and strategies and transferring them to people who will apply them for economic, environmental and social gain.

### 3.2 Recent national developments.

Feral animals have received widespread attention during the reporting period. Most significantly, the Australian Parliament's Standing Committee on Agriculture, Fisheries and Forestry handed down their report *Taking Control: a National Approach to Pest Animals*. Six of the Committee's 46 recommendations to Government named the Invasive Animals CRC, generally very much in line with the CRC's motto of "together, create and apply solutions". The Committee received many submissions and spoke widely with rural Australians about pest animal issues, in particular those affecting agriculture. The thrust of the report bore many similarities to the business case for the Invasive Animals CRC: that better coordination was required; there needs to be an emphasis on application of knowledge and that innovation requires joint approaches in most circumstances.

The Australian Government is expected to respond to the recommendations of the Standing Committee by the end of calendar 2006.

Another potentially major impact on the Invasive Animals CRC during the year has been the development of the Australian Pest Animal Strategy (APAS). Australia has never had a national strategy in relation to pest animals so APAS is a significant step forward. Widespread consultation has taken place during 2005-2006 and the CRC was an active contributor. Now in draft form, APAS is expected to be approved by relevant Ministerial Councils in 2006-2007. Once approved, the CRC may need to alter some objectives or change priorities to best meet APAS objectives. It is expected that any necessary changes in emphasis would most appropriately be discussed at the CRC's third year review.

# 4 Commercialisation/Technology Transfer/Utilisation

## 4.1 Strategies for the commercialisation and utilisation of research; effectiveness in delivering the intended benefits to industry and other research users during the reporting period.

The commercialisation strategy of the IA CRC relies on two fundamental principles: each project has at least one commercial participant involved in managing the research and a dedicated commercialisation resource within the CRC whose aim is to add and capture value from centre activities. The advantages of this strategy within this CRC's field are:

1. The most significant imposts (research and registration costs) to SMEs launching innovative products into niche "public good" markets are mitigated.
2. The commercialisation critical path, commercialisation arrangements and appropriate business models are agreed upon early in the development of research projects.
3. Commercial partners that will ultimately launch and support products and services in the market place are active participants in the development of the product; and
4. The critical mass that partnering with the CRC brings to research, registration and commercialisation activities adds significant value and credibility to research development and market acceptability of products and services.

The commitment of the CRC to this commercialisation/utilisation strategy is reflected in its appointment of a Commercialisation manager.

## 4.2 The achievement/progress against all commercialisation.

In this CRC's schedule of milestones, research and commercialisation are not separated. As demonstrated in Schedule 1 of the Commonwealth Agreement, table 1 commercialisation milestones and outputs have been compiled into table 3.

## 4.3 Research, development and technology uptake:

### a. Commercialisation arrangements with industry.

All research projects have a commercial partner directly involved in their management and committed to the transfer of the technology, if the results of the research and development prove a viable product or service. Where the anticipated research outcomes do not fit with the core businesses of CRC participants, the CRC will look to non-participant companies to maximise the robustness of research projects and the returns to CRC participants. This is particularly relevant to the reproductive control research in which the CRC is strategically investing.



**b. New or improved products, services or processes.**

The CRC has, with Animal Control Technologies Australia and Meat and Livestock Australia, recently submitted a registration data package for a new feral pig bait – PIGOUT®, which will be the first feral pig bait registered anywhere in the world.

The CRC is currently progressing two late stage development projects aimed at delivering improved rabbit control technologies that can be integrated into a best management code of practice that encompass products and services based around warren fumigation and effective seeding of calici (rabbit haemorrhagic disease) virus into susceptible rabbit populations.

**c. Uptake by industry of outcomes of contracted research.**

Where possible the CRC encourages industry stakeholders and end users to participate in research and development in order to maximise buy-in to research projects and ownership of the outcomes of research projects. This approach helps to manage the technology transfer risk during the commercialisation phase and early-market adoption of new technology, as industry and stakeholders are committed to the success of the research-proven outcomes.

**d. Status/health of existing spin off companies.**

No new spin off companies have been formed. Pestat Ltd, a spin-off from the previous PAC CRC continues to expand. It is a participant in the IA CRC.

**4.6 IP Management.**

The Board approved an IP management strategy that involves the following:

1. An IP audit of all projects to identify Background IP (BIP) to:
  - a) define the IP asset class of BIP;
  - b) pre-emptively identify the Potential Centre IP (CIP); and
  - c) highlight IP of probably commercial value.
2. Predicting from BIP and project milestones CIP that will be commercially valuable so as to proactively manage value adding activities and the researcher's motivations and goals.
3. Identifying relevant non-participant IP such that CIP is positioned within the broader global context in order to highlight infringement risks and future opportunities for collaboration and value adding.
4. Increasing awareness in centre staff and students of the critical processes that underpin commercialisation of research (appropriate record keeping) protecting confidentiality, disclosure, IP asset classes, IP protection methods and the value their research adds to the IP they are working with or developing.
5. Planning and implementing procedures that capture the value of centre IP without adversely affecting research collaboration, a researcher's personal motivations or the unique selling points of the CRC.



# 5

## End user involvement and CRC's impact on end users

**Table 1: The involvement of end-users in CRC activities**

Industry or other research users and the basis of their Interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment etc)	Actual or expected benefit to user (where possible, include benefits accruing in \$ terms)
Animal Control Technologies (Core Participant)	Commercialisation. Company offices and factory located in Victoria.	Licensed to manufacture, distribute and sell CRC's wild dog, fox and feral pig baits and baits to control rodents in industrial settings.	New products once registered, likely to increase company turnover and market share.
Australian Wool Innovation Ltd (Supporting Participant)	Funder. Industry R&D body representing wool growers. Company offices Sydney and Melbourne.	Enhanced productivity through: a) 10% reduction in loss from wild dog and fox attack; b) reduced impacts of rabbit	New tools and techniques, applied at farm-level will deliver nationally a \$29,000,000 benefit.
Australian Veterinary Association (Core Participant)	Animal welfare policy development. Headquarters in Canberra.	Advice to vets on new products.	More informed professionals (and public).
Australian Wildlife Conservancy (Supporting Participant)	Private natural resource conservation. Sites in a number of States.	Access to new tools and techniques.	Increased efficiencies in feral animal control.
Central Science Laboratories, UK (Supporting Participant)	Research and commercialisation.	Trailing of products in UK.	Enhances export potential.

Industry or other research users and the basis of their Interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment etc)	Actual or expected benefit to user (where possible, include benefits accruing in \$ terms)
Connovation (Supporting Participant)	Research SME, manufacturer. Offices in Sydney and NZ.	Access to proprietary formulations. Export opportunities.	Enhances export potential.
Environment ACT	Public sector environmental protection. Offices in Canberra.	Access to new tools and techniques.	Increased efficiencies in feral animal control on public land.
Grains Research and Development Corporation (Supporting Participant)	Funder. Industry R&D body representing 30,000 grain growers. Company offices Canberra.	Enhanced productivity through reduction in damage by rodents.	A benefit to grain growers of \$7,000,000 through reduction of rodent damage.
K&C Fisheries Ltd (Supporting Participant)	Commercialisation. Company offices and factory located in Victoria.	Access to new tools and techniques.	New products once registered, likely to increase company turnover and market share.
Meat and Livestock Australia Ltd (Supporting Participant)	Funder. Industry R&D body representing 34,000 graziers. Company offices Sydney.	Enhanced productivity through 15% reduction in damage by feral pigs.	New tools and techniques, applied at farm-level will deliver nationally a \$16,000,000 benefit.
Murray-Darling Basin Commission (Core Participant)	Public sector natural resource management.	Access to new tools and techniques for pest fish control.	Increased efficiencies in pest fish control.

Industry or other research users and the basis of their Interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment etc)	Actual or expected benefit to user (where possible, include benefits accruing in \$ terms)
NSW Department of Primary Industries	Public sector agricultural resource management. HQ in Orange, NSW.	Access to new tools and techniques.	Increased efficiencies in feral animal control on public and private land.
NSW Department of Environment and Conservation	Public sector natural resource management. HQ in Orange, NSW.	Access to new tools and techniques.	Increased efficiencies in feral animal control on public land.
Pestat Ltd (Core Participant)	Research SME, commercialiser. Offices in Canberra.	Provision of research services, commercialisation of research products.	New products once registered, likely to increase company turnover and market share.
Parasitech (Supporting Participant)	Research SME. Offices in Canberra.	Provision of research expertise. Access to new tools and techniques.	New products once registered, likely to increase company turnover and market share.
State Council of NSW Rural Land Protection Boards (Supporting Participant)	Public sector natural resource management. HQ in Orange, NSW.	Access to new tools and techniques.	Increased efficiencies in feral animal control on pastoral land.
Tasmanian Dpt Primary Industries (Supporting Participant)	Public sector natural resource management. HQ in Hobart.	Access to new tools and techniques.	Increased efficiencies in feral animal control on public land.
ValueMetrics Australia (Core Participant)	Research SME. Offices in Sydney.	Provision of research expertise. Access to new tools and techniques.	New research tools and services likely to increase company turnover and market share.

Industry or other research users and the basis of their Interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment etc)	Actual or expected benefit to user (where possible, include benefits accruing in \$ terms)
Victorian Dept Sustainability and the Environment (Supporting Participant)	Public sector natural resource management. HQ in Melbourne.	Access to new tools and techniques.	Increased efficiencies in feral animal control on public and private land.
Victorian Department of Primary Industry (Core Participant)	Public sector natural resource management. HQ in Melbourne.	Access to new tools and techniques.	Increased efficiencies in feral animal control on public and private land.
WA Dept of Environment and Conservation (Supporting Participant)	Public sector natural resource management. HQ in Perth.	Access to new tools and techniques.	Increased efficiencies in feral animal control on public and private land.

# 6

## Research activities and achievements

### 6.1 Overview of the research, communications, education and governance milestones and outputs, as specified in Schedule 1 of the Commonwealth Agreement.

**Table 2: Research milestones and/or outputs**

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
1.1 Output	2012	Fox and wild dog management packages that include new and existing toxins, application strategies and end-user training.						
1.1.3 Milestone	July 2005 with biennial review in July 2007, 2009	Management-scale (end-user) assessment of new wild dog and fox strategies commenced at demonstration sites in different states with different stakeholders.	10.U.1/ 10.U.4/ 10.U.5/ 10.U.3	Research	Yes	Demonstration sites 10.U.1 (Western Australia), 10.U.3 (Tasmania), 10.U.4 (Victoria) and 10.U.5 (New South Wales) all involve assessment of wild dog and fox management strategies. Project Agreements for all four sites have been received and approved and all are underway. 2006/07 will involve ecological, economic & social benchmarking at each site so a true assessment of each strategy can be achieved, followed by vast amounts of on-ground action.	N/A	



Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
1.1.4 Milestone	July 2005 & ongoing with biennial review in July 2007, 2009	Ecological studies commenced to identify interactions with other processes threatening wild-life or damaging production, and new wild dog and fox management technologies and strategies tested and refined. Issues not covered at demonstration sites targeted.	1.T.2/Fox control	Research	No for ecological studies. Yes for new technologies.	Ecological studies are a planned activity 06/07. See milestones in cells below for information regarding progress on new technologies.	Delayed CRC start due to MDBC negotiations unfortunately made some researchers reconsider priorities within their own jurisdictions	Wild dog projects identified at recent Adelaide workshop and will commence 06/07
1.2 Output	<i>Delivery Targets:</i> 2008 (Registration), 2010 (Marketing and Adoption)	Description: Fox and wild dog management packages that include new and existing toxins, application strategies and end-user training.						
1.2.1 Milestone	July 2006	Description: End-users of package engaged and involved in its development.	Canid bait – AWI	Commercialisation	Yes	05/06 AWI and MLA sponsored presentations (Prime Time forums) given to landholders in WA (x2), QLD (Cunnamulla), NSW (Broken Hill) and SA (Port Augusta). End user involvement ensure product is on the right track. 06/07 stability trials and field trials will be carried out on product. Land managers will be involved with field trials.		
1.3 Output	<i>Delivery Targets:</i> 2008 (Registration), 2010 (Marketing and Adoption)	Description: Additional registered fox and wild dog management tools, including lures and new toxin delivery methods.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
1.3.1 Milestone	Jun-06	Description: National market potential and registration requirements of fox and wild dog lures and novel toxin delivery systems (e.g. M-44 mechanical ejectors) assessed.	Pestat commercialised Feralmone	Commercialisation: by Pestat alone. No CRC input in 2005-2006	Yes	05/06 market potential and registration requirements assessed on 'Clods', PAPP bait matrixes and a feralmone lure for feral pigs. 06/07 Clods – Trial to commence following delayed APVMA approval. Bait matrixes for PAPP to be trialed and registration put forward to APVMA for complete fox bait package. Feralmone feral pig lure – gain additional external funding for trials for information towards a registration package.		
1.3.2 Milestone	Jun-06	Description: Quickest route to market for land managers assessed for lure and ejector products.	Pestat commercialise M44s	Commercialisation: by Pestat alone. No CRC input in 2005-2006	Yes	05/06 start evaluating the efficiency and economy of M44s. 06/07 continue evaluation, get permits in place and scheduled for completion in may 07. Project collaboration with District Council Grant in SA.		
2.1 Output	2012	Management packages for feral pigs, including new and existing toxins, application strategies and end-user training.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
2.1.4 Milestone	July 2006 and ongoing with reviews June 2008, 2010	Ecological studies commenced to identify interactions with other processes threatening wildlife or human health or damaging production, and new feral pig management technologies and strategies tested and refined.	10.U.2 / 10.U.6	Research	Yes	Demonstration Sites 10.U.2 South Australia) and 10.U.6 (Queensland) both involve assessment of feral pig management strategies. Project Agreements for the two sites have been received and approved and both projects are under-way. 2006/07 will involve ecological, economic and social benchmarking at each site so a true assessment of each strategy can be achieved, followed by vast amounts of on-ground action.	Due to additional trials conducted, and competing interests slowing compilation of registration dossier.	Milestone will be met, albeit a few months late
2.2 Output	<i>Delivery Targets:</i> 2006 (Sodium fluoroacetate bait), 2008 (Marketing and adoption), 2012 ('Achilles Heel' baits)	Description: Humane and target-specific feral pig baits.						
2.2.1 Milestone	Dec-06	Description: Registration and market delivery of sodium fluoroacetate feral pig baits.	Pig roll-out	Commercialisation	No	The registration dossier for PIGOUT version 1 (1080 variety) will be submitted to the APVMA by the end of July 2006, likely resulting in registration by early 2007 rather than December 2006.	Due to additional trials conducted, and competing interests slowing compilation of registration dossier	Milestone will be met, albeit a few months late
2.3 Output	<i>Delivery Targets:</i> 2011 (Registered product)	Description: Feral pig baits with capacity to carry contraceptives and/or vaccines (in collaboration with USA and UK scientists).						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
2.3.1 Milestone	Jun-06	Description: International market potential and registration requirements assessed for contraceptive or vaccine incorporation in feral pig baits.	Pig bait roll-out	Commercialisation	Yes	Collaboration with the United States Department of Agriculture (National Wildlife Research Centre), Landcare Research (New Zealand), Department of Conservation (New Zealand), Central Science Laboratory (United Kingdom) and Veterinary Laboratory Agency (United Kingdom) continues in regards to vaccine & contraceptive versions of PIGOUT. Market potential is guesstimated at 10million baits per annum (principally based on USDA rabies program), however this is a gross over-estimate if markets do not develop due to target-specificity or palatability issues currently being tested. International pen and field trials will continue during 2006/07.		
2.4 Output	<i>Delivery Targets:</i> 2010 (Registration), 2012 (Marketing and adoption)	Description: Feral pig management packages that include new and existing toxins, application strategies and end-user training.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
2.4.1 Milestone	June 2006	Description: End-users of package engaged and involved in its development. Benchmarking product and strategy acceptance initiated.	Pig roll-out	Commercialisation	Yes	All IA CRC partners involved with feral pig management are directly or indirectly involved with project 2.T.1, Roll out of feral pig control solutions. As products, such as PIGOUT, become registered, end-users will work in partnership with IA CRC scientists to tailor management packages. It would, however, be premature to do this prior to registration. Furthermore, all IA CRC partners & end-users will be welcomed to join the development team for PIGOUT version 2 – the development of a new feral pig toxin. Proof-of-concept, in terms of efficacy and humaneness, was achieved in 2005/06. 2006/07 will involve seeking external funding & commencing development & commercialisation of the new toxin & lures.		
3.1 Output	2012	A virally vectored immuno-contraceptive product for the control of mouse plagues.						
3.2 Output	Dec-09	An information package which satisfies State and Federal Government requirements, inclusive of public support, to deploy VVIC for the control of mouse plagues.	3T1					



Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
3.2.1 Milestone	Jul-05	A communication strategy to obtain acceptance for full release of VVIC product implemented.	3T1/ 10U12	Research	No		VVIC would replicate, but wasn't transmissible	Project unable to fulfil milestones and will now wind down
3.2.2 Milestone	Jun-06	Strategy developed for consultation and survey of public and regulatory attitudes to GM house mouse contraceptive release.	10U12/ 12.D4	Research	No		A strategy was not developed when it was deemed likely that there would not be a suitable mouse contraceptive product released. ValueMetrics (10.U.12) were requested to undertake a public attitude survey towards foxes in Tasmania.	
3.4 Output	<i>Delivery Targets:</i> 2010 (Field release), 2012 (Adoption)	Description: Technology and products for the control of mouse plagues transferred to commercial partners.						
3.5 Output	<i>Delivery Target:</i> 2012	Description: New and improved rodent control options to protect produce in agricultural areas and bulk storage facilities.						
4.5 Output	<i>Delivery Targets:</i> 2012	Description: Improved technologies for reducing rate of spread of pest fish species.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
4.5.1 Milestone	June 2006	Description: Hazard analysis workshop held for water managers, community groups, and local, national and international biologists on reducing risks of spread of pest fish from water storage and irrigation impoundments.	TBA	Research	No			Milestone modified – to be completed 2007
5.1 Output	<i>Delivery Target: 2007</i>	Bait and other lethal control technologies developed, tested and (where possible) registered for local control of cane toads.						
5.1.1. Milestone	Dec-05	Discovery phase of lethal bait and pheromone research projects established.	5T2	Research	Yes	05/06 Research program established. 06/07 Comprehensive analysis of cane toad venom and cane toad pheromones which could reveal a class of chemicals to follow through as potential lethal cane toad baits or attractants to encourage toad to seek and enter cane toad traps.		
6.2 Output	<i>Delivery Targets: 2011</i>	Description: Humane and target-specific feral cat baits.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
6.2.1 Milestone	Jun-06	Description: Market potential and public acceptance of feral cat baits assessed.	10U4	Research	No	Currently no feral cat bait is registered for general use in Australia. As such, estimating the market potential and likely public acceptance of such a product would be premature, as target-specificity, price, and efficacy must be known before one can accurately gauge this. Once this is known for a potential cat bait, estimates will be made. Regardless, throughout 2005/06 the pen efficacy of PAPP for feral cats has been assured, so a suitable carrier is now being sourced.	See left	Cat research meeting occurring in July 2006
7.1 Output	Dec-10	The mechanisms behind the lack of effectiveness of Rabbit Haemorrhagic Disease (RHD) in higher rainfall areas understood.						
7.1.1 Milestone	Jun-06	Network for RHD Virus sample collection and field observation, and a centralised laboratory for virus analysis established.	7T1	Research	Yes	05/06 SA, NSW and Vic sites secured. Sites also have historical data. CSIRO and SA labs established. 06/07 establish full project design and techniques for detection of calicivirus in rabbit samples. Analyse data for preliminary trends to epidemiology.		

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
7.1.2 Milestone	June 2006 and reviews in June 2007, 2008, 2009, 2010	Field studies, sample collection and laboratory analysis commenced.	7T1	Research	No		Delayed start due to MDBC negotiations and then project sign off.	Once epidemiologist/ statistician is employed, project design to be achieved by October 06 and samples collected and preliminary trends analysed by May 07
7.4 Output	<i>Delivery Target: 2012</i>	Description: Strategies for optimal use of Rabbit Haemorrhagic Disease (RHD) and conventional controls.						
7.4.1 Milestone	Jun-06	Description: Consultation process established with community and end users (pest control managers and land managers).	Linked to AWI rabbit work	Research	Yes	05/06 End users such as AWI agreed to fund further RHDV work to achieve output. 06/07 RHD Review and Genetic Resistance research to commence. RLPBs in NSW likely to provide CRC with data on RHDV releases and results for project 7T1. Data collection could have possible broader application into other states and territories.		06/07 RLPBs in NSW to provide CRC with data on RHDV releases and results. Data collection could have possible broader application into other states and territories.
7.5 Output	<i>Delivery Target: 2012</i>	Description: Rabbit Haemorrhagic Disease bait delivered product made available to end users.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
7.5.1 Milestone	Jun-06	Description: Approval for use of Rabbit Haemorrhagic Disease virus on baits obtained from regulatory authority.	RHD bait project – new – 7T2	Commercialisation	Yes	05/06 APVMA, and subsequently States and Territories agreed to the use of RHDV on baits. 06/07 Secured BRS funding will now be used to develop shelf stable product.		
7.5.2 Milestone	Jun-06	Description: Adequate stocks of Rabbit Haemorrhagic Disease virus available for use by pest control managers.	RHD bait project – new – 7T2	Commercialisation	Yes	05/06 Collaboration with NSW DPI ensured adequate stocks of RHDV would be made available for pest managers. 06/07 Stock will be monitored, and once a shelf stable formulation is produced and approved, new product stocks will be adequately maintained.		
8.1 Output	<i>Delivery Targets: 2009 (Registration), 2011 (Uptake of management recommendations)</i>	Description: Management recommendations for endemic and exotic diseases of invasive animals.						
8.1.1 Milestone	Jun-06	Description: Current information relating to invasive animal diseases (exotic and endemic) collated, published and disseminated, and potential risks to Australasia assessed.	To be assigned by D&P	Research	No		CRC late starting & too busy getting other projects underway. Also, need co-funding as not enough \$'s in budget.	Have approached Chris Bunn about possibility of co-funding a review in 06/07
8.2 Output	<i>Delivery Target: 2010</i>	Description: Remote vaccine delivery systems (RVDS), such as species-targeted baits and feeders (linked to output 2.2).						



Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
8.2.1 Milestone	Jun-06	Description: Existing vaccine technology, in relation to invasive animal diseases of economic importance to Australasia and international partners, and market potential of remote vaccinations assessed.	Pig roll-out	Commercialisation	Yes	See Milestone 2.3.1. Additionally, collaboration continues with Immune Solutions Ltd (New Zealand) to look at oral delivery, through baits or potentially feeders, of commercially-available vaccines to wildlife. Research has principally focussed on the Pseudo-rabies virus of economic importance to America & spread by feral pigs. Preliminary results indicate that a PRV Vaccine could be orally delivered using PIGOUT baits. Pen challenge studies are currently being negotiated between USDA, Immune Solutions & the IA CRC. These will hopefully occur in 2006/07. Further investigation of the possibilities for RVDS will occur throughout the year.		
9.1 Output	2012	Comprehensive package of generic management strategies and policies synthesised from species-specific outputs in Programmes 1 and 2, demonstration projects in Program 3, and outputs relating to risk assessment, community participation in pest management.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
9.4 Output	2010	The development of information systems that will improve coordination and evaluation of effort on a national, regional and local level.						
9.4.1 Milestone	June 2006 and ongoing	Results from a survey and inventory of pest animal populations, incorporating emerging property management information systems, collated and evaluated.	12D1	Research	Yes, in part	Project has reviewed monitoring methods and existing spatial data, and is in the process of collating state-data for 10 species.	Delays in State collaboration for collation of data.	
9.4.2 Milestone	June 2007 and ongoing	Web based data entry systems for abundance, density and damage information developed and evaluated.	12D1	Research	Milestone 2007 - but progress has been made.	Review of state/territory and national-level information systems for invasive animals, discussion underway on requirements for national information system.	N/A	
9.4.4 Milestone	June 2007 and ongoing	Pest density-damage relationships for invasive animals assessed to optimise benefits from control.	12D1 – but requires further coordination by D&P	Research	Milestone 2007 – but progress has been made.	Past density data will be available during 2006/07 for broad assessment against available damage data.	N/A	
9.5 Output	2011	Development and implementation of improved, cost-effective risk management strategies and response options to restrict introductions or the range of invasive animals.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
9.7 Output	2012	National responses to reducing adverse impacts caused by invasive pest animals.						
9.7.1 Milestone	Annual – dates flexible to suit subject and attendees.	National workshops held to describe pest problems, share knowledge, recognise gaps and agree on coordinated actions.	10U11/ 12D2/	Research	Yes	1. Workshop on the socio-economics of invasive animal impacts. 2. National Invasive Animal's Information Workshop in Hobart addressing Resource Condition Indicators, Protocol, Information Products and Systems.		
9.7.2 Milestone	Jun-07	A national pest animal genotyping facility developed.	9D2	Research	Yes	Postdoc and research fellow appointed; PC2 accreditation gained for lab; Rapid high throughput genotyping approach adapted; Tissue collection commenced for foxes. 06/07: Business Plan, ID SNPs for foxes & cats, Database DNA markers, Continue collecting fox & cat tissue.		
9.8 Output	2012	Delivery of improved technical and strategic packages for managing invasive species that are hosts for endemic/ exotic pathogens that threaten humans, livestock or native fauna.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
9.8.1 Milestone	Jun-05	Ecological and epidemiological studies to improve the management of invasive species that are hosts for endemic pathogens commenced.	2.T.1	Research	Yes	Wildlife Exotic Disease Preparedness Program and National Feral Animal Control program-funded projects: A novel molecular-ecology approach to ascertaining emigration/immigration and potential disease spread in feral pigs, and feral pig population structuring in the rangelands of eastern Australia: applications for optimal control have either been completed in 2005 (the former) or are currently being completed. 2006/07 will see the completion of the later two projects, with management recommendations on invasive species & endemic pathogens being detailed in the final reports & journal papers.		
10.1 Output	<i>Delivery Target:</i> June 2010	Description: A registration, marketing, export and community uptake package for reducing the impacts of invasive pest animals.						

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
11.2 Output	Jun-12	Stakeholder Training: delivery of workshops, training courses and community awareness to increase practical skills and knowledge, and ensure consistent national management strategies of invasive species.						
11.2.1 Milestone	June 2005 and ongoing to June 2012	Consultation with partners to develop training courses and management packages to ensure rapid and correct uptake of products delivered to national and international stakeholders and end-users, as new IACRC products, technologies, techniques and strategies.	11.E.6	Research	No	Education program will consult with the Uptake programme to identify best practice for new products from the demonstration sites. Training courses and management practices will be developed and implemented as products and strategies emerge for the CRC.		
11.2.8 Milestone	Jun-06	All current stakeholder knowledge and provided management and practical skills training benchmarked and re-evaluated, and a training implementation strategy developed.	11.E.6	Research	In part	Survey of existing stakeholder pest control strategies to be undertaken between August and December 06. New NHT Trust project approved to update and maintain Feral.org website as a resource for stakeholders. Will include curriculum based school education packages.	All PESTPLAN project milestones delayed due to late signing of contract.	CRC Social scientist will assist with survey content. Stakeholder contacts have been selected and survey appointments to be arranged. Will be completed by December 06



Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
11.3 Output	<i>Delivery Targets:</i> December 2012.	Description: Enhanced professional and skill development for partner agencies to produce benefits through reduced on-ground costs and increased productivity from invasive animal control.						
11.3.1 Milestone	January 2006 and annually thereafter.	Description: The provision of appropriate education and training packages.	11.E.6	Research	Ongoing	Cohort 1 student recruited and have been supported to attend some specific courses and conferences. A group training workshop has been arranged for march 2007 for Cohort 1 and 2 students.	N/A	N/A
11.4 Output	<i>Delivery Targets:</i> December 2012.	Description: Commercial application of training programs offshore.						
11.4.1 Milestone	January 2006 and annually thereafter.	Description: Commercial application of short and online courses and training packages developed as part of our Preparedness Through Education Program. (Courses will specifically target offshore regions such as the USA and Pacific nations where there is a high level of concern with invasive animals control).	IA Offshore – details to be developed	Education	Ongoing	Diploma level course will be ready for delivery by January 2008 in Australia, this can then be rolled out overseas.	N/A	N/A

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
12.1 Output	<i>Delivery Target: 2012</i>	Description: Assessment of the overall impact of the Australasian Invasive Animal CRC throughout its life, and recommended directions and requirements into the future.						
12.1.1 Milestone	June 2006 and review	Description: Agreed benchmarks established for invasive animal impacts, density and distribution in Australasia, this information portrayed to the public and changes in community attitudes to invasive animals monitored.	12.D.1	Education	Yes, in part	National Resource Condition Indicator development and endorsement by VPC; Species identified, prioritised; and State/Territory reporting of existing information commenced.	State reporting of data not completed due to State collaboration delays.	Information to be relayed to public via relevant documents and web-sites.
12.1.2 Milestone	June 2006 and reviewed annually	Description: Invasive animal distributions and impacts in Australasia, and community attitudes towards current and potential invasive animal species evaluated.	12.D.1	Education	Yes	05/06 review of existing spatial data on invasive animals. 06/07 invasive animal distributions reported. 06/07 Review of the social research on invasive animals.	State reporting of data not completed due to State collaboration delays.	Information to be finalised during 06/07.
12.1.3 Milestone	June 2006 and reviewed annually	Description: Reductions in pest animal impacts (and associated gains in production) through the various activities of the AIA CRC demonstrated through rigorous science.	12.D.1	Education	Yes in part	Nov 05 workshop on the socio-economics of invasive animal impacts. New project 06/07 Measuring the environmental & economic impacts of vertebrate pests. 06/07 case studies used to reporting impacts established for on-going monitoring, evaluation and reporting.		Pest animal impacts ascertained at selected areas and reported through case studies in on-going capacity.

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
13.1 Output	Ongoing	Effective & accountable management.						
13.1.1 Milestone	Dec-06	Achieve compliance with reporting requirements required by ASIC.	13F1	Governance	Yes	CRC and Invasive Animals Ltd. registered		
13.1.2 Milestone	June 2006 and June each subsequent year	Board performance and annual review.	13F1	Governance	Yes	Process for Board self-review established. First review to be conducted Sept. 2006		
13.1.3 Milestone	Dec-05	Board Code of Conduct policy introduced.	13F1	Governance	Yes	Board considered and adopted protocol in May 2006		
13.1.5 Milestone	July 2006 and ongoing with reviews June 2008, 2010	Draft and implement a board-approved Procedures, Protocols and Operating Manual.	13F1	Governance	Yes	Governance, strategy, internal controls, financial control policies approved by Board during the year		
13.1.6 Milestone	Dec-05	Approvals and authorities matrix established and implemented.	13F1	Governance	Yes	Considered and adopted by Board Feb. 2006		
13.2 Output	Ongoing	Engagement and communication with partners and community.						
13.2.1 Milestone	Jun-06	Corporate identity established: website, annual report and other publications, style manuals.	13B3	Governance	Yes	Invasive Animals website established. Corporate style and document templates established.		
13.2.2 Milestone	July 2006 and ongoing with reviews June 2008, 2010	News brokering arrangements with at least six partners.	13B3	Governance	Yes	News brokering process established with NSW DPI, QNRM&W, U Can, Pestat, AWI, ACTA.		
13.2.3 Milestone	Dec-05	Establish internal newsletter for staff and partners.	13B3	Governance	Yes	Feral Flyer electronic newsletter established and broadcast. Circulation 530.		

Milestone	Due Date	Detail	Project assigned	Research/ Commercialisation/ Education/ Governance	Achieved? (Y/N)	If achieved, progress during 2005/6 and planned activity 2006/7	Reason why milestone not met	Strategy for achieving unmet milestone
13.2.4 Milestone	December annually	Planning and reporting documents (annual report, operational plan and annual budget statements) published and submitted on time.	13B3	Governance	Yes	Operational plan published and Annual Report on schedule.		
13.3 Output	Ongoing	Efficient Financial and Information Management.						
13.3.1 Milestone	Dec-05	Effective management systems (Centric) introduced to optimise the use of resources and eliminate duplication	13B2	Governance	Yes	Centric introduced and training session held.		
13.4 Output	Ongoing	Risk Management Strategy and Plan.						
13.4.1 Milestone	Dec-05	Board-approved risk management plans for the company developed and implemented.	13F1	Governance	Yes	Project-level risk management process established. Corporate risk a standing item on Board agenda.		
13.4.2 Milestone	Jul-06	Standard templates for agreements, licensing, contracts developed.	13F1	Governance	Yes	Audit committee and Board approved templates. IP policy approved by Board.		



## 6.2 Key research achievements.

Work by Professor Rick Shine's laboratory at the University of Sydney has provided new information on cane toad movements, which indicate that toads do not seem to move as a massive front across the north of Australia but instead are a highly selective species when it comes to breeding areas and only breed successfully in relatively limited types of waterholes. This will be relevant to the CRC's Goal 5, which is to develop new controls for cane toads.

This work by has parallels in New South Wales Fisheries researcher Dr Dean Gilligan's findings on the breeding habits of the common carp, which addresses Goal 4 to develop technologies and reduce the rate of pest fish spread. These significant advances in ecological knowledge allow us to look at local control of both the cane toad and carp in "hot spots" of breeding activity and reinforce the need for ecological investigations to understand invasive animals.

The CRC's partners are producing strong preliminary results for the efficacy and humaneness of Aminopropiophenone (PAPP) as an additional poison for control of wild dog, fox and possibly feral cat. This work, commenced in the previous Pest Animal Control CRC, targets development of PAPP as an additional toxin to those currently available and will increase the range of baiting opportunities to control these important species. It is gratifying that the Pest Animal Control CRC spin-off company, Pestat Ltd, is successfully managing this project for Australian Wool Innovation through the IA CRC and has become a fully-fledged member of the new CRC. This project, which addresses the CRC's Goal 1 – to reduce the impact of foxes and wild dogs – is generating data on effectiveness, dose-rates, chemical environmental fate and non-target species sensitivity, all of which are required for registration approval by the national Australian Pesticides and Veterinary Medicines Authority.

Significant application of product and services has already begun under the banner of the Invasive Animals CRC. The handing down of the CRC's commissioned independent review of the Tasmanian fox incursion has already guided control measures in that state.

The Bureau of Rural Sciences through the National Feral Animal Control Program has supported short term rabbit control measures for development of a CO2 fumigator and to improve the shelf stability of the RHDV in bait format which will be delivered in the short term. The CRC's Goal 7 is to develop improved rabbit control techniques.

Animal Control Technologies Australia with the University of Queensland had a significant early achievement in their project delivering additional rodent control measures for horticultural situations. Within a single teak plantation in far north Queensland some 3.5 million dollars worth of trees were saved with application of existing technology developed by ACTA.

A major milestone during the year has been delivery of the registration package for PIGOUT® a new bait for feral pig control. Requested in 2003 during the feral pig workshop by IA CRC members the Australian Veterinary Association and the Cattle Council of Australia, we are delighted that this product will be an early delivery for the



CRC during 2006 – 2007. Funded by Meat & Livestock Australia PIGOUT® delivers on Goal 2 – a humane and target-specific feral pig bait – and will make a significant difference to control of feral pigs in many situations, making a direct contribution to reducing the impact from that destructive species.

#### **6.2.1 Reasons for milestones not being reached.**

In real terms, the CRC did not start operation until 19 January 2006. Despite this, 2/3 of milestones have been reached.

#### **6.2.2 Nature of major consultancies and their contribution to the CRC.**

No major consultancies for the period.

#### **6.2.3 Nature of the grants and how they contribute to the CRC.**

Collaborative National Land and Water Resource Audit project. This collaboration with the NLWRA has allowed combination of the CRC's milestone 12.D.1 (Assessment of the overall impact of the Australasian Invasive Animal CRC throughout its life, and recommended directions and requirements into the future) with complementary NLWRA objectives to review existing spatial data on invasive animals. Work has also been done on establishing agreed benchmarks for established invasive animal impacts, density and distribution in Australasia. National Resource Conditions Indicators have been developed and endorsed by the Vertebrate pest Committee. Priority species have been identified and prioritised. These projects will continue in the next financial year with reporting on the distribution data.

Australian Wool Innovation made a new investment in two rabbit control projects. This work was commenced by Dr Brian Cooke and ties in with CRC milestone 7.1 "Understanding the mechanisms behind the lack of effectiveness of Rabbit Haemorrhagic Disease (RHD) in higher rainfall areas" and also 7.4 "Strategies for optimal use of Rabbit Haemorrhagic Disease (RHD) and conventional controls". The first project will review the effectiveness of RHD. Improved understanding of regional variations in the timing of outbreaks of RHD and its effectiveness will enable recommendations for enhancing or prolonging its usefulness. It will provide a framework for understanding the significance of data from related AWI funded projects (e.g. development of genetic resistance to RHD) and enable us to make decisions on directions for further rabbit control research – for example, do we need to seek new biological control agents urgently? Additionally, the work complements CRC-funded research on RHDV-like viruses, thought to be impeding RHD in some areas, and will provide insight into the likely importance of these viruses in different regions of Australia. This review will also enable recommendations for strategic release of RHD virus on baits and can be seen as providing essential background in the development of shelf-stable RHD virus baits currently being undertaken by the Invasive Animals CRC.

The 2nd project, "Enhancing RHD Effectiveness" is aimed at establishing whether or not rabbits are quickly developing resistance to RHD. This research will underpin future strategies for rabbit control. If there is little evidence of resistance developing, priorities for rabbit control may concern mopping up post-RHD populations, but if resistance appears to be developing quickly it may be important to recommend immediate rabbit control action and to embark on broader, long-term projects such as the evaluation of new biological control agents.

National Heritage Trust – for PestPlan project. This project is related to CRC milestone 11.2 “Stakeholder training: delivery of workshops, training courses and community awareness to increase practical skills and knowledge, and ensure consistent national management strategies of invasive species.” PestPlan provides a guide to setting priorities and developing a management plan for pest animals, and is aimed at land management stakeholders. A cd has been produced, and training sessions conducted at various regional centres.

#### **6.2.4 How the research overall has contributed to national research priorities.**

Invasive Animals CRC research contributes to the national research priority of “Safeguarding Australia Priority Goal No. 3: Protecting Australia from Invasive Diseases and Pests”. Specifically to “counteract the impact of invasive species through the application of new technologies and by integrating approaches across agencies and jurisdictions”.

#### **6.2.5 Any changes proposed to future directions.**

During the first year the CRC has established an operational plan for the first three years, with no significant changes from the original Commonwealth Agreement.

### **6.3 Research collaborations.**

The focus for Invasive Animals CRC collaborations during 2005-2006 was to establish the many new internal relationships within the CRC. Bringing the CRC’s large number of Participants together has created a plethora of new relationships, which are already returning dividends to the CRC in terms of offshore trialing of new products. To foster the new collaborations, the CRC has concentrated on strengthening internal links. A weekly email newsletter “Feral Flyer” announces new opportunities, profiles researchers and encourages interaction. A number of workshops were held during the year, which addressed major invasive animal problems, and encouraged collaborations to address CRC objectives.

Progress was made on new collaborations during the year:

**ARC Centre of Excellence in Reproduction and Biotechnology.** The ARC funds a number of Centres of Excellence, enabling an elite group of researchers to concentrate efforts in a particular area. The Invasive Animals CRC developed a formal relationship with the Centre of Excellence in Reproduction and Biotechnology based at the University of Newcastle. This arrangement gives the CRC an insight into a range of developments in reproductive biology that may be applied to developing fertility control techniques for feral animals. For the ARC Centre, the CRC provides a suite of different targets for their technologies. In other words, the CRC benefits by gaining access to greater depth of science and the ARC Centre benefits by access to greater breadth of application.

**United States Department of Agriculture.** Researchers at the USDA’s National Wildlife Research Center in Fort Collins Colorado have been undertaking fertility control work on wildlife for a number of years and have advanced their Gonadotrophin-releasing hormone vaccine GonaCon™ to the point of significant testing on pigs and white-tailed deer. The Invasive Animals CRC supported a research meeting in Colorado, also attended by CRC members from the UK Department of Environment, Food and Rural Affairs and Landcare Research NZ. It has been agreed that these groups from the UK, NZ, Australia

and the USA will continue to share data and expertise in the area of fertility control. It is expected that the relationship with the USDA will be formalized in a collaborative research agreement during 2006 – 2007.

On another front, PIGOUT® feral pig baits have been tested at the USDA's Texas research station throughout the year to assess their suitability in delivering a combined pseudo-rabies virus (PRV) vaccine and contraceptive for wild pigs in the USA. Elimination of PRV from feral pigs is a goal for improving livestock production. Suitable vaccine immunogens exist for the control of PRV, mostly based on live, avirulent variants of the disease.

**Immune Solutions Ltd (ISL).** Related to oral delivery of a PRV vaccine for pigs, a collaboration has formed between IA CRC scientists and ISL in New Zealand. ISL has been assessing the compatibility of a PRV vaccine formulation within PIGOUT®. ISL has developed a lipid-based delivery matrix specifically for oral wildlife vaccination; this matrix allows live immunogens that are ordinarily administered by needle to be administered orally yet still remain viable and effective. The CRC/ISL/USDA collaboration aims to deliver an efficacious immunogen and an effective delivery vehicle, in order to produce a field-practical oral wildlife vaccination technique.

**Senestech Inc.** The CRC signed confidential disclosure agreements with Senestech Inc, an American start-up company developing fertility control work from Northern Arizona University. A collaborative research agreement has also been entered into for testing of Senestech's products in CRC fertility control experiments.

**Veterinary Laboratory Agency.** The United Kingdom Veterinary Laboratory Agency imported inert PIGOUT® baits during early 2006 to assess their palatability and efficacy for delivery of the BCG tuberculosis vaccine to badgers. As another opportunistic omnivore, it is hoped that badgers may find the baits desirable.

#### **6.3.1 Number of collaborations entered into**

The new CRC is cementing relationships with its 41 participants before seeking additional members.

#### **6.3.2 Number of International collaborations**

The CRC has major collaborations with the following Participants:

- \* New Zealand Department of Conservation.
- \* New Zealand Landcare Research.
- \* University of York (UK).
- \* Central Science Laboratories (UK).
- \* University of Minnesota (US).
- \* United States Department of Agriculture, National Wildlife Research Centre.

### **6.4 Nature of collaborations and how they add value to the CRC.**

IA CRC creates a continuum of stakeholders from perception of a problem, conception of an idea through all stages of design, formulation, scale-up, registration, marketing, distribution and application. Agricultural industry priorities are addressed through partnership with peak bodies. AWI Ltd, GRDC and MLA represent thousands of

individual farmers – SMEs in their own right – and their substantial cash commitments target priority problems for industry stakeholders. University, CSIRO and state agency scientists provide project-oriented research capacity. The state agriculture and NRM agencies link the lab with field sites and broad-acre end-users. Australia’s largest commercial bait manufacturer (ACTA) is also a core member.

## **6.5 Progress on developing collaborative linkages within the CRC across all activities.**

The large number of partners in this CRC and the diversity of interests, reflect the axiom that invasive pest animals are “everybody’s business”. Servicing this group and the stakeholders they represent underscores the need for a focus on communication. This is addressed through:

- ✱ The communications and partner-liaison program which is a core business activity. It integrates communication and adoption principles into planning and implementation of each project. By focussing on collaborative projects – each having more than one partner, with at least one being a ‘delivery’ agent - communication and adoption of research outcomes should be maximised.
- ✱ The CRC, in addition to annual program research meetings, holds specialist workshops and will support national/international conferences on key topical issues. This will promote the profile of the CRC and the stature of its research, as well as delivering its research findings. The workshops also help the partners’ staff and stakeholders contribute to and keep abreast with, innovations in the field.
- ✱ The CRC continues with development, in collaboration with the University of Canberra, of the web-based information site on invasive animal pest management: [feral.org.au](http://feral.org.au).

## **6.6 Linkages with research users and external linkages (including cooperative arrangements with other CRCs).**

End-users in the CRC are contributing very significant amounts of cash, in-kind expertise and strategic direction. For example:

- ✱ The Murray Darling Basin Commission contributes the strategic direction for pest carp research, development and extension through their “Native Fish Strategy”, a 50-year vision for revitalisation of the Basin’s native fish stocks.
- ✱ Animal Control Technologies (Australia) is contributing significantly to prospective adoption of new products. The company’s R&D expertise in formulation, manufacture and marketing will be invaluable, as will its regulatory experience and skills.



- ✱ Australian Wool Innovation has committed an annual cash contribution of \$500,000 and importantly has also committed 10% of their Program Manager (Animal Health) to providing strategic direction and networking with the industry. We believe this will contribute an invaluable link to Australia's 12,000 wool growers and ensure the CRC's activities result in direct and measurable benefits to them.
- ✱ By working with end-users such as the Department of Conservation in WA, AWC will assist us in developing programs that are likely to be successful across differing land tenures.
- ✱ Of the IA CRCs' 41 partners, 26 have identified themselves as end-users in our intended delivery chain. These partners contribute to invasive animal management in a variety of ways including legislative and policy support, R&D and training as well as the hands on application of control technologies and strategies. This provides the strong partnerships required for the delivery of new products and strategies and is one of the great strengths of the CRC's collaborative arrangements.

The CRC contributes to the Australian Biosecurity Group and the Australian Animal Welfare Strategy.



# 7 Education and Training

## 7.1 Progress towards milestones in the Education and Training programme outlined in Schedule 1 of the Commonwealth Agreement, including any significant initiatives or innovative approaches, challenges and problems experienced, and plans for the next year.

**Schedule 1 Output 11.1 Post-graduate training:** 24 PhD candidatures completed in support of CRC outcomes and fully integrated with a Certificate of Achievement in Research Leadership and Management.

A Program Coordinator was recruited in May 2007. 11 PhD candidates and 1 Honors student enrolled (Cohort 1). Student Agreements were developed and have been signed by all students. Students have commenced their studies and some have attended specialist training courses to assist them with their PhD studies. The Program Coordinator has developed a Graduate Student Personal Development Tool to assist students to identify training and development needs in the context of their future careers. Areas of development identified by the student will be discussed with the supervisor and the Education program Coordinator and used draw up a long-term development plan to be supported by the Education Program.

The recruitment process for Cohort 2 has commenced. A total of 28 PhD projects and one honors project were submitted for review. Of these 18 PhDs and one Honors project were approved by the Education Program. Projects span 5 universities and cover research within each of the 4 CRC research programs. Projects have been advertised and applications for specific projects closed on August 31. Applications for APAs/IPRs must be submitted to the relevant Universities by Sept 30, 2007.

A workshop for all PhD students (Cohort 1 and 2) will be held at Cooradigbee Shearers Quarters, near Wee Jasper (NSW) in March 2007. The workshop objectives are to:

- \* Develop a sense of camaraderie and belonging among CRC PhD students.
- \* Provide an introduction to the objectives of the CRC and the context that it provides for the students and their projects.
- \* Discuss students Personal Development Plans.
- \* Provide one or two key training activities from common training needs.
- \* Introduce the students' to a successful example of pest animal management.

**Schedule 1 Output 11.2 Stakeholder Training and Output 11.3 Enhanced professional skill development for partner agencies:** Delivery of workshops, training courses and community awareness to increase practical skills knowledge and ensure consistent national management strategies of invasive species.

1. The Education Program has secured an external NHT Grant, which will assist in the Development of a Diploma course in Conservation and Land Management to train appropriate officers in the development of integrated pest management plans PestPlan at the regional level. Key features:
  - a. \$330,000 (NHT) + 150,000 from Education Program;
  - b. Targets: agriculture protection officers, senior RLPB rangers, CMA/NRM planners, senior NPWS, senior NSW forests, water catchment planners, Indigenous Land Councils, others concerned with planning pest management;
  - c. Assessment of successful/non-successful aspects of past pest planning exercises and implementation to obtain key aspects for course development. Initial target groups for these case studies have been identified and the interview process initiated. Target groups include: Wee Jasper wild dog group, Goonoo fox project, SA west coast integrated pest control project, DSE Vic and a Victorian CMA, NSW South Coast shore bird cooperative community project, Namoi CMA Clare Smith, Lachlan CMA. Discussions are well advanced with some of these groups.
2. Development of a Certificate Course in Conservation and Land Management for vertebrate pest field staff and employers (Fleming, Williamson; NSW DPI). Key features:
  - a. \$32,000 investment in a pilot study from Education Program;
  - b. Aim is to train workers in pest animal management in the core skills necessary for pest control;
  - c. Course already well developed (most units currently available) but not formalised into a certificate.
3. Development and implementation of an educational extension program aimed at engaging school, community and professional groups in the issues surrounding feral animals and their management. The Education Program has secured another external grant from NHT (\$110,000) primarily to employ an educationalist to develop school and community targeted resources associated with the [www.feral.org.au](http://www.feral.org.au) web site. In the coming 12 months we anticipate rapid progress in the development of course material for the three stakeholder groups. We will also be holding a workshop on Pest Monitoring Techniques and Data Collection to develop suitable protocols for farmers and land managers to assess efficacy of control techniques.

## **7.2 Extent to which CRC is on target in terms of recruiting and supervising PhD and masters students.**

Eleven PhD candidates and one Honors student are enrolled (Cohort 1). Two students have since withdrawn from their studies leaving 9 PhD students in the first Cohort. The budget was for eight students per year and therefore the CRC is well on track to achieve our overall target of 24 PhD students over three years of recruitment. We have a total of 18 PhD projects available for Cohort 2 and have advertised these projects widely. It is expected that at least 12 students will be accepted into Cohort 2 at the beginning of 2007, with further recruitment advertising to occur later this year.

### **7.3 Involvement of industry in research supervision.**

PhD students are supported by industry partners including CSIRO, the NSW Department of Primary Industries and Animal Control Technologies (Melbourne). Links with industry will be increased through liaison with the Education Program and student placements as part of the student development and training package.

### **7.4 Graduate destinations, if known.**

At this early stage of the CRC there are as yet no PhD graduates, however, the Honours student from Cohort 1 has made an application for one of the Cohort 2 PhD projects.

### **7.5 Nature of end-user involvement in developing undergraduate courses.**

The Education program is developing a Diploma level course in Conservation and Land Management and is consulting key stakeholders and end users as part of the course development process. A number of key strategic pest management projects from across Australia will be used as case studies within the course.

### **7.6 Nature of seminars/workshops/courses run for industry.**

Courses are still under development, but will be rolled out over the next 2-3 years.

### **7.7 Contribution to skill development in the industry.**

The Education program is in the process of developing courses in pest animal management from skill level 1 through to 6 under the Australian Qualifications Framework.

# 8

## Communication Strategy

### 8.1 Developing linkages with businesses, including SMEs.

The CRC has rapidly implemented activities to develop a sense of unity and shared purpose, bringing Participants together to address the 13 goals. We have encouraged:

- \* collaboration not competition (team approach);
- \* acknowledgement of the significance of research objectives and outcomes;
- \* the importance of knowing what is going on in the CRC outside of an individual project; and
- \* support for researchers to publish findings and actively promote their own work.

Early communications efforts reflect this. We have:

- \* developed a corporate style;
- \* established effective internal communications among the 41 Participants by developing an e-newsletter which is distributed to appropriate personnel within all Participant organisations (circulation 530 and growing);
- \* used a news clipping and distribution service (Media Monitors) to track news items reporting on successes of individual participant organisations (including SMEs), researchers, or the IA CRC as a whole;
- \* worked to understand how we can best access our partners' own communication channels to deliver appropriate stories/information to their stakeholders;
- \* briefed key senior SMEs, Government and University personnel on the CRC's goals and their agency's opportunities to collaborate;
- \* commenced a number of science-focused but 'headline' events to help increase the CRC's profile.

### 8.2 How involvement with SMEs aligns with strategic direction.

IA CRC's strategy is to improve the efficiency and speed of innovative interventions, by optimising delivery and by achieving empowerment to landowners to facilitate long-term programs. Small-to-medium sized enterprises are crucial – some, such as Pestat Ltd and Animal Control Technologies Australia, are generators of innovation, and others – the 51,000 grazing enterprises, 14,000 grain growers and 12,000 sheep farming enterprises – are recipients.

Mechanisms for innovation include:

- \* Bringing together a broad mix of members to achieve economies of capability and capacity and significantly cut the cost of innovation and implementation.
- \* Much on-ground management is undertaken by state NRM departments. IA CRC has as members lead agencies in each state and territory except NT. This is a key to reaching the achieving on-ground control.



- \* Having active, project-oriented, international collaborations, to import practical solutions.
- \* Promoting and encouraging direct partnerships with established invasive animal pest management industries for the rapid commercialisation, production and effective distribution of new products and technologies.
- \* Creating more viable markets – by bringing together the unique mix of stakeholders, the CRC expects to open up markets across Australasia and beyond for delivery of new products and services; and
- \* ‘IA CRC Offshore’: this initiative will develop markets for Australasia with its near neighbours in the Pacific, helping promote and enhance export of the CRCs products and services.



# 9

## Specified Personnel

**Table 3: Specified Personnel**

Specified Personnel	Their contributing Organisation	Their position in the CRC	The percentage of their time contributed to CRC Activities	Any changes during the year (Approval required for 2000 agreements only)
Dr Peter Allen		Chairman of the Board	0.35	
Dr Tony Peacock	IA CRC	Chief Executive Officer	1.0	
Dr Steven Lapidge	IA CRC	Program Leader, Uptake	1.0	
Dr Glen Saunders	NSW Department of Primary Industries	Program Leader, Terrestrial Products & Strategies	0.6	
Dr Anthony Arthur	CSIRO	Key Researcher	1.0	
Dr Christopher Hardy	CSIRO	Key Researcher	1.0	
Prof. Peter Koopman	IMB, University of Queensland	Key Researcher	0.1	
Gregory Mutze	Animal & Plant Control Commission	Key Researcher	0.4	
Dr Geoffrey Shellam	University of WA	Key Researcher	0.2	
Dr Wayne Fulton	Victorian Dept. of Primary Industries	Program Leader, Freshwater Program	0.3	
Dr Dean Gilligan	NSW Dept. of Primary Industries	Key Researcher	0.3	
Lindsay Chadderton	NZ Department of Conservation	Key Researcher	0.2	

Specified Personnel	Their contributing Organisation	Their position in the CRC	The percentage of their time contributed to CRC Activities	Any changes during the year (Approval required for 2000 agreements only)
Prof. Peter Sorensen	University of Minnesota	Key Researcher	0.25	
Paul Brown	VIC DPI	Key Researcher	0.5	
Dr Michael Hutchison	QLD DPI	Key Researcher	0.2	
Dr Ronald Thresher	CSIRO	Key Researcher	0.1	
Dr Elaine Murphy	NZ Department of Conservation	Program Leader, Detection & Prevention	0.2	
Prof. Richard Whittington	University of Sydney	Key Researcher	0.1	
Dr Piran C White	University of York	Key Researcher	0.06	
Mark Lintermans	Environment ACT	Key Researcher	0.1	
Dr Nicholas Fisher	ValueMetrics Australia	Key Researcher	0.1	
Dr Stephen Sarre	University of Canberra	Program Leader, Education	0.3	
Suzanne Balogh	NSW DPI	Training Provider	0.25	
Assoc. Prof. Anthony English	University of Sydney	Training Provider	0.5 (year 1 only)	

## Appendix: List of Publications

### Publications and Reports for Industry and Other End Users

Code	Author	Title	Journal	Date	Published	Type
T	Robinson, A.	Enhancing the effectiveness of rabbit haemorrhagic disease virus.	Rabbit Free Australia Newsletter	June 2006	In-press	Newsletter
T	Shine, R., G. P. Brown, B. L. Phillips, J. K. Webb, and M. Hagman.	The biology, impact and control of cane toads: an overview of the University of Sydney's research program.	Proceedings of the Cane Toad Workshop, CRC for Invasive Animals, Brisbane	June 2006	In-press	Conference proceedings
T	Robinson, A.	CSIRO biocontrol project: concept and progress.	Proceedings of the Cane Toad Workshop, CRC for Invasive Animals, Brisbane	June 2006	In-press	Conference proceedings
T	Koopman, P.	Daughterless cane toads: possible strategies for management of cane toad populations.	Proceedings of the Cane Toad Workshop, CRC for Invasive Animals, Brisbane	June 2006	In-press	Conference proceedings
T	Capon, R.	Cane toad chemical ecology: getting to know your enemy.	Proceedings of the Cane Toad Workshop, CRC for Invasive Animals, Brisbane	June 2006	In-press	Conference proceedings
T	Robinson, A.	Cane toad toxin – and Achilles heel?	Proceedings of the Cane Toad Workshop, CRC for Invasive Animals, Brisbane	June 2006	In-press	Conference proceedings
T	Cooke, B	Developing a grazing industry Research, Development & Extension strategy for rabbit abatement.	Internal report	December 2005	No	Confidential Report to Australian Wool Innovation and Meat and Live-stock Australia
T	Tracey, J.P.	Opportunity for lychee growers to direct research into pest birds.	Living Lychee <b>38: 12</b>	2005	Published	Industry Paper

Code	Author	Title	Journal	Date	Published	Type
T	Tracey, J.P. and Harrison, N.	Bird damage survey – progress report.	Living Lychee <b>39</b> : 28.	2005	Published	Industry Paper
T	Tracey, J.P. and Saunders, G.R.	Bird damage survey update.	Tree Fruit: 17.	2005	Published	Industry paper
T	Tracey, J.P.	Targeting surveillance for avian influenza in wild birds: a pilot investigation in New South Wales.	Final report to the Department of Agriculture, Fisheries and Forestry. Wildlife and Exotic Disease Preparedness Program and NSW Department of Primary Industries, Orange.	2005	Yes as a Dept. report	Industry report
T	Tracey, J.P.	An evaluation of aerial pig baiting using helicopter surveys, Toorale NSW.	Final Report to the Invasive Animal Cooperative Research Centre. NSW Department of Primary Industries, Orange.	2006	Yes as a Dept. report	Industry report
T	Tracey, J.P. and Harrison, N.	Bird Damage to Lychees and Current Management Techniques	A Report on a National Survey to the Australian Lychee Growers Association. NSW Department of Primary Industries, Orange.	2005	No	Industry report
T	Tracey, J.P., Sheean, R., and Saunders, G.	Bait Acceptability Trials for Starlings ( <i>Sturnus vulgaris</i> ), Orange NSW	Final Report to Pestat Ltd and the Bureau of Rural Sciences. NSW Department of Primary Industries, Orange.	In Review	Not yet	Industry report
T	Tracey, J.P.	How does native vegetation influence bird damage in vineyards?	In <i>Benefits of Native Vegetation in Vineyards. Wine for Life Training Manual</i> , Yarra Glen Racecourse. Greening Australia Victoria, Heidelberg, Melbourne: pp. 31-36.	2005	Yes	Workshop/ training course paper

Code	Author	Title	Journal	Date	Published	Type
T	Tracey, J.P.	Biology and management of bird pests.	In <i>Vertebrate Pest Management Course Handbook</i> . 27-31 March 2006. Williamson, R. (ed). NSW Agriculture, Orange NSW.	2006	Yes	Workshop/ training course paper
T	Saunders, G.	Red Fox: Biology and Control.	In <i>Vertebrate Pest Management Course Handbook</i> . 27-31 March 2006. Williamson, R. (ed). NSW Agriculture, Orange NSW.	2006	Yes	Workshop/ training course paper
T	McLeod, S.	Kangaroo Biology and Control.	In <i>Vertebrate Pest Management Course Handbook</i> . 27-31 March 2006. Williamson, R. (ed). NSW Agriculture, Orange NSW.	2006	Yes	Workshop/ training course paper
T	Fleming, P.J.S.	Biology and Management of Feral Goats.	In <i>Vertebrate Pest Management Course Handbook</i> . 27-31 March 2006. Williamson, R. (ed). NSW Agriculture, Orange NSW.	2006	Yes	Workshop/ training course paper
T	Dall, D	EC470 : Milestone Report 4.	No	January 2006	No	Confidential report to Australian Wool Innovations
T	Hardy CM, Hinds LA, Redwood AJ and Shellam GR.	Biological control of mice – immunocontraception.	Final Report, Project CSV00002, Grains Research and Development Corporation, 16 pp	June 2006	Submitted	Confidential report to Grains Research and Development Corporation
T	Hinds LA.	immunocontraception of small mammals: Case study for the wild house mouse in Australia.	Conference Proceedings - 22 <sup>nd</sup> Vertebrate Pest Conference, Berkeley, California.	March 2006	Not yet	Conference paper



Code	Author	Title	Journal	Date	Published	Type
T	Tracey, J.P.	Australasian Pest Bird Network.	<i>Proceedings of the Third NSW Pest Animal Control Conference: practical pest animal management.</i>	July 2005	Yes	Conference paper/abstract. <b>3:</b> 136
T	Tracey, J.P.	Reducing the impacts of birds in horticulture.	<i>Proceedings of the Third NSW Pest Animal Control Conference: practical pest animal management.</i>	July 2005	Yes	Conference paper/abstract. <b>3:</b> 59-63
T	Tracey, J.P., Saunders, G., and Zikesch, F.	Movements of wild birds between Australia and Asia and implications for avian influenza.	<i>Australasian Wildlife Management Society Conference Proceedings.</i>	November 2005	Yes	Conference paper/abstract.
T	Saunders, G.R., Lane, C., Harris, S., and Dickman, C.	Foxes in Tasmania: a report on an incursion by an invasive species.	Invasive Animals CRC Publication, Canberra. 93 pp.	June 2006	In-press	IA CRC Report
T	Saunders, G.R.	The new Invasive Animals CRC.	<i>Proceedings of the Third NSW Pest Animal Control Conference: Practical Pest Animal Management.</i>	July 2005	Yes	Conference paper/abstract.
T	Hardy, CM	Progress on Australian Mouse Immunocastration Studies.	<i>Proceedings of the Rodent Research Workshop. Christchurch NZ.</i>	March 2006	Yes	Conference paper/abstract
T	Cowled, B.	An Achilles' heel approach to identifying additional feral pig toxins.	No	June 2006	No	Confidential report to IA CRC
T	Cowled, B.	Feral pig population structuring in the rangelands of eastern Australia: applications for optimal control.	No	June 2006	No	Report to National Feral Animal Control Program
U	Masters, P.	Feral Fallow Deer on Kangaroo Island. A strategy for future Management.		March 2006	No	Unpublished report
U	Masters, P	Management of Fallow Deer on Kangaroo Island.	<i>Proceedings of the Deer Workshop, Canberra.</i>	March 2006	In press	<i>Proceedings of the Deer Workshop, Canberra</i>
U	Gordon Friend	DSE	'The Ark'		May 2006	Published

Code	Author	Title	Journal	Date	Published	Type
U	Gordon Friend	DSE	Southern Ark		Ongoing review	Published
D&P	West, P, Auricht, C.M., and Franco, M.A	Report on an Introductory Visit to State/Territory Jurisdictions.	Invasive Animals CRC Publication, Canberra	Feb 2006	To web	NLWRA report
D&P	West, P	Report on engagement of States / Territories in the National Invasive Animals Project.	Report to the National Land & Water Resources Audit	March 2006	No	NLWRA report
D&P	West, P., Auricht, C, M., Franco, M, and Alexandra, J.	National Weeds and Invasive Animals Information Workshop: A report on workshop outcomes	Report to the National Land & Water Resources Audit	June 2006	No	Workshop report
D&P	Auricht, C.M., West, P., and Franco, M.A. (	National Weeds and Invasive Animals Information Workshop. Participants reflections	Report to the National Land & Water Resources Audit	June 2006	No	NLWRA Report
D&P	West, P., Auricht, C.	Invasive Species Working Groups: Update on engagement: Report to NLWRA and Invasive Animals CRC	Report to the National Land & Water Resources Audit	July 2006	No	NLWRA Report
D&P	Gibson, J and West, P	Summary of State/Territory jurisdiction invasive animal distribution and abundance monitoring	Invasive Animals CRC Publication, Canberra	August 2006	In press	IA CRC
D&P	West, P	State/Territory Jurisdictional Workshops: Report on outcomes. Report to NLWRA and Invasive Animals CRC:	Report to the National Land & Water Resources Audit	July 2006	No	NLWRA Report
D&P	West, P, Murphy, E., and Saunders, G	National Assessment of Invasive Animals – program in development	Australasian Wildlife Management Society Conference Proceedings, 21-24 November, Hobart.	November 2005	Yes	Conference paper.

## Formal Research Publication

Code	Author	Title	Journal/Book/Conf	Date	Accepted	Published	Type
T	Peter J.S. Fleming, Lee R. Allen, Steven J. Lapidge, Alan Robley, Glen R. Saunders and Peter C. Thomson	A strategic approach to mitigating the impacts of wild canids: proposed activities of the Invasive Animals Cooperative Research Centre	Australian Journal of Experimental Agriculture	2006	Yes	Yes <b>46</b> , 753-762	Journal
T	Hardy CM	<i>Current status of virally vectored immunocontraception for biological control of mice</i>	Reproduction Supplement (63)	2006	Yes	In press	Journal
T	Hardy CM, Hinds LA, Kerr PJ, Lloyd ML, Redwood AJ, Shellam GR and Strive T	Biological control of pest animals using virally vectored immunocontraception	Journal Reproductive Immunology	2006	Yes	In press	Journal
T	Smith LM, Shellam GR and Redwood AJ	Genes of murine cytomegalovirus exist as a number of distinct genotypes	Virology	2006	Yes	In press	Journal
T	Shellam GR, Redwood AJ, Smith LM and Gorman S	Cytomegalovirus	The Mouse in Biomedical Research, Second Edition. JG Fox, C Newcomer, A Smith, S Barthold, F Quimby and M Davisson (eds)	2006	Yes	In press	Book
T	Gorman S, Harvey NL, Moro D, Lloyd ML, Voigt V, Smith, LM, Lawson MA, Shellam GR	Mixed infection with multiple strains of murine cytomegalovirus occurs following simultaneous or sequential infection of immunocompetent mice	J Gen Virol 87, 1123-1132	2006	Yes	Yes	Journal

Code	Author	Title	Journal/Book/ Conf	Date	Accepted	Published	Type
T	Philbey, A , Kirkland, P. and Saunders, G.R.	Assessment of antibody to rabbit haemor- rhagic disease virus in fox serum as an indicator of infection in sympatric rabbit populations	<i>Australian Vet. Journal</i> 83: 97-100	2005	Yes	Yes	Journal
T	Smith, M., Lapidge, S., Cowled, B. and Staples, L.	The design and development of PIGOUT® – a target-specific feral pig bait.	Australasian Vertebrate Pest Conference 13:129-134	2005	Yes	Yes	Journal
T	Spencer P.B.S., Lapidge, S.J., Hampton J.O. and Pluske, J.R.	The sociogenetic structure of a controlled feral pig population.	Wildlife Research 32: 297-304	2005	Yes	Yes	Journal
T	Lapidge, S.	Taking the fight to feral pigs.	<i>Australian Veterinary Journal</i> 83: 262-263	2005	Yes	Yes	Journal
T	Spencer, P.B.S., Hampton, J., Lapidge S.J., Mitchell J., Lee J. and Pluske J. R.	An assessment of the genetic diversity and structure within and among popu- lations of wild pigs ( <i>Sus scrofa</i> ) from Australia and Papua New Guinea.	Journal of Genetics 85: 63-66	2006	Yes	Yes	Journal
T	Cowled B.D., Lapidge S.J., and Hampton J.O. Spencer P.B.S.	Measuring the demographic and genetic effects of pest control in a highly persecuted feral pig population	Journal of Wildlife Management	2006	Yes	No	Journal
T	Lapidge, S., Dall, D., Hunt, R., Cowled, B., Smith, M. and Staples, L.	A review of the impact of sheep predators in Australia and new control methods under development.	Vertebrate Pest Conference 22	2006	Yes	No	Conference papers

Code	Author	Title	Journal/Book/Conf	Date	Accepted	Published	Type
T	Campbell, T.A., Lapidge, S.J. and Long D.B.	Baits to deliver pharmaceuticals to feral swine in southern Texas.	Wildlife Society Bulletin	2006	Yes	No	Journal
T	Cowled, B.D., Gifford, E., Smith, M., Staples, L and Lapidge, S.J.	Efficacy of manufactured PIGOUT® baits for localised control of feral pigs in the semi-arid rangelands in western Queensland.	Wildlife Research	2006	Yes	No	Journal
U	Berry, O. and Sarre, S.D.	Gel-free species identification using melt-curve analysis	Molecular Ecology Notes	In press	Yes	No	
U	Murray, A.J., Poore, R.N. and Dexter, N.	<i>Project Deliverance – the response of 'critical weight range' mammals to effective fox control in mesic forest habitats in far East Gippsland, Victoria.</i>	DSE report	June 2006	N/A – peer reviewed	Published	
U	Peter J.S. Fleming, Lee R. Allen, Steven J. Lapidge, Alan Robley, Glen R. Saunders and Peter C. Thomson	A strategic approach to mitigating the impacts of wild canids: proposed activities of the Invasive Animals Cooperative Research Centre	Australian Journal of Experimental Agriculture	2006	Yes	Yes Vol 46, 753-762	



Code	Author	Title	Journal/Book/ Conf	Date	Accepted	Published	Type
U	Cowled B., Humphrys S., Lapidge S., Rudolph, J., Smith, M., Staples L	PIGOUT Registration	APVMA Registration	July 06	Completed	APVMA data package	
U	Cowled B., Humphrys S., Lapidge S., Rudolph, J., Smith, M., Staples L	PIGOUT SOP	APVMA Registration	July 06	Completed	Industry best current practice	







