Animal Control Technologies and Applied Biotechnologies Group

Submission to:
House of Representatives Enquiry
into

Pest Animals In Australia

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1 General comments on pest animals in Australia

1.1 Introduction

We thank the panel for extending the time available for people and groups to make submissions to this enquiry.

We come from a slightly different perspective to most other groups who have made submissions. We develop and supply technology and products for pest animal management and also work closely with most other participants to this enquiry. Our links are with individual landholders, landholder groups, regulatory agencies, policy groups, state and federal agencies and with the chemical manufacturing and distribution groups. We take a whole-of-project approach and focus on solving problems by developing and applying appropriate technology.

We have attempted to provide some thought-provoking commentary and have provided some examples of our work and technology to the review panel since this information does not appear to have been provided by others. We have prepared some introductory comments to tease out some aspects of the pest problem of managing pest animals and to highlight areas that we feel might be improved. We have sought to avoid restating the obvious with regard to the damage caused by pest animals to Australian agriculture and the environment.

We have addressed our comments to the main terms of reference in **section 2**. As we are committed to on-going operational matters, we have limited time to devote to this enquiry. Nevertheless, in view of the potential importance of a parliamentary level enquiry to lead to true change and of the importance of the pest animal topic generally, we have devoted some effort to bringing a number of facts and opinions to the attention of the panel. We have assembled general commentary on various matters that we feel are pertinent to the enquiry in **section 1**. These may not be assembled in a logical sequence and we ask the indulgence of the panel for the lack of formal structure and some overlap or repetition. This was simply a result of time constraint.

Also by attachment to the main text, we incorporate some previous discussion of the problems of rabbit management for the long term (**Section 3**). These issues were raised in a paper presented at the 50th Anniversary celebration of the release of the myxoma virus in Australia and, accordingly, are prefaced by a recognition of the important contribution of this biological control to management of the pest rabbit. There are issues of principal outlined in that paper that are relevant to all vertebrate pest issues in Australia.

We also note, as have others that, while the enquiry appears to be focusing particularly on the politically eruptive issue of the management of wild dogs and

dingos, there are many other pest problems that should not be ignored. We have attempted to draw some attention to other pests.

We also believe that, for the enquiry to have maximum value, some comments should be made in a forthright manner, even if controversial. Debate will not be encouraged unless submissions go further than the restatement of entrenched positions or if submissions are in the flaccid language of consensus. Some lateral thinking and honest recognition of the errors of the past must be identified for the purpose of preventing continuation or repetition.

In making this submission we are conscious that our perspective may present a challenge to the established dogmas that have pervaded this field for many years. We make no apology for this, as the pest animal problem is becoming worse and some hard realities need to be acknowledged and suggestions for improvement need to be made.

Since we have been intensively involved with the process of service and technology development and delivery for about 15 years, we can say that the playing field is not consistent. Some groups are doing much better than others and any generalisation will be challenged by the particulars and the exceptions. We have taken a "broad brush" approach in seeking to raise some issues.

It is a plain reality that the pest animals of Australia are neither constrained by geographical boundaries of land tenure nor by bureaucracy. They focus only on eating and breeding while the rest of us throw harmless policy statements in their general direction. A betting man would rather place his money of the terrorist fox, feral pig or innocuous female mouse with a litter of 10, than on a threat abatement plan backed with policy documentation, regulations, enforcement and surveys. It is a war zone in Australia and there needs to be a more systematic approach to supporting effector actions.

As a company in the field of pest animal management we have enjoyed considerable support and encouragement from a great many groups and individuals. This has helped us to make our own contribution. We would particularly like to mention the many informal reviewers in state agencies who have vetted most of our information releases and training aids, the APVMA who have provide the necessary permits to enable large-scale testing or emergency controls, the researchers who have done contract testing for us or who have encouraged us to take up their processes for delivery to landowners, the educational groups who have invited us to present to their trainees and the agency staff who have supported our projects and provided both distribution and product stewardship. We hope that our critical generalisations are not misinterpreted by these achievers who have all made a real difference in the pest animal area.

1.2 Who are we and what are our credentials to comment?

Since others submissions have not discussed the role of the private sector in pest animal management, we take this time to provide a description of this company group and to outline some of the roles that we have played in the area of pest animal

management. I hope we will be forgiven this indulgence but also that the panel will appreciate that there are many different groups with an interest in the pest animal problems and their solutions.

We are a private sector research group with R&D capability and a proven track record in bringing new technology and information to both public and private land owners and occupiers of Australia. We have made a significant impact over a period of approximately 15 years of sustained effort in the field.

We were commenced as an R&D consulting company (Applied Biotechnologies Pty Ltd, **ABT**) in 1986 and formed a sister company (Animal Control Technologies Australia Pty Ltd, **ACTA**) in 1995 to focus on product production and distribution in the vertebrate pest area. The group is now the largest specialist provider of technology and products for this aspect of environmental and agricultural management in Australia. We operate from a purpose-built facility on the northern side of Melbourne.

The ABT/ACTA group has contributed to the maintenance of species diversity and sustainable agricultural production by developing simple, novel and effective methods to manage many of Australia's most significant introduced pest animals including foxes, rabbits, wild dogs, plague mice and plague rats.

ACTA has also carefully delivered and supported this technology to achieve "best practice" approaches, at all levels and by all agencies and individual users. This approach has been effective and sustained over one and a half decades of work.

Our contributions to the pest management field:

The company's major projects, **FOXOFF®, RABBAIT®, MOUSEOFF®** and **RATTOFF®,** are household names throughout rural Australia, forming the backbone of many landcare activities. Lesser known work includes the development of **DEN-CO-FUME®** carbon monoxide fumigation for urban foxes, **NatureNest®** nest boxes and **DOGGONE®** wild dog bait. The company was also responsible for writing the full submission that allowed formal consideration and official approval for the release of the **rabbit calicivirus (RCV)** and prepared the proponent case for RCV on behalf of all regional councils in NZ.

More recently, the ABT/ACTA group has developed a new type of ant bait that has already been used successfully to save the unique red crab populations of Christmas Island from attack and extinction by the introduced yellow crazy ant. The bait is currently being used to control yellow crazy ant infestations in the NT and Queensland.

The group is currently actively participating in the development of a new bait for control of feral pigs (project part supported by Meat & Livestock Commission and Feral Animal Program) and on the practical applications of a putative new target specific and humane toxin for wild dog and fox control (project with Pestat, the present Pest Animal CRC with support from Australian Wool Innovation). The

company is the principal commercial partner in the new Australasian Invasive Animal (AIA) CRC proposal.

Example materials that define and describe these projects more fully are provided in supporting information provided to the panel.

These technologies have been adopted widely to alleviate the environmental and agricultural impacts of pest animals over vast areas.

Direct benefits from the ABT/ACTA group to sustainable production in rural Australia are estimated to have exceeded $1 billion to Australian agricultural enterprises over the last 15 years.

We have been almost entirely self-funded from reinvestment of revenues derived from the adoption of our products and technologies and services. We have received very little from the many millions that have been invested into pest animal research and management in Australia, yet we have been directly responsible for many of the leading innovations in the field. This statement alone must cause some to consider what could have been done with some redirection of available resources.

In 1995, ABT was Victorian winner of the BHP Landcare prize for *Research and Technical Innovation*. In 1998 ACTA was a finalist in the *Telstra Small Business Awards* (and Ernst & Young *Entrepreneur of the Year* finalist) and in 1999 the company received a special award from Fuji Xerox for industry contribution to Landcare. These awards recognise the simultaneous achievement of ethical business development while maintaining commitment to research and technical service.

Though small, the company has contributed several of the most important innovations in environmental pest management in Australia. More importantly, commitment to technical education has brought new understanding to all those who plan and implement pest management programs. Copies of 25 technical information newsletters and example video and DVD educational programs on foxes and plague mice are included with attachments to this submission.

As stated above, the vast majority of the achievements of the group have been self funded. Approximately 40% of total revenue is devoted to two major areas of a) research and b) information transfer and education. We also provide ongoing technical resource service to Landcare in the area of management of pest problems.

The group is committed to on-going R&D in a constant search for new and better ways to use existing technology or to validate entirely new technology. This effort has not only resulted in quality products, but has contributed to adoption of a "best practice" approach to environmental pest problems.

The company has worked to improve product technology and supported this with information exchange and teaching:
a) To promote better understanding of the basis of major pest animal problems,
b) To highlight the significance of these pests for the Australian ecosystems,

c) To improve skills of those at the "workface" of pest management throughout Australia.

Technical training and education:

A major commitment has been made to supporting technical education, training and information transfer at all levels. This has included:

- Participation in Environment Australia strategy workshops on foxes and feral cats
- Unpaid running of training seminars for field staff in numerous Government agencies
- Production of information sheets and booklets for farmers and landcare staff
  - 60,000 x 16-page full colour FOXOFF® booklets
  - 50,000 x 20-page full colour RABBAIT® booklets
  - 20,000 x 20-page full colour mouse control booklets and now expanded to 75,000 x 32-page booklets on best practice mouse management (with support of Grains Research & Development Corporation)
  - advisory booklets on wild dog management (currently under revision)
  - 16-page full-colour booklet on best practice IPM of rats in cane crops
- Production of 25 editions of a technical newsletter for staff involved in pest management (now mailed free to over 10,000 landcare groups, government and semi government advisers and rural merchant agronomists around Australia)
- Attendance at field days and Landcare meetings (several hundred in 15 years)
- Production and distribution of professional training films on the fox problem and the FOXOFF project and on management of mice in crops (both available on VHS and DVD formats)
- Technical advisory service to answer queries from landowners, government and landcare staff
- Regular liaison with other stakeholders including welfare and regulatory agencies
- Managing demonstration projects and providing information exchange between agencies for other successful projects around Australia (eg via newsletter or in-house contract programmes)
- Presentation of scientific papers at vertebrate pest conferences
- Support of press and publicity initiatives at the local level for landcare groups
- Interviews on ABC regional radio (country hour and landline) and regional stations
- Preparation and free loan of display kits for local field days and landcare meetings (Voted "best exhibit" for DNR at 1994 Royal Melbourne Show.)
- Free mail response to press coupon requests (over 2000 responses to landholders made to date)
- Support for students at primary and secondary level with project material and fact sheets
- Printing and distribution of gate signs, bumper stickers and posters to increase community awareness of pest animal problems, support of Rotary and other projects on pest management and major sponsorship of the Vertebrate Pest Conferences, ranger conferences and the like

Research support:

The company provides research support by the provision on specialist products to enable other groups to conduct trials and further studies into pest control. Examples include use of FOXOFF® to deliver chemical or immunological contraceptive agents and oral vaccines for vaccination against rabies, research studies to deliver bio-markers such as tetracycline and rhodamine to foxes and feral pigs, and gastrointestinal markers such as coloured plastic beads as an aid to identify scats

from foxes. Similarly, the company provides research versions of rabbit and mouse control products to improve knowledge of effectiveness and best practice application.

Promotion of the Landcare Ethic throughout the Community:

Our technology and information has been adopted by advisers, landowners and Landcare throughout Australia. Because some of our products are highly regulated, we often play a "back room" role in Landcare initiatives, with technology supplied indirectly to the landcare movement via almost all Government and semi government agencies involved in pest animal management.

To the best of our knowledge, our technology and methods have been adopted by more than 10,000 landowners. Even more significant most users surveyed have indicated that they will continue to adopt the technologies in coming years to achieve sustained benefits.

Despite the small size of the company, we have sponsored the Vertebrate Pest Conferences held in Hobart in 1995, Bunbury in 1998 and Melbourne in 2001. We also created the "ANIMAL CONTROL TECHNOLOGIES AWARD". This award is given to an individual who has implemented a best practice community based control of pest animals ate the field level. The winner is selected from finalists nominated from each State and we provide airfares and accommodation to attend the Vertebrate Pest Conference and to present a paper on his/her practical work on pest animal control. An objective of the award is to help bridge the gap between basic research and the applied aspects of managing feral animal pests.

Structural "behind the scenes" inputs are focused on "train the trainer" activities. The technical “Information Update”, mailed free around Australia, is an important practical aid. The newsletter is highly regarded and is one way in which quality information is delivered to the field. Changes in practice are not achieved overnight, but over the 12 years since the newsletter was first released, it has been credited with encouraging a major change in the approach to pest animals.

Our projects have provided model examples of cooperation between several government agencies and the innovative capability of the private sector. This has led to integrated projects that have been both technically and commercially successful with every participant achieving a benefit.

By far the greatest beneficiaries of this applied and integrated approach have been the livestock industries, wildlife and Australian environment.

ACTA has pioneered a professional approach to pest animals on a large scale and over a long period. ACTA was the first to re-evaluate the true impact of foxes on stock and wildlife and pioneered group approaches at all levels. At the time of the launch of the FOXOFF project, some agencies were of the view that the fox problem was overrated and that foxes simply provided a useful scavenger role cleaning up lambs that had died from other causes. There was even scientific literature quoted to support this!

The cooperative approach that we have catalysed and supported was required since pest animal problems are owned, and must be addressed by, a wide range of stakeholders. The ACTA approach was to develop simple and effective technology and then educate all users on the best methods of applying it safely and successfully. **This combination of technology and education empowered landholders to tackle pest animal problems carefully but also on a vast scale**.

In summary, the ABT/ACTA group of companies was established to effectively transfer research on pest animals to practical applications throughout rural Australia. The group has an unbroken record of significant achievement and ethical application of new technology to solve some of Australia's most significant introduced pest animal problems.

The company is the leader in this field and is well placed to comment on the current problems with management of vertebrate pests in Australia.

Summaries of the group projects are provided as **Attachments.**

1.3 Is Australia's emphasis on pest animal research correct?

With all the benefits of hindsight, it can be observed that some public money has been wasted by governments of both persuasions and at all tiers of government on research and policy on pest animals. Sadly, some of this has done more to prevent rather than encourage the development or implementation of effective solutions.

However, this statement is easily made with the benefit of hindsight! It is not so easy for those who administer the funding allocations to identify definite winners at the front end of projects. Some research is uncertain or risky. Nevertheless, we would prefer that better risk assessment was done on some speculative projects before they were commenced. It is not a perfect world and there will always be some research failures but, with limited resources and a massive problem, the nation must be careful to prioritise.

Research management would be easier for all of us if we always knew the outcome before staring the project! Nevertheless, some errors have been repeated and, in industry, we feel that a lot of attention is paid to the reinvention of existing wheels to overcome problems that are unlikely to be fixed any better by the new technology than the technology that it replaces. In the financial world this would be termed "churning" and the nation should be watchful that this does not divert attention away from real progress in the field. All agencies and governments should avoid wasteful expenditure on the "reinvention of wheels" wherever possible. This approach is being increasingly taken by rural industry funding agencies and is to be commended.

Allocations of government funds should not be led by the research innovators alone. A more strategic view of the context is required. A recent exception to this has been the industry driven development of a new bait to control feral pigs and a new focus o the development of new toxins for certain animals. There should be more of this targeted approach to research priorities.

To this extent, as a strategic suggestion, we would envisage that an improvement could be made to research allocation if there was greater industry involvement in determining the quantum and direction of funding allocations. By industry we include groups such as our own but also more importantly the peak farming bodies and land management and environmental groups. The models for guided and priority driven research recently adopted by industry groups such as Australian Wool Innovation (AWI) and Grains Research and Development Corporation (GRDC) could be instructive here.

There also needs to be a better outsourcing of appropriate expertise and more critical evaluation of the outcomes of projects.

The development of the AIA CRC proposal has much merit in achieving a more collegiate approach to research priorities and is to be commended for its consultative approach during development. This proposed CRC is strongly supported by relevant industries and a wide range of research providers in the state, university and private sectors.

The value of research on pest animals and their effective management would be assisted and complimented by a more vigorous and critical appraisal of papers presented at vertebrate pest conferences and to scientific journals. Though there is some excellent research being done in applied ecology and vertebrate pest management, there are equally times where the science is soft. A more rigorous reviewing process and more constructive commentary on presented papers would be of assistance in further raising scientific standards in this field. This would have the longer term benefit of making those who are in receipt of funding more accountable to the funding bodies and to industry generally, for the work done with such funding.

The development and promulgation of folklore evidence should be discouraged. The field is currently encumbered with the baggage of impressions from past generations. Some of these are very correct while others are totally incorrect or taken out of context in wide generalisations. Too often we still hear that it is one particularly nasty "old rogue fox" that is difficult to shoot and that roams around the country killing hundreds of lambs a night. He has a white tip on his tail, a white brisket and white tips on his ears so it must be the same fox! However, research and simple logic dictates that the majority of damage is done by the vast majority of foxes that are just 1 or 2 years old. Old folklore takes a long time to erase and new folklore even longer! Some have raised risks to non targets on flimsy evidence to non critical audiences and caused considerable anxiety that takes many hundreds of thousands of dollars of research to disprove. One of the great vulnerabilities in the pest management industry is that the public very often require absolute proof of the negative and this is a technically difficult task for any group. Just ask those involved with the debate on genetically modified crops!

In this regard we in industry find it particularly frustrating when someone with a new research project seeks to admonish the current technique of procedure in order to justify the new approach. This happens in all fields of science and endeavour, but in the pest field, it does have a destabilising effect on those who are already nervous about adopting a specific technology for pest management. The reality is that some

of the mud sticks, whether it is true or not, and a great deal of harm is done by those who make loose comments against one technology in order to justify another.

If the criticism was returned we would quickly find fault with all technologies, whether old or new, and end up with absolutely no confidence in pest management at all. Policy regulators, regulatory bodies, researchers and industry must rise above this type of mis-information. All in the field should desist from the temptation to repeat an existing dogma as a substitute for real facts.

Of even greater importance than the mis-direction of research effort is the overall balance between research and regulation versus development and application of technology.

To our judgment there balance needs to be changed in favour of improved application of existing technology, at least in the short term.

This is not to say that new technology should not also be developed, just that there are immediate needs that are not being adequately addressed. The urgency of the wild dog problem is one such example.

There are methods and opportunities that enable immediate action to be taken. Such immediate action will be substantially effective. Very often no decision to take action is made until another research project or survey is completed. There is considerable frustration at this "do nothing" conservatism in rural Australia. Landowners are rightly flexing their political muscles to support greater delivery of action.

Greater forward vision and commitment at the state and federal level, combined with the support to those "on-the-ground" who can take the appropriate actions. The extent to which vision and commitment is made varies between states so any generalisation will be challenged here. We certainly do not wish to offend a good many people who are currently doing battle with pests at many levels and with a variety of approaches ranging from ministerial submissions to bullets. We work every day with individuals who have vision or are committed. However, we also attend many farewell and retirement parties for those who had vision and commitment but who are too old, too tired or who lack sufficient support to continue. We will raise the issue of succession planning and training in a subsequent section.

A central theme in this submission is that greater support is need for those on the ground.

By those "on-the-ground" we mean the individual landowners, individual land managers (in the case of crown controlled lands) and the local coordinating groups whether they by local shires, local departmental staff or members of pest animal boards. These latter groups are well positioned to take an even greater role and are the front line of the human resource against pest animals. They should receive much greater direct support than is currently the case. We expand on this point in subsequent discussion.

1.4 Are landowners and land managers given enough support?

Landholders have been provided with increasing barriers to adoption and with fewer on-the-ground resources while funding is absorbed into policy and regulation. There are many landcare and state agency initiatives throughout Australia that have the opportunity to make a difference over vast areas but which are starved of seed funding or structural support to take effective, prolonged and integrated approaches to their pressing problems.

There is a progressive swing towards a culture of finding reasons why things cannot be done in place of an approach which works on what can be done. Regulations will not control pests but they will result in reduced action on pests. Even worse, the increased regulation of approved processes will lead to an incentive for landowners to take their own illegal or improper actions that, though not right are easier to achieve. The resurgence of strychnine and organophosphate baits are surely more dangerous than under regulation of approved control processes.

The attitude towards regulation, restriction and prosecution must change at all levels. We must move towards education, encouragement and empowerment. In our view the carrot is far more productive than the stick in achieving the desired outcome of "adoption of best practice pest management". Others do argue that there needs to be a stick behind the carrot but our impression is that very often the stick is being used or threatened before the carrot and this is not the way to encourage landholder participation! Even less credible is when the stick is being wielded by a government agency that does not do an adequate job of pest management on its own land. Everyone can see the double standard and this builds barriers rather than encourages cooperation.

We, and many landowners in some states are left dismayed by any agency that on the one hand threatens prosecution for the inadequate control of a pest or weed, then at that same time takes a lot of measures that have the effect of restricting or delaying any effective action being taken or which fails to take similar actions on its own land.

If a cultural change is not achieved here, this defeatist status quo will bear witness to a generation of land managers presiding over the final stages of what will surely be recorded in history as one of the world's worst wildlife and agricultural disasters.

Others have described the progression that we now witness as a decline into a "feral future" (Refer for example to "*Feral Future*" by Tim Low, published by Viking Press).

1.5 Are we doing well or losing the battle?

The pest problem is not small in terms of numbers or geographic distribution. The foregoing statement applies to almost every pest species. Australia is reported to have witnessed the loss of more species in the last 200 years than has the rest of the planet combined. Whilst Australia had a lot more species than many other nations to lose, the record is not flattering to our combined efforts over some two centuries.

Even the loss of one species to an introduced predator must been seen as a failure. The introduction of pest predators to the defenceless fauna of the Australian continent may be recorded in history as a wildlife disaster to rival the loss of the dinosaurs.

It is an appropriate time to objectively assess the progress and achievement of numerous environmental agencies and individual landowners on this track record of continuing loss of species diversity.

We do not wish to admonish the many significant efforts and programmes. There are certainly some outstanding local and regional conservation efforts and we congratulate and support them. We are just posing the question is stark terms. Are we winning or losing the battle overall at present?

Surely, despite some commendable local efforts, and even some large-scale programmes, the final arbiter of our joint success is the ever increasing loss of wildlife and stock from an entire continent. Few could be proud to announce to their grandchildren that, during their tenure as land managers of Australia (which includes all of us) that we witnessed the last of the ground nesting birds or mammals disappear in just a few generations of careless mismanagement and inaction.

In my own time of presenting training workshops on fox control in all states I have heard aging farmers tell of how, “in the old days” they had to “kick the bandicoots out of the way to sink the fence post holes”. Yet now ask anyone what the most common wildlife seen dead on the roads is… not the bandicoot or wallaby or even the rabbit… but the European red fox! The switch from kangaroos and bandicoots, to rabbits to foxes has occurred in just a few short generations. Watch the Tasmanian space for another example of this!

If the record of a century or more of wildlife disaster was not reason enough to encourage a more serious approach to pest animals, we should also reflect on the consequences of a future incursion of rabies into the wild animal population or the introduction of Japanese encephalitis virus or foot and mouth disease into pigs or other cloven hoofed pest animals.

Rabies recently arrived on Flores Island to the west of Timor. There are few more island steps before Australia? Thankfully, exotic disease incursions for major viruses like foot and mouth disease or rabies have not happened yet despite risks over many decades. Can we still ignore them and turn our back? We think not, but we might get away with it for another electoral cycle or until early retirement when it will become someone else’s problem! Who has custody of the long term risk planning?

Our agricultural industries already suffer hundreds of millions of dollars loss annually (much of which is preventable with CURRENT TECHNOLOGY) and our environment and native plants and tress are still decimated by rabbits at a faster rate than initiatives to plant more trees. Though well intentioned, the “Greening Australia Campaign” is considered by some to have fed more rabbits than created new forests. Someone forgot the carrot bait and tree guards!

Any objective and honest appraisal would have to seriously question whether we have had good management of pest animals for several decades.

That is not to say that the situation is irredeemable, as we will discuss below. Our purpose in being realistic at the outset is to stress the size and seriousness of the pervasive pest animal problems of and pest animal threats to Australia. We need to be honest and objective and to admit our recent history of failure in taking effective steps to stem the tide of pest animal invasion.

It is not all doom and gloom however. The landcare movement and local coordination efforts are increasingly harnessing "people power' to start the massive task of managing the most serious pest animals. There is also exciting new progress with the proposal for a new CRC on invasive species (many of which are pest animals). Embodied in the proposal are more constructive links with landowners, with better focused short and long term research, with more effective links to technology delivery agencies, such as ourselves, and with more effective rural industry support. This enlightened approach will bring better vertical integration between fundamental and risky research with product and service delivery to users. These linkages have been lacking in the past.

1.6 Should we put all of our eggs into "high risk" research?

The emphasis appears to have shifted away from "high risk" (read probably impossible) programmes towards more practical initiatives. We submit that this change in emphasis is important and appropriate if the nation is to make short-term progress on the pest problems.

A great deal of the nation's research resource has been focused on a programme to explore the possibility that pest can be managed by manipulating their fertility. The effort has extended over more than a decade, which itself demonstrates the difficulty of bringing entirely new technology to bear on the pest problem. The primary focus was to develop a virus that would carry a reproductive protein (or code for it) that would engender an autoimmune response in the infected animal directed against its own reproductive system. The concept was that by reducing fertility of existing animals, the rate of population increase could be slowed or the population even forced to decline over time. It did not provide a solution to the damage being done by existing adults but did offer he potential of "population control by stealth".

The concept of a self-disseminating virally vectored immunofertility control was conceptually exciting and was morally attractive to those who saw this as an alternative to lethal management options, but it has not been achieved at a practical level. Even if the insurmountable technical hurdles could have been decisively overcome, the release of a self-disseminating sterility virus would pose nightmarish local and international regulatory questions upon dissemination (read uncontrollable spread). The development of a genetically engineered virus to carry anti-fertility vaccination agent was always an extraordinarily high risk approach.

Such a virus is not only difficult to construct but there are a vast array of practical questions that needed to be answered before such an approach would ever have

been deemed effective. Questions such as what antigen should the virus be coded to express, when should the virus express it, how reliably will the target immune system respond with the right type of immune response, will the response be at the right time of the season, will he response last for a long time or require annual boosters, is the carrier virus reliably infective to the target animals, what is the risk of resistance or pre-existing immunity, what is the reliability of the technique across seasons, what is the risk of attenuation or further mutation, what are the transmission rates, how specific is the carrier virus and the immunising protein to the target host, what is the persistence of the virus in the field and what proportion of targets need to be sterilised to achieve adequate levels of pest management? This is a massive research undertaking.

The simple reality is that the technologies are very complex, are difficult to achieve. It was unlikely that all the practical hurdles could be overcome to give rise to truly effective pest animal management.

Even if successful, the release of a self replicating virus might pose a risk to animals which, though regarded rightly as pests in Australia, are welcome native species in ecological balance in other parts of the world. On this basis the rest of the world is likely to oppose the release of non-controllable genetically engineered viruses that have the potential to sterilise any species.

The important lesson here for the future of pest animal management is that projects with a very high likelihood of failure should be subjected to a thorough and objective project risk analysis in the national interest before large long-term financial commitments are made.

This does not mean that all high risk work should never be attempted. If the long term benefits are high (for example the myxoma virus or calicivirus) then the research may be warranted even if the risks of success are low. It is just a question of priority setting with limited resources. However, there is a down side to the diversion of a high proportion of available resources towards one particular project if other projects are starved or inputs and support. If the favoured project fails (and research is an uncertain field after all) then we may miss an opportunity to make progress with other technologies. Thus the opportunity cost of the research allocation must be included in the risk-benefit assessment of large and long-term programmes.

For the future, we would prefer to see very high risk projects have staged funding with less resources committed until some of the risks are better defined or reduced by pilot work. Hard and fully objective decisions need to be made as to practical realities of projects at early phases of major projects.

Though we do not see a high likelihood of success for a self disseminating genetically engineered anti-fertility virus to solve any of Australia's pest animal problems, there are some practical outcomes from the research effort.

Though less spectacular, there remains some prospect of a bait delivered viral or bacterial vector for control of breeding or to achieve vaccination (i.e. controllable release of a non-disseminating agent). These possible options have arisen from the fundamental research effort and provide examples of possible collateral outcome

from the basic research. They may offer an applied opportunity for the future. However, many would argue that, if baits are needed to deliver a fertility control agent, then the same bait may as well include a toxin. The cost of the delivery is the same and dead pests don't breed whereas sterilised pests still eat!

Some also consider that the background research in the area will provide a platform for the exploration of bait delivered biocides that are not self disseminating but which might be very highly specific to a target pest animal. The bait delivery of rabbit calicivirus, and perhaps flea-delivered myxoma virus are examples of current biocides that work. However, the development of a new biocide will be subject to great scrutiny in respect of humaneness and safety as the world becomes increasingly nervous about biological technology that may not always be able to be retrieved once released.

Nevertheless, despite the technological difficulties for biocide or anti-fertility vaccine research, we must all recognise that our current pest management options are limited. Some background research should continue, despite the high risk and low chances of success. No control measure can compare with the spectacular impact of diseases such as calicivirus and myxoma virus for sheer scale of impact or long term cost, so we should always stay alert to any new option for any pest species. However, the likelihood of a third virus emerging that is both lethal to a rabbit and inactive in other species is remote, and to our knowledge no such agent has yet been identified for foxes, feral cats, pests birds, cane toads or feral pigs.

Moreover, if such an agent was developed there are massive problems and costs associated with the required protection of domesticated species held as pets or used in agricultural production situations.

1.7 What is a pest animal?

Consideration of the possible international concern if Australia's efforts on pest may impact on desired species elsewhere, raises the truism that it is often not the animal that is the fundamental problem, but rather the mis-location of the animal in the wrong environment.

I have great respect for the fox. It is one of the most sophisticated predators alive with great hearing, sight, smell, speed, teeth and adaptability to food resources and environments. In Australia it is just in the wrong place!

In turn, this leads to the consideration that it is not always the introduced or exotic or feral species that is the pest.

We must soon face up objectively to the over-abundance of native species in certain situations, especially where the perturbations of habitat by man have allowed a superabundance to co-evolve with agricultural or social practice. Examples of this are increasing. The over-abundance of brush and ring tailed possums in some urban environments will require redress some day, as the pressure on both native and exotic tress becomes unsustainable. The superabundance of kangaroos where improved pastures and water distribution have enabled population explosions will

need increasing attention, as will the occasional explosion of grassland native rodent species in man-made grasslands like sugarcane crops. There are many more examples, such as the overabundance of pest birds in some situations.

In all these examples it is not the animal itself that is the problem, nor the fact that it has escaped or been introduced, but just that it is out of balance with the local environment. To our judgment it is not a "pest animal" but rather a "local pest problem".

With this in mind it is entirely possible to apply local pest solutions to achieve significant local benefit. This opportunity for locally effective action for local benefit should not be derailed by a more general academic debate about the impossibility of "total eradication". The inability of any of us to totally eradicate a well established pest is a simple "no brainer". It can be reasonably stated that no well established introduced pest species is able to be totally and permanently eradicated from an entire continent. However this thinking should not be put up against the role of sustained local or regional control.

In this context it is important to recognise the special threats posed by pest bird species in Australia. These are very mobile creatures that are not readily able to be controlled. Their pest potential can be prolonged (eg the urban nuisance of the Indian Minor) or can be sporadic (eg the transitory damage to rice crops from migrating native ducks). This is a controversial area of the greater pest debate, but no government or agency should presume that the problem will go away if it is ignored for long enough. Pest birds are an emerging issue especially for the important fruit and viticulture industries and pest birds pose problems in the turf and cereals industries and social problems in cities. The pest bird issue is raised in our response to TOR 1 (Section 2).

1.8 Are all the stakeholders properly appreciated?

On reading the submissions made to the enquiry at the time of writing, we are surprised that some submissions have failed to note the role of industry in providing and supporting solutions to pest animals.

We might as why is this so? Panel member Tucky mentioned, perhaps with tongue in cheek (in discussion page 70 from first public hearing), the possibility that some within the pest research industry might "pray that the problem might never go away because they make a living out of it". This might be a cynical oversimplification and was no doubt said to provoke discussion, but some problems are being studied to death rather than solved!

The tradition in Australia for vertebrate pest is that "the government will fix it". This is no longer supportable and there needs to be a better recognition of the crucial roles and capabilities of landowners and land managers at the workface, of their local support structures and of industry in providing the practical technology for these groups to take on the tasks of local pest management.

Though others will see things differently, we believe that the industry groups such as ourselves have an important role to play both tactically and strategically in the pest field. Since we see the work to solve Australia's pest animal problems has some similarities to a war, the military analogy is not entirely misplaced.

We have provided stable tactical resources to assist with day-to-day pest management in a variety of ways. We are a resource for expert advice and consultancy as well as stable supplier of high quality technology and products that are practical and effective. We thus provide the "ammunition" and "range finding". The local coordinating groups "identify and prioritise the targets" and "marshal the troops" while the "people resources or ground troops" take action.

At a strategic level we assist in the transfer of knowledge and encourage a best practice approach. We also provide a strategic resource in the event of an exotic disease incursion by maintaining stockpiles and production capability to respond to emergencies. We actively conduct in research and development and participate constructively with the research activities of other groups. We also provide a conduit for vertical integration between groups as we deal with virtually everyone from policy to the field. However, we must note that it is extremely difficult to achieve all of these roles with very limited commercial margins and almost no external funding support.

1.9 Is more research the only answer?

How often do we hear the catch cry that "more research is needed to solve this major problem" or "we need to develop and improved …"? We should always ask whether the problem being solved is important and whether the research has already been done.

I have never seen a pest animal eat some research and die but I have seen them eat the trees on which the research was to be printed. We cannot control pests by throwing more books and strategies at them. They can't read! They are even less likely to be adversely affected by rule books! The pests are not playing by our rules. They eat and they procreate. That's it. They don't read books, they do not understand the value of our unique wildlife or the need for profitable agricultural production, they do not know if they are transmitting disease and they don't respect the land titles or fence lines.

Nor is it possible to solve pest problems by throwing "new and innovative research programs" at them. Very often we have seen obviously simple approaches derailed by the introduction of untested new techniques that "might do the trick". The research is great but the problem gets worse!

By way of example, the use of oestrogen-primed spayed fox vixens was suggested as means to control the Tasmanian fox incursion. The idea was that a caged vixen in oestrus (heat) would attract all the males back to the cage. The suggestion had merit because no one knew how to find a very low density of foxes and the idea of utilising their own ability to track pheromone had charisma. The problem was that no one new where in Tasmania to place the cage, what to do next or which way the wind was blowing! Moreover, it could probably only be implemented at a seasonal time when the males were receptive and, by this time, they may have already paired or

mated with more available females. Could we afford to risk Tasmania's wildlife on this and other untested approaches? History will tell. (Note: Fortunately for Tasmania, the fox control programme also applied other control measures and did not adopt the Judas vixen approach as a control measure - the example is just made to illustrate the potential).

We have also observed that the same wheel tends to get invented may times in the pest field. How many times do we hear that we need "new improved baits" for fox or rabbit control? The dear old rabbit has not changed much during the last two centuries, and the humble carrot or oat is still pretty good tucker! It is often not the technology that is deficient, but rather the way that it is being applied. Funding bodies must be careful evaluate the cost of the great job creation scheme in the "wheel reinvention factory" of science. Those with an interest in wheel reinvention should carefully read a book that describes some early methods to control rabbits ("*Of Tooth and Nail*" by Brian Coman).

On the other hand let's also acknowledge that some pest animal problems are complex, pervasive and cannot be addressed in isolation from other environmental factors and social agendas. Some additional research is needed, even on well described pests. In other cases our basic knowledge of the pest and methods to combat the pest are rudimentary. Research **is** needed but it is not the only issue.

We still lack even a basic understanding of some pests and lack appropriate, safe or humane technology to address them. We are powerless in the face of the toxic cane toad invasion, we have no certain method to make a serious long term dent on European carp and we are unsure of how to tackle feral goats, camels and a whole range of introduced avian pest species. We can tackle brumby horses but no-one likes the present approach of high speed lead treatment that is sometimes imperfect.

Long-term research is needed to find a weakness that will enable targeted and effective management of these pests. This remains everyone utopia but we must not delay action with current technologies until the "magic bullet" is found, validated and registered.

We are also still able to fine-tune and improve existing techniques and we are still able to find truly new techniques or replace those that have failed, or which have become obsolete, that have an unacceptable risk of collateral damage or that do not deliver outcomes that are acceptable to the community.

Thus research of both short and long term nature is still very much need in the pest area. However the research needs to be focused, prioritised and truly innovative.

To our judgment, even if innovative and providing "new wheels", research alone is not going to solve urgent problems without technology transfer and delivery.

Our role, and that of the people "on the ground" in regional offices and depots of state agencies, in the landcare movements and on individual landholdings, is focused on the areas of technology transfer and delivery. It is the transfer and delivery on the ground that has been starved of support and under-recognised in recent years.

Our submission, therefore is not that research is unimportant, but that it needs to be better focused and balanced with better application of existing and new technology. The stakeholders capable of the delivery aspect are landowners, land managers and industry and they have an essential role to play in addressing pest animals on a local and regional basis.

1.10 Should we be phasing out some options?

Not every current pest control technique works well and not all are entirely acceptable to some stakeholders or in some situations. Some such as dung burners for fumigating rabbit warrens have been phased out yet they worked and were humane. Others techniques are still used but should be seriously questioned on a variety of grounds.

Use of chloropicrin and steel jaw traps must be strongly questioned on humaneness grounds, and to our view are indefensible in most situations. Chloropicrin also presents some risks to users. However, simply banning all traps or all fumigants in all situations would be a serious error. While not ideal, traps are the only available option in some situations (where for example shooting or baiting is inappropriate or where fencing or harbour destruction is impractical). Cage traps are very appropriate for the capture of feral cats and when checked and when monitored appropriately, traps do provide a good control option for some pests in some situations.

Similarly baits, if they must be used, should kill decisively and quickly with minimisation of suffering wherever possible, and preferably always. Progress is being made towards this and this progress includes a better understanding of the humaneness of the present techniques, as well as active research of new alternatives that might improve humaneness.

Development of new poisons or the addition of sedatives to poisons has been considered and some options are being developed. The area is extremely difficult to research and prospects of success or of achieving regulatory approval remain poor for many (but not all) options. We are involved with some of this research as there are reasonable prospects that new technologies will arise from it. However, new poisons are not likely in the very short term for many species and many hurdles must be overcome before a new technology can be formally approved. The additional of a powerful sedative to a poison bait has some merit but might change the regulatory framework on which the bait is made available (i.e. change the scheduling) or it might pose an unacceptable risk to non-target animals (the sedative may be more dangerous than the poisons to some species). The pharmacology and dosing of such agents is sometimes complex and they may antagonise the action of the poison itself in some cases or lead to aversive responses in the target pest.

Owners of proprietary human or animal therapeutics are sometimes reluctant to see these linked to the “less fashionable” activity of pest animal control. Also a therapeutic in one animal may be a toxin in another.

In this context, few existing control options should be summarily discarded.

Despite the difficulty of making baits a socially acceptable means for pest animal management, progress is being made. We would like to acknowledge the constructive way the peak welfare groups have engaged in the process of dialogue to raise awareness, to teach, and to try to reach mutually acceptable outcomes on the welfare aspects of pest animal management. This improved dialogue has achieved a greater appreciation of the concerns of welfare groups by those engaged in pest animal management. Conversely, the dialogue has given a greater appreciation by animal welfare groups that the majority of pest animal control practitioners seek to achieve high standards of animal welfare. Both groups acknowledge that there is a need to balance the rights of animal welfare of pests against the damage being done to wildlife and stock animals. We have also welcomed constructive dialogue with pro-animal movements that place the welfare of an individual animal (even if a declared or serious pest) above the welfare of the species that are being destroyed. This is an important community issue as well as being a crucial issue for effective pest management. Fortunately, the majority of pest managers are certainly respectful of this issue. This respect is increasing as a result of the constructive approach of interaction being taken by RSPCA and peak animal welfare groups. There is a pragmatic acceptance of the need to remove some animals for the greater good of agriculture and the environment. The debate and discussion is on how this can be done both efficiently and humanely at the same time.

Despite this constructive progress there are still some extremes at the fringes on both sides of the debate and this may always be the case. The recent progress towards constructive engagement is however, testimony that some resources should be provided to further strengthen the interchange of views on animal welfare and the broader community in a constructive framework and with objective information exchange. This has been one of the great steps forward in recent years and is far more productive that the poles-apart adversarial approach of both “sides” of the past.

1.11 Are approaches to pest animals acceptable to the community?

One constraint to pest animal management programs is that the concept is not terribly attractive to the community. This is particularly the case for people based in cities who are distant to the ugliness of stock and wildlife losses and who do not understand the scale and difficulty of pest problems. It is difficult to raise the profile of pest animal management as a priority for many people. Involvement in the field is a little less “desirable” than a career in journalism, sport or the wine industry.

The growth of the anti-chemical and anti-farming lobby groups has made it more difficult to justify the chemical control measures. Gun ownership is also discouraged yet shooting is still a very important pest management option. The use of traps or toxic fumigants is appropriately under question. Access to poison baits is under increasing restriction in some states and many small landowners are almost powerless to address their own pest animal problems.

However, we do have a major pest animal problem and we must be careful, as a nation, that we do not exclude valid options for pest management unless there are replacements available that are better. We must also be sure to allow appropriate and effective access to approved control measures. If we fail to do this then we will

effectively prevent our most valuable resource (people on the ground) from taking effective action.

We believe that we are at a cross road at this time, where the balance has shifted too far away from encouraging action and too far towards restriction of action. The consequences are horrendous and this is one reason why the wild dog and fox problems are front page news in almost every major rural newspaper and presumably why an enquiry has been initiated!

One way to bring diverging positions together is to increase awareness and education. This should be an important part of any truly integrated approach to pest management. We have already done much towards this with the FOXOFF®, RABBAIT® and MOUSEOFF® programs but our product revenue resources are limited in this regard. Even so, we have produced information booklets, videos, DVD's, fact sheets, seminar programs and newsletters that have done much to improve knowledge and direction at all levels. In the days of the escape of rabbit calicivirus we even provided a 1900 information line (now long discontinued).

The ability of companies such as ourselves to integrate information exchange should not be underestimated. We have focused especially on the need to provide resources to others who need to transfer information at the ground level. We would certainly appreciate some assistance with this work. One simple way that governments could assist in this process is to reduce their own emphasis on promoting the negative aspects of pest management techniques. In one state the instructions for how to bait a fox listed about 10 things that "must not be done". The instructions did not say what "should be done". Most casual readers would have considered the process far too risky to adopt yet this is old technology with risks that are well defined and well appreciated by most users.

There remains a wide divergence of views on pest animals. Some suggest that the pests should be allowed to roam freely and, if this is incompatible with farming and agriculture, the affected land should be abandoned to the pests. Others suggest that, by harvesting pests (such as for meat or fertiliser) a new and sustainable balance will be struck between pest and the environment (see discussion of harvesting below). At the extreme this argument is taken to suggest that the pest animals may be the most adapted to the particular environment and thus agriculture should be focused around the pest.

Fortunately, this attitude has not held currency in recent times for foxes and rabbits but it is raised in respect of feral pigs, brumby horses and feral goats.

In some cases there is merit in the concept but, in many situations, it is simply a defeatist resignation in the face of mounting pest animal pressure and decreased ability to take effective management steps. "If we can't beat them we may as well utilise them".

The evidence for the damage is overwhelming to those of us close to the field. However, the scale of the problem is poorly recognised by the greater population. There is a need to achieve greater awareness in cities. We submit that a better

understanding of the pest animal problem will lead to greater community acceptance of the need for pest animal management.

Raising awareness will require a collegiate and cooperative response by all stakeholders. There are many ways this can be achieved. For example, farmers can bring this to the attention of visitors to farms and to their local political parties, state agencies could work with companies and recognise the role of commercial products in a cooperative way, zoos and national parks can stress the critical loss of native species due to predation, health and quarantine authorities can stress the current and potential disease problems and threats, educational authorities can train more professionals to carry the technical burden and to provide the teachers of current and future generations, CRC's can consolidate research information for distribution and provide research answers where gaps in knowledge exist; industry bodies can devote financial resources to "oil the wheels" of information transfer …and so on.

The most important point is that there needs to be a concerted and coordinated effort to put out a proper factual message at many levels. The risk of one or other group trying to steal this agenda will be the basis for failure of the message transfer overall.

This is addressed in our response to **TOR 5.**

1.12 The role of landowners and land managers

There are many reasons for our national failure in managing many pest species. Many more contributing factors to our failures remain to be identified. We can, however list a few that come readily to mind:

- The difficulty of harnessing people and groups in the right direction with uniformity of purpose.
- The lack of uniform approaches across state and territory boundaries
- The development and proliferation of ill-considered or cumbersome regulations and restrictions to effective pest animal management
- The centralisation of commentary, discussion and advice and the disempowerment of people who have the capacity to manage pest animals at a local level
- The starvation of land managers, land owners and their immediate coordinating authorities at a local a regional level of funding and infrastructure support.

To our judgment all of the above factors rank more highly than a lack of available technology at this time for many major pest animals. One major problem with pest animal management is inaction and lack of concerted application of well proven existing technologies.

The exceptions are the cane toads, pest birds, carp and the like where much greater research input is need before we even embark on implementation of control or management.

It is our contention that the points above are somewhat interrelated and that all lead to problems with effective delivery at the field level.

It is also our opinion that the most important tool in the management of vertebrate pests is PEOPLE ON THE GROUND (we will separately address the possible role of "people in aircraft" in a later section).

Individual landowners or land managers throughout rural Australia are not only cognisant of pest problems but are well placed to take local and regional actions. This applies whether it the required action is harbour destruction, shooting, baiting or exclusion, or an integrated combination. However, the cries from land owners around the country is that they are being both prevented from access to appropriate tools and also under-resourced to do the job (see other submissions to this enquiry).

This under-resourcing occurs at the individual landowner level and also at the next level above. The next level is the local landcare group and the local office of the relevant state agency or the local pest control board or local council authority. **These locally based groups are the backbone of any vertebrate pest management program on settled private tenure land.**

These groups contain very skilled and capable people who have excellent local knowledge and people skills. These people are those who have the local vision of the pest problems and who can and must assemble local teams to achieve effective and sustained management over reasonable areas. This process has been going on for decades and has done much to alleviate pest problems locally.

However, in recent times thee seems to have been a decrease of support for these people and an increase in top-down management and increased restriction of their autonomy to make local decisions and to regulate their own activities.

In our opinion the balance needs to be redressed and urgent attention given to the re-empowerment of experienced people on the ground to take action. This is not to say that head office and Pitt Street/Spring Street functions are not important. It is just the question of balance.

Empowerment of those on-the-ground can take several forms:

Empowerment to encourage action can include many things and most can be achieved easily and immediately by such steps as:

- providing information and training,
- subsidising the supply of resources such as bullets, baits, fencing, nets or bulldozer time,
- supporting monitoring and planning,
- supporting aerial campaigns in support of land operations,
- improving access to pest animal management technology (better distribution of products) and
- conducting collateral pest management operations in adjoining crown lands.

It is with individual landowners that the battle will be won or lost and not with those of us doing fundamental research or writing books about the problem or re-inventing existing wheels.

This does not mean that work towards future technologies is irrelevant. The pests are evolving and the technology must also be improved. It is just that right now, for this day, for this week and for this year, more urgent and focused application of technology is needed.

Continuing role for the landcare movement

The landcare movement has done so much to coordinate and consolidate effort at the ground level. However, our general observation is that some groups have tired from the constant struggle for support and from the on-going demands from local programs. This is not a criticism of the landcare movement but a plea on their behalf for greater support. This support can be achieved in many ways. Examples could be via direct funding, via tax relief, and via strengthening the capacity of locally based agency staff to assist local landcare groups to establish and run programmes, by training and by encouragement of new members to join up with local groups.

Structural support for the system is weakening as the reach becomes greater. This is a tragedy as it threatens one of the most important weapons in pest animal management – people dispersed on the ground where it matters. We are strong advocates for improved support of those who are actually able to do something, who need assistance and who will deliver multiplier effects from seed support.

1.13 Are we prepared for a disaster?

We all hope that there is an incursion of foot and mouth disease or rabies into our feral animal populations. While this might focus everyone's attention of the scale of the problem it will be a return to reactive panic management rather than forward planning.

Nevertheless, should a new virus or bacterial disease breach our quarantine barriers, we must be prepared with technology, capacity and people on-he-ground to deliver a response.

This will necessarily involved those involved in quarantine ad exotic disease management (Ausvetplan and the like) but will also require the full resources of the pest industry and the important landcare coordinators, local government staff, local land protection broads and catchment groups.

For our part we already retain reserves of strategic materials on behalf of the nation for major pest management emergencies and have dedicated capacity above daily requirements in the event of a major emergency need. We can, for example now provide control of plague mice on a million hectares of crop before we need to draw on external supplies.

However, it will still fall upon people "on the ground" to manage the problem. It will be important to maintain support for them to achieve the task that only they can do effectively.

The point we are making repeatedly is that the resources on-the-ground (individual landowners and the local agency coordinators) are the front line strategic resource to try to prevent a disease incursion. Their strategic value to the nation should not be under estimated.

1.14 Who should pay for pest animals?

Clearly, one reason why pest animals are a relatively low priority of government (as are weeds) is that the problem is so big that no one wants to accept responsibility for it. Pests are a problem and responsibility for every Australian. Planting 100 tree seedlings provides a better public relations stunt opportunity than presiding proudly over a hundred rabbit carcasses, but those who have been around rabbits will know well which is better for re-forestation!

The taxpayers of Australia generally should be making a contribution to the solution of pest animal problems. The taxpayers should assist with policy and research and with application. Everyone owns the problem and no-one can fix it alone.

However, the pest problem is not only the "gummerments problem" and the gummerment should not be the only ones trying to fix it. The old free-service pest management of the past is not sustainable on any economic rationalist model.

So, in a world where the task is large and resources are limited overall, responsibility for action on closely settled land must generally be taken by individual landowners and land managers. It is the landowners who suffer immediate financial hardship if pest are not managed effectively, and who achieve an immediate financial benefit from their own effective pest management.

The opportunity for self funded projects like FOXOFF® (largely user-pays approach) is very appropriate to the intensively farmed high value land on the eastern seaboard of Australia. This project has demonstrated this approach works for over 13 years.

However, user pays approaches are less readily achieved in the more extensive grazing or cropping areas where the size of the burden on low value land is too large to be fully supported by the farming enterprise alone. User pays approaches are virtually non-existent for land owned or controlled by state and federal governments where no commercial enterprise is undertaken. Here the onus must be on the tax payer to implement the management strategies.

We thus recognise a range of ownership and range of responsibilities for action. We also submit that effective action to control or mange pests in the situations listed above are mutually complimentary. The control of pest animals on crown and private land are not mutually exclusive and there is great synergy to be achieved by combined actions that are mutually supportive.

It thus requires a combination of inputs. Pests on crown land must be managed effectively by the agencies that are responsible for those lands. This is easily said but hard to achieve. This is not a simple exercise. The overall task is vast and not every area can be addressed even once, much less in a sustained way over many

years. Economic rationalists have a reasonable case to question this expenditure lest re-infestations or edge effects render the expenditure wasteful or futile.

Not every state or federal park can be tackled at once, so a priority setting exercise should be established objectively. This sort of prioritisation is already done for new road infrastructure, for replacement of level crossings, for defence expenditure or for the health sectors. There is nothing new in this, but it requires managers with vision and focus and government with a real commitment to make a real impact over time. A "head-in-the-sand" or defeatist approach to pest management on extensive areas is not really an acceptable outcome in the long term.

It is important to recognise the potential power of multiplier effects from seed investments of taxpayer funds. If the government of the day provides sufficient seed funding there is very often a substantial amplifier effect at the field level.

Better support for the landcare networks and their immediate coordination at the board or state agency level generally would be a valuable structural investment in this regard. The troops are in place and organised but they struggle to keep going on the current shoestring budgets.

1.15 Are bounties an option?

From time to time we see the suggestion made that all would be well if there was a bounty on the particular pest. Most commonly this is applied to foxes, where there is a worthwhile recreational shooting "industry" that does remove a large number of animals annually. This is to be encouraged along with other alternatives. However, to put a bounty on a pest is to put a value on a pest. This, in turn, encourages a sustainable harvesting operation that will not achieve local or even regional control.

Bounty schemes were recently reviewed thoroughly by the Bureau of Resource Sciences (refer to the BRS for their review). They concluded that, almost without exception bounty schemes were ineffective.

Bounty schemes were commonly defrauded (stories about how many times the same fox ears or tails could be sold are legendary in the industry!), lead to removal of only the easily accessible animals, and are very expensive to administer. They do not lead to effective management of pests in low abundance (just when control to eradicate should be maximised) and they can even encourage reintroduction to achieve sustained levels of profitable harvesting.

In the late 1980's some half a million fox pelts were harvested for skin trading in south eastern Australia annually, yet fox numbers increased and lamb damage continued. It is highly desirable that these foxes were removed, but even this massive level of harvesting still did not fully address the problem.

Despite our "in principle" disagreement with the value of bounty schemes, shooting is a viable option for some local control and can deplete foxes and other pest animals over defined areas. We encourage this. As we have submitted above, no technique should be admonished or removed.

It is also important to recognise that no single technique is likely to be totally effective in isolation. A good example here is the need to remove rabbit harbourage and apply baits even if a myxoma or RCV outbreak occurs. Likewise, the control of feral pigs will very likely require the combined resources of harvesters, cullers, trappers and baiters over vast areas. Integrated control programmes are essential for most pest species.

Sadly, the cynical might observe that bounties have their greatest value as a marketing strategy for governments who wish to be seen to be taking action especially in marginal rural electorates in election years! There needs to be a separation made between the bounty approach and the valid need to encourage more shooting of foxes. Moreover, the administration of bounty schemes becomes more difficult if there are other sources of the animals for which control is required. Imagine the difficulty of distinguishing between wild dogs and pet dogs in this regard if a bounty was placed on dog ears.

Despite these shortcomings, the highly publicised bounty schemes are one way to raise awareness of pest problems even if the pests are seldom controlled. Bounty schemes are certainly popular with many rural groups and they certainly stimulate increased levels of management, but there does need to be a greater appreciation of their limitations.

Perhaps there is still some room for some sort of encouragement of control operations. Perhaps ammunition of the right calibre could be subsidised though responsible gun clubs in rural areas, or shooting groups could be supported to do thorough control operations or mop up after bait programmes. Equally bait programmes could be subsidised to encourage further action on the ground. The latter would certainly be a cheaper cost per pest removed.

However, as stated above, the economic benefit-cost calculation for pest management dictates that there is ample return to farmers in high value agricultural land for them to fund their own pest management. In most closely settled high-value agricultural lands, the control of foxes has one of the highest benefit-to-cost of any activity to increase animal production that we are aware of (at least in the sheep industry). Only gate latches provide a better return on investment!

Even at modest lamb prices the benefits exceed costs by more than 100 fold. Thus, on theoretical grounds, there should be ample imperative for graziers to make every effort to control their own pest foxes (or wild dogs) that are on their own land. The exceptions are in those areas where grazing land is surrounded by crown land harbourage and where landholdings are very extensive, making the cost of control high in relation to stocking density.

Thus if total funding is limited, we would favour allocation of resources into large-scale operations on crown lands rather than subsidies of intensively farmed grazing areas. However, if some funds are available to rekindle a practical approach on private land, then a mix of allocation toward private and public landowners would be appropriate.

1.16 Control of pest animals on crown lands

Given the above comments, perhaps the best allocation of discretionary public funds would be to provide indirect support for graziers via the control of pest animals on neighbouring crown lands. Here there is a public good in terms of protection of wildlife while achieving a reduction in predatory pressure on stock for nearby private landowners. Even better if the work on crown land is supported by encouragement of surrounding local private landholders.

Too often we hear the cry that the pests are coming from the crown lands, but the pests are not cognisant of property boundaries and we believe the flux of pest animals between private a public lands is bi-directional. This also means that simply designating a land area as a wildlife refuge is not enough.

The reality of the land for wildlife schemes and many national parks is that we have created “no go” zones for people in which pest animals often flourish. Many could describe national parks and reserves as wildlife risk areas rather than wildlife safe havens.

The problem is becoming worse in some situations where the ability of owners of small properties have been effectively discouraged from taking action. In Victoria, for example, small-scale property owners (hobby farmers) would like to control foxes. However, they are discouraged from gun ownership and are required to do a two day training course and then apply for a permit before being able to place a single fox bait. Many have simply walked away from fox management as a result and watch the wildlife disappear from under the “land for wildlife” protective signs. Similarly the declaration of reference areas means that nothing is done to manage weeds and pest animals. Who is going to clean up the long term mess from such declarations?

Many agencies are involved in the management of pest animals on such lands but they also have responsibility for weed, fire and soil management. Many are trying their best to stem the tide of pest animals but resources are limited. In some cases the government agencies lead the way but are impeded by a lack of support from surrounding farms, while in other cases the reverse applies.

There is clearly a need for better cooperation and a more serious commitment of all Australians, via both sate and federal governments, to make more serious progress on pest animal management.

1.17 The climate is changing in favour of cooperation

A recent Supreme Court ruling in Victoria would appear to have changed the legal landscape for pest management.

The much publicised case was commenced in 1995 by Mr Ron Stockwell as plaintiff and the State of Victoria as defendant, and provided a landmark ruling as to the liabilities of landowners to take action to reduce the damages to neighbours from pests crossing property boundaries.

A full transcript of the ruling given by Justice Gillard is available on the court web site. The case was #6720 of 1995 and the ruling was VSC 497 brought down on the 17th 7 December 2001. We do not pretend to be experts in law and recommend a full reading of the 80-page judgment. The following is a simplified summary of the case, and is not a formal legal assessment.

The case had its genesis when the Stockwell family inherited a small 681 acre grazing property 18km from Corryong that abutted crown forest near the Victorian border with NSW. The area is well known for wild dog problems but in the early 1980's the dog attacks on Mr Stockwell's sheep increased in severity. In 1982 he lost 20 sheep with another 40 maimed by wild dogs. Mr Stockwell attempted to bait on his own land and sometimes into the adjoining forest, but was advised that this was not approved. The then Department of Forests and Lands declared the area adjoining the Stockwell land as a "reference area" that prevented access to all, except for a 200m wide buffer zone. According to the Department, measures to reduce dog numbers could not be achieved in a reference area.

Once control measures were prevented, the dog attacks became more severe. After loosing 250 sheep in 1987 he complained bitterly to the department and was supported with a grant to establish a short length of protective electric fencing. Attacks continued and Mr Stockwell was advised to take the vulnerable sheep off his property. He sold his remaining sheep at a time of low stock prices then had little other income with which to service his mounting debt. Though the exact losses attributable to the dog problem were clouded in many other matters and further confused by poor farm records, the final result was that the debt burden spiralled and the property was sold under instructions form the bank. The price received in a depressed market was adversely affected by the on-going menace from wild dogs in the area.

Mr Stockwell decided to sue the Department for failing to control pest animals that affected his land, for preventing his ability to do the same and for negligence.

The legal principals of the case rested on three points:

1 The State allowed a nuisance from their land to affect his rights on his land
2 The State was negligent for not controlling dogs
3 The State breached its statutory duty under Vermin & Noxious Weeds Act

The ruling by eminent judge Gillard took into account the history of the site and the problem, the obligations of the crown to control pest animals (and plants) and the failure of the crown to take effective action despite being advised of the adverse consequences of their failures for neighbours, in this case the Stockwell's.

The Crown agued that the wild dogs were not theirs and that they were *Ferrae naturae* (i.e. wild animals able to roam freely). The Crown also argued that it had some dog-men trapping in the area and had assisted with the electric fencing even though budgets were limited. The judge rejected this defence and was forceful in determining that the obligations of the then vermin and Noxious Weeds Act 1958 (and subsequent Land Protection Act) clearly required that the Crown managed pest

animals (and weeds!) that existed on their land and that this applied even if the pest animals were not strictly under the control of the State.

After consideration of the historical laws and precedents regarding the torte of nuisance over several centuries of case law, Justice Gillard summarised the modern law as follows:

"Where a nuisance has been created …. without the actions, omissions, authority or permission of the occupier of land, the occupier is liable
if
he has knowledge or ought to know of the existence of the nuisance, it is foreseeable that damage could occur, and he fails to comply with a measured duty of care to abate the nuisance."

This means that, even though the landowner (in this case the Crown in respect of the State Forests) was not in control of the pest animals, the landowner was still liable for the consequences of harbouring the pests if they move onto and cause damage to a neighbour. Thus, the onus for action is on the landowner to do something to mitigate the problem if a neighbour is being affected.

The "do something" in this case was, according to the eminent Judge, to take a "measured duty of care" to address the problem. He went on to define the nature of a "measured duty of care" and distinguish this from a general duty of care.

"However, the duty is different to the normal duty of care which rests upon a person to take reasonable care in the particular circumstances. This measured duty of care takes into account the resources of the land owner, the gravity of the nuisance, and the ability of the land owner to eradicate it."

This expanded definition allows for a test of reasonable action in the light of resources, as distinct from the achievement of absolute control. Nevertheless, having regard for the command and control chain from the local officers, regional officers, department head, minister and finally the Crown, the judge was forceful in his finding that the Sate was liable under the tort of nuisance and negligence was found.

With legal costs also awarded against the Crown, the total damages awarded to the Stockwells exceeded $100,000 overall.

The case appears to provide a precedent for any landowner who has pest animals on his land that cause a nuisance for a neighbour. The landowner harbouring the nuisance must take a measured duty of care to control the pest, and if he fails to do this after notification of the problem, he can be sued by the affected neighbour.

It is not inconceivable that a large group of landowners could individually or jointly start actions against any National park or other Crown land that was harbouring pests and not taking a measured duty of care to control them. The case is important for railways and state road reservations, catchments and any other land. However, before everyone gets too excited at this prospect, it appears that the ruling does not distinguish between Crown and private land in principle. Thus the Crown could sue a neighbouring farmer if pests were coming from a farm and damaging the Crown's wild life.

Thus, it is a two edged sword that establishes a legal precedent for neighbourly cooperation on the pest animal problem regardless of the type of landowner (i.e. crown or private).

1.18 Harvesting pests as a resource

We consider that harvesting superabundant pest animals does have a place in control. Why waste a resource that exists even if it should not be where it is? Shooting groups particularly can provide an important resource in many situations. However, harvesting of pests should be seen and supported as part of the approach to control or local eradication and not as a justification for continuation of the pest as a resource. The pest problems are so large that harvesting may the only practical option in some cases. In this case we support it as a means to at least partially reduce the offending pest population until other controls can be implemented.

Harvesting approaches, like bounties, do have the effect of placing a value on the pest and this will lead to sustained harvesting from the most easily accessible areas and where the pest is at highest abundance. Harvesting is less sustainable when pest density is low. This means that harvesters will tend to do sporadic harvesting when numbers are at high points with the result of a boom and bust impact on pest density. Also the placement of a value on a pest animal can provide an incentive for reintroduction or "seeding" of otherwise pest feral areas to ensure a future supply of pests to be harvested. This is known to happen with a variety of pest animals and is a serious concern to those wishing to achieve local eradication.

Harvesting that leads to a sustained presence of the pest species in reasonable (harvestable) densities also poses particular problems if the harvesting areas adjoin higher value land where productive agriculture with conventional livestock, cropping or forestry are achieved.

1.19 Aerial baiting

When we first became involved in fox control the application of baits from the air was phased out in Victoria and being discouraged in New South Wales. It was and is still used in at least WA and Queensland. Why the differences between states? Sometimes the answer is not clear, but in Victoria land is very much more closely settled than in the outer reaches of other larger states. In Victoria the use of the buried bait technique can offer an additional layer of safety in most circumstances. Foxes and to a lesser extent wild dogs can seek and excavate a buried bait, but many native animals and most stock do not share this capacity. The burying of baits largely prevents access by birds and is generally highly effective against foxes, and to a lesser but still significant extent against wild dogs.

Thus, in high value agricultural land that is closely settled with relatively small tenure, the buried bait technique is acceptable, possible and offers the highest degree of safety.

In more sparsely settle areas the buried bait technique is too time consuming for an operator who must try to control pest animals over thousands of hectares.

Buried bait programmes can be conducted on large scale but only where access is excellent. Our own team, in a landmark fox control operation at Puckapunyal army base in 1994 conducted a buried baiting program on approximately 44,000 hectares of the base. The programme was highly successful, removing about 94% of foxes over a six-week monitoring period. At the time it was the largest single fox control operation in Eastern Australia. However, the project was supported heavily as part of the environmental management programme at the base and required three teams of two people working non-stop with all terrain vehicles over a period of four weeks to place one round of baits at the standard density. The base had an excellent network of tracks and trails and generally good access to most parts and the programme was conducted during a drought year when grass cover was minimal and there was no boggy territory to obstruct access. A larger station or farm with scrub and bushland or waterways and few tracks may have to achieve this with just one or two staff who are also required to attend to the myriad of other farm operations.

Thus, it is a practical impossibility for most very large scale wild dog, fox (or feral pig) control to be achieved by ground-based baiting programmes.

Additionally, ground based baiting programmes still require a grid based baiting strategy (largely) that provides for one or two bait stations per 10 hectares of land. In many situations there are insufficient ground access tracks to allow such programmes to be undertaken.

This lack of ground access applies to a large proportion of the crown controlled lands and particularly in the alpine and sub-alpine regions. In fact, access tracks are being progressively removed to prevent excessive human incursion into many wilderness areas.

The application of baits from the air is the only way to achieve a high level of coverage in such large and inaccessible areas.

To qualify this, it is true that wild dogs do use particular travel routes within large areas and baiting can be targeted along such travel routes. Ridgelines, creek beds, animal pads and vehicle access tracks all offer enhanced opportunities to geographically targeted bait placement. However, this still does not achieve full coverage. Men on horseback or on foot can achieve even greater access but the cost of such programs and time constraints again limit the practical opportunity to properly address a large area of otherwise inaccessible country.

There is no question that ground based baiting programs are the first priority wherever practically possible. This includes most closely settled farmland and also applies to some crown land.

However, without any doubt, the nation must face the reality of aerial baiting campaigns if we seek to make a serious impact on the pest problems in larges areas of low human density or inaccessible country and where budgetary constraints limit other options.

The only debate is on how to best mange the slightly higher non-target risk that may be associated with such baiting. In doing so the analysis should not only consider the risk but also the benefits from the control operation. The do-nothing option is always risk free but the downside is that there are no benefits either. This is the current approach at many sites and it is a totally reprehensible abrogation of responsibility.

The bottom line is that aerial baiting should be permitted and conducted where the other options are not practical and where the BALANCE OF ACCEPIRTIBLE RISK is in favour of this control method. This does not mean that the risk must be zero. Even if there is some collateral damage, however regrettable, the overall long term survival of species at risk will be enhanced by effective predator control. The saddest thing will be to sit back and watch as the last examples of endangered species disappear in "predator pit" situations while a zero risk approach dominates policy.

Many independent studies have demonstrated the risk to be small. Relatively few species are at significant population risk to baiting programs other than dogs or foxes. However, much attention has been played on the risks to native quoll species since these animals do have the capacity to take the same baits used for dogs and foxes and may be vulnerable to the doses of poison required for canid pest species.

Some of the evidence for such risk has been the inappropriate extrapolation for the reactions by cage housed animals in zoos that generally provide a poor representation of the true risk in the field. More thorough studies with radio collared non-target species such as native quolls have all shown either no impact or very minor impact and generally the scientific consensus is that the quolls, and presumably other native species at risk, are more protected than lost as a result of the removal of predators by baiting programmes.

Foxes (data not available for wild dogs) can have quoll hair in their scats which indicates that they either directly prey on or at least scavenge on native quolls. Most would expect that small quolls would be particularly vulnerable. Moreover, both foxes and dogs can compete for available natural prey items for the native carnivores. Over time when food becomes short, the foxes can switch to insects mice and berries but the quolls are less adaptable and are potentially out competed in their natural environment.

On balance, we submit that the careful application of aerial baiting programs will be of benefit for the adequate management of canid pest animals in inaccessible or large areas. The application of aerial baiting will be enhanced if sparingly dosed baits are used at carefully controlled drop rates and if supported with appropriate monitoring of risks and impact. In a learning-by-doing exercise a progressive programme could be attempted with gradual evaluation of impacts (both positive and negative). If the risks are confirmed to be low and the benefits confirmed to be great then the programmes could be expanded and repeated with confidence. Already

there is substantial data to support aerial baiting programmes and such programmes could be progressively introduced or reintroduced to better manage pest animals in inaccessible alpine areas and in very extensive areas of rangeland. Such programmes are already used with great effect for the protection of vulnerable native species in Western Australia.

To fail to take this option will leave the wildlife almost totally undefended in its last genuine refuge habitat. The consequences are obvious and inevitable.

2 Response to terms of reference

2.1 TOR 1 Identify significant pest animals

This has been done adequately in other reports and in sections above. The obvious priority animals remain foxes, wild dogs, rabbits, feral cats and feral pigs with the addition of cane toads and carp. However, Australia does have several sleeper issues including camels, feral horses, goats and deer. A watch should be kept on the potential for harbourage or safe haven animals to become pest animals of the future and also the very great potential for the introduction of reptile species including exotic snakes. Ferrets and stoats and escaped pet species may pose a risk over time.

There are also many native animal species that at certain times or in certain situations are, or will become, pest animals. Possum damage to trees in urban areas is increasing and will pose a technical and ethical dilemma in the near future. Management of superabundant bat and flying fox populations in urban situations and in fruit growing areas and the superabundance of native rodents in broad acre cereal crops and sugar cane crops in Queensland is an immediate issue.

The term “pest animal” should not be restricted to just exotic or introduced species.

We believe that a series of books published by the BRS adequately describes the pest status of many of the more serious pest species and no further analysis is needed for those species already covered. However, there appears to be an oversight of the emerging problems of pest birds in Australia.

We are not directly involved except for research on a putative repellent for ducks and the supply of emergency control baits to help contain exotic disease outbreaks (Newcastle disease in poultry). However, there are about 50 different native and introduced bird species that at various times and in various situations may require management in Australia. Some pest birds are sedentary, while others are migratory or flocking and each general class may require a different management approach.

Pest birds have a potential to act as carriers for disease and can compete or disrupt natural avian species in certain habitats. They also impact on a wide range of agricultural enterprises particularly the fruit, aquaculture, floriculture and viticulture industries. Problems include destruction or damage to fruit, defoliation of trees, damage to grain crops and to bulk grain storage infrastructure (tarpaulins particularly). Birds also spread some weed seeds and can transmit diseases. Current bird dispersion or scaring techniques are not very successful in the long term with many birds adapting to artificial dispersal techniques. This is a sleeper pest issue that required some strategic thinking and further research effort.

The challenge will be to focus on managing the problems caused by the animals and not the animals themselves. Thus when a native species becomes overabundant it may be considered to be in a pest animal situation. This would never mean that the

native animals need to be targeted in their natural environment and never mean that control was appropriate if the control in crops or other situations would threaten survival in natural habitat. The challenge is to work out how to manage native species that can travel large distances.

2.2 TOR 2 To consider approaches across jurisdictions

To prevent pests becoming established

This is essentially a quarantine and surveillance issue and others are better qualified to discuss this. However the truism that "prevention is better than cure" is very applicable in this context.

Vigilance must be maintained and action taken to minimise the risk of new pest species entering Australia. Even more so, action should be taken to prevent the spread of established pests to new parts of Australia. The spread of Indian minors or starlings to WA or the establishment of foxes in Tasmania are good examples here. The cost of prevention is much lower than the cost of eradication (even if such was possible).

Detection and reporting of new and established pest species

See comments above.

Eradication of new incursions

The eradication debate runs wild in most discussions of pest animals.

Eradication, as a purist concept, refers to the total and sustainable (or permanent) removal of a pest from an entire area. This is a wonderful goal but is rarely if ever achieved, even for small island situations with a vulnerable pest.

Put bluntly, the potential to eradicate major pests like rabbits, foxes, feral cats, wild dogs or feral pigs from the continent of Australia is zero.

There will always be re-introductions, edge effects and imperfect control operations. The best we can hope for is for low concentrations of pest animals to be sustained over large areas of management. Certainly if the damage is reduced then it may not be important that every last animal is eliminated, even if this is a commendable goal in principle. Significant economic and environmental outcomes will be achieved by substantial reductions of pest animals in local areas. This should be the real focus.

Theorists correctly note that the principles of science and realities of biology and geography dictate that eradication is impossible and costly. This is generally true on a continental basis but there is plenty of potential for serious pests to be eradicated from small or large areas. Of course there will always be an edge effect on such programs with reinfestation over time. Eradication, even in a local area, will always fail the test of permanency. But the principles of normal quarantine apply here and the benefits of localised eradication can be sustained by maintenance operations and vigilance.

To consider better linkages across state boundaries

The divergence of actions between jurisdictions in respect of pests that are essentially identical in behaviour and threat is nothing short of silly.

As a company trying to manage fox bait production, for example, we are required to maintain five separately labelled stockpiles of baits that are otherwise identical in formulation, identical in function and are used for the control of the same pest animal in the same situations. The difference between states is in minor changes in wording to otherwise similar use patterns and differences in the restrictions and constraints. The differences between states contributes to costs and absorbs considerable management time and delays registration and label approval for many new technologies.

The APVMA procedures can be improved and this may lead to a reduction of differences between states as a national approach is taken. This may require giving increased authority to the APVMA. The process is presently frustrating, slow and tedious. Applicants are often required to explain and re-explain things to anonymous reviewers who though often very capable and objective can also sometimes fail to understand the area or may act with bias. Even relatively simple issues seem to take weeks or months to resolve.

The problems could be addressed, at least in part, if there was greater in-house capacity with the APVMA to critically appraise review reports rather than simply forwarding them backwards and forwards to applicants and reviewers. This, in turn may require some additional empowerment of the APVMA to make binding decisions on regulatory matters above the rights of individual states.

The current APMVA review process becomes an expensive mailing house rather than a proper house of objective functional review. There is a need to retain highly skilled staff in the regulatory area and our observation is that there is a shortage of these skills currently in Australia.

Consistency between states would also be helpful. For example, when we first started to manufacture fox baits in Victoria we were advised that the then recommended dose of 1080 in Victoria was 3.3mg/bait. In most other states the recommended dose was 3mg/bait but was 4.5mg/bait in WA due to lower sensitivities of non-target animals in that state. The recommended dose for dog baits indicated by the vertebrate pest committee at the time was 6mg/bait and we have adopted this in our bait products for wild dog control. The Victorian Department of Primary industries has now adopted 4mg/bait or 4.5mg/bait for wild dogs, yet we hold a valid registration for a 6mg bait approved by the APVMA and supported at the time of registration by Victoria.

The goal posts seem to have moved, presumably as a result of re-consideration of potential non-target impact of potent baits. A lower dose bait may reduce the risks to some non-target animals. However, there is also a concern about the use of baits that may be sub-lethal to the target (this would raise efficacy as well as welfare and aversion problems). We are unaware as to the scientific basis for the recommendation of a 4 or 4.5mg wild dog bait in Victoria in the face of a VPC recommendation of 6mg per bait. While most wild dogs will be destroyed by 4 or

4.5mg baits the largest dogs may require a higher dose. Manufacturers can easily prepare baits to any specification but it would be helpful if there was some consistency in this area. The requirements to change registrations to meet revised specifications in individual states is a major impediment to effective industry participation in solving the pest animal problems.

It is difficult to recover professional costs and fees associated with minor changes. If the goal posts are moved by governments we believe that the cost of updating registrations to match should also be reimbursed by Government and the required changes facilitated promptly by the APVMA.

The difficulty for manufacturers is that economies-of-scale, that help to keep bait costs down and which allow regulatory overheads and fees to be spread, are lost if a wide variety of dose rates must be provided. Moreover, farmers on one side of the border are told that the correct dose is "x" while those on the other side of the border are told that the correct dose is "y". This leaves farmers unsure and wondering whether the problem is one of biology or policy. This undermines the confidence in the advice being given on both sides of the border.

A further concern in industry is the chemical review process that is undertaken by the APVMA. Few can comprehend the time and resources required by industry to attend fully to such reviews. The review processes and outputs raise serious commercial concerns about data protection and the current processes for data protection during chemical reviews are inadequate.

However, the review process has some merits and can be used to resolve important issues of chemical safety and use in special problem situations. In our view this should only be undertaken if there is a sound scientific basis for the review being called. The APVMA must therefore carefully consider the basis for a review before undertaking a public review project.

Reviews are expensive to service and create very considerable uncertainty while in progress. The cost of servicing procedural reviews cannot be recovered from product sales since the market expects very cheap pest management options. If companies seek to recover regulatory overhead costs the market will simply move back to the use of illegal chemicals and "home made" methods for pest animal control. Thus the regulatory system has the potential to achieve outcomes that are the exact opposite of what was originally intended.

Industry is between a rock and hard place in these circumstances and we would appreciate some support or recompense to resource the review process. Chemical reviews should not be entered into lightly or on frivolous accusations of a problem. With greater skill levels in the APVMA a process of audit on the requirement for any review could be implemented.

Coordination of policy and procedures between jurisdictions

Currently there is a peak body known as the Vertebrate Pest Committee (VPC) that is designed to provide some linkages between states. While well intentioned, this committee is insufficiently resourced to work as well as it might. However we believe

that the group could be strengthened to play a greater and more pro-active role in the field.

The inconsistencies between states is simply illustrative of the problems faced in trying to bring pest management in Australia into a standard format for the benefit of everyone involved. The fragmentation of pest management is so great across state boundaries that this is a major impediment to effective programs on a national scale. Individual agencies are working strictly within their own guidelines but from outer space it looks like a farce. Even worse is the potential for deliberate bias if state agencies have a clear conflict of interest in being both regulators and suppliers of products in the field. This issue must be addressed at a high level.

Nevertheless, despite some current functional shortcomings, we believe that the VPC group should be strengthened in order to be able to play a more forthright and pro-active role in coordination of national policy and approach to pest animals. This can be done very easily.

- The VPC group should have permanent professional secretarial support and better operating budget to perform a more important role in this field.
- The VPC should be able to call in and pay for expert reports where in-house skills are limited
- The VPC should have an expanded budget to organise and run the Vertebrate Pest Conference and this conference should be more frequent (bi-annual) and have stronger refereeing of papers and presentations to lift academic standards further in the field.
- Representation of the VPC could be broadened to better reflect all stakeholders while maintaining the primary focus of linking between relevant state agencies. Inclusion of industry representation would be of assistance.
- Setting a series of work tasks that aim directly at the removal of inconsistencies between states in vertebrate pest management would be a constructive task for the VPC. The rest of us (including industry and product regulators) can then go forward with a consistent approach being adopted nationally.

Difficulties of direct conflict-of-interest arise when state agencies are involved in regulation and policy while, at the same time the manufacture and profitable sale of bait products.

The APVMA should take advice from the VPC into account when considering new product registrations in the vertebrate pest area. Perhaps the APVMA could have high level representation on the VPC to facilitate the smooth transfer of information in both directions. Sometimes the APVMA seeks limited state input to registrations via other parts of state agencies (such as chemical safety groups or state regulators) who are not always fully aware of the field issues being addressed by the effector parts of the same state organisations. Perspectives between groups within the same organisation sometime differ and the APVMA must ensure that all points of view are considered fully.

Sometimes conflicting advice is being given between the “left and right hands” of government at the state level.

Is there a role for a centralised federal coordination group?

This question will provoke a range of positive and negative comments. A central tenant of our submission is that the present emphasis on management, regulation restriction and research is out of balance with what we see as a required emphasis on delivery and action at the ground level. Accordingly, we submit that the creation or expansion of existing federal bodies for vertebrate pest management is not what is required.

However, we also recognise there is a special need for policy advice to ministers that may need to be separated from the operational policy issues of pest management.

There is also a need to link at very senior levels between various jurisdictions within government. The management of an exotic disease outbreak, for example would require very strong cooperation between a wide range of stakeholders and operatives. The release of a new virus, for example, would under normal circumstances require a full interaction between a large number of reviewing and policy agencies at a variety of functional levels at state, federal and possibly international levels. Such a complex process requires the existence of a management group that is pro-active and capable of driving the review process.

Our considerations in this submission are focused on the operational issues rather tan on high level policy matters and our considerations of organisation do not fully address the latter need. Others can comment more authoritatively on this. The important point however, is that a policy group dealing with high level consultation should not also seek to manage operational issues of implementation. It is the latter area with which we are most acutely concerned and it is this area that needs to be better resourced if the nation is to take effective action to combat pest animals.

National coordination of research

We anticipate the new AIA CRC (if successful) will be able to provide a research coordination role that appropriately involves a wide range of significant stakeholders working in cooperation rather than competition. The development of the bid has been a commendable effort in this direction.

This does not mean that all research will be managed or worse still controlled by the AIA CRC and that research outside the CRC should not also be supported. However, because of the sheer size and depth of the collaboration embodied within the AIA CRC proposal, it raises the first opportunity for coordinated and focused research capability on pest animals in Australia. The AIA proposal is strong on the generation of new and well validated management tools and has strong linkages to industry (including ourselves) to deliver the outcomes of research to the community.

National coordination of action

The service delivery and local control of use issues will stay with the State agencies and, most importantly, the local pest management authorities such as Animal and Plant Control Boards (APCB's) and Rural Lands Protection Boards (RLPB's). **Even**

more importantly, action by individual landowners and land managers must be encouraged and supported.

We therefore see the actions of policy coordination and research coordination to have a fundamental direction in service of those who are going to be doing the work on the ground. Thus the primary focus, at the end of the day should be to achieve and encourage more effective action. The direction of policy and the development and transfer of research should be directed towards assisting in the real actions of those in the field who must do the work of implementation.

To our judgment, this will require greater support of individual landowners (tax rebates, subsidies and other direct support), their local networks such as landcare groups and local state agencies (RLPB's, APCB's etc) and of the state agencies that provide policy support for these groups.

We submit that these groups should be substantially strengthened with an increasing role of coordination played by a strengthened VPC structure involving industry representation rather than the creation of a separate federal coordinating body.

We would also like to raise here the emerging role of the rural merchant networks in pest animal management.

Traditionally, the role of pest control has been provided by governments. Over many decades this has led to an attitude that "pests are the government's problem and the government must fix it". There is an acceptance of a free service. However, with increasing understanding of the direct financial benefits of pest management for agricultural production and the protection of native species, private landowners have increasingly come to treat vertebrate pests as their own problem. Thus productive agricultural enterprises apply controls as appropriate on economically rational grounds. This is similar to the standard approach taken for any other on-farm disease or pest issue.

We have pioneered this approach for foxes and for mouse infestations in crops and seen net benefits on-farms in the hundreds of millions of dollars from this simple approach. We do not see over-use of pest control products but we do see appropriate decision making where actions are taken in response to immediate economic damage or pre-emptively to prevent looming economic damage. This has all been achieved with the use of professionally prepared products that are highly reliable, properly labelled and approved and sensibly packaged to empower landholder to concentrate on effective implementation. These procedures have also been encouraged by industry sponsored education and training and high quality technical support materials.

Moreover, with the advent of professionally prepared end user products the need for field mixing has lessened. Skilled local staff time has been spared for the more important roles of local coordination and surveillance etc.

The development of commercial pest management products such as FOXOFF®, RABBAIT®, MOUSEOFF® and DOGGONE® that are easy to use and cost-effective has enabled a whole new team to join in the fight. Some of these products are able

to be distributed via rural merchants and this has greatly increased convenience to landholders.

We have been pioneers in this approach, having recognised the potential workforce of several thousand rural merchant agronomists who are providing daily advice on other farm matters and other types of pest management every day. This is an enormous resource that can be brought in to strengthen, not replace, the existing agency staff.

TOR 3 Consider Adequacy of State Expenditures in context of other priorities and with reference to National Parks

We are not in a position to make authoritative comments on the levels of state expenditure in this context as we do not have detailed information on state expenditures and budgets.

However, as we have stressed above and in **Part One** of this submission, there is an economic benefit from individual landholders conducting their own pest management – at least on high value land. There is also an enormous benefit to be obtained from effective pest management on Crown lands such as National Parks. The recent legal precedent dictates that any landowner may be vulnerable if he/she or it fails to take a "measured duty of care".

Currently, on most objective grounds, an argument can be mounted that the level of pest management on Crown lands is inadequate to ether address the real pest problems or to adequately support the efforts of neighbouring landowners who are affected by pests on both sides of the boundary fence.

Obviously some would argue that there will never be enough funding to totally address the true pest problems on every site. This is a reality that we must all face. Also there are many other competing priorities for environmental expenditure. A priority setting exercise is needed to at least focus available resources. This must be supported by policy setting exercise to increase the quantum of resources overall.

Nevertheless, despite the overall size of the problem, we would not like to see a defeatist view prevail. In reality, the pest animal problems can be addressed more easily and cheaply than the pest weed, salinity or soil erosion problems at many sites and thus this may be one of the most beneficial expenditure options (though we do not suggest for a moment that the other problems should be left unaddressed).

We have tried to highlight that there are many ways to increase the effort and ability of landowners to address pest problems. These are not necessarily very costly. Removal or simplification on restriction of landowners to take action would cost nothing and save everybody much time and expense. We certainly should not be making it more difficult for anyone to do anything in this field. This is totally the wrong approach. We should be removing barriers and impediments for action wherever possible. We can focus on the positive encouragement of responsible actions rather

than focus negatively on preventing any possible mis-use of control techniques by overly restrictive regulation.

Better resourcing of the VPC and the VPC conference could be achieved for trivial expenditure by a committed federal government. Providing tax concessions or modest subsidies for pest management expenditures on private lands would probably achieve high multiplier effects. The expenditure on pest management within crown lands will be more effective if neighbouring landowners are also encouraged and supported to take collateral actions (and visa versa). Pest animal management on private land can also be supported by improved resourcing of the direct support groups like landcare and state authorities and boards. These groups are under-resourced at present. Support to industry groups could be considered to help alleviate regulatory overheads and achieve economies-of-scale.

TOR 4 Consider scope for industry groups and R&D Corporations to improve responses to Landowners

Industry groups, such as ourselves, can make a significant contribution to the overall approach to pest management but our resources are limited to the relatively small margins available from providing technologies to the market for pest animal management.

Other industry groups such as meat and livestock, wool, and even tourism agencies that depend on native wildlife can all contribute and all have potential to objectively guide the process at many levels. There has been a significant move in the right direction by these agencies supporting the AIA-CRC proposal and also by meat and wool industry bodies directly supporting research towards developing improved technologies. This is easily justified on economic grounds and is a recognition over recent years that more action is needed on the whole pest animal problem. There is also a need for all industry bodies with an involvement in the overall utilisation and management of lands in Australia to make a contribution to pest animal management. Environmental agencies could be better resourced to contribute, as could many other groups outside the traditional grazing animal industries. The funding requirements over the long term are large and only a cooperative and additive approach by all participants will be effective.

Greater involvement of rural merchant chains and independents could be facilitated by changes in restrictive regulations and this would further increase the overall ease and convenience of pest management as well as expand the “people resources” over wide geographical areas. There are several thousand professionally trained agronomists within the rural merchant system who already advise farmers on weed, insect and fungal pest problems. It is a small step to also involve them with actions on vertebrate pests in conjunction with existing supporting agencies. The grains industry has recognised the potential for improved and more pro-active approaches to mouse management in Australia. With the assistance of the grains industry and many state agencies we have brought a new approach to prevention of major mouse plagues by user pays adoption of new technology in the MOUSEOFF® project. We have separately worked to improve skills on rabbit management within the merchant

system in the RABBAIT® project and this has enhanced the ability of both small and large landholders to take appropriate measures to control rabbits.

Many of the problems currently experienced by both small and large landholders in Victoria, as a result of the introduction of the ACUP system and extensive paperwork, could be overcome by making baits available from approved rural merchants to landholders who are approved to use baits by DPI staff. The approval to use baits could be an enduring right, once an initial training and possibly property inspection, but could be withdrawn if any mis-use was identified. This approach would simplify approaches at many levels and would not increase bait costs to farmers since the merchant system would probably distribute with lower margins and higher efficiency that the present government system. This approach would release skilled staff at the DPI depots from the need to sell baits and would allow greater constructive focus on coordinating programs and training or inspecting new participants (i.e. harnessing the people resource). This approach would be welcomed by farmer groups and would bring the provision of vertebrate pest animal products more into line with other agricultural chemicals. The difference would be that individual landholders would require a specific approval to access baits. This approval would not be given, for example, in the peri-urban fringe where risks to pest would be judged to be high.

The Federal Government should not leave the burden to industry alone, especially since industry is also contributing to species diversity and the protection of crown lands from pest animal problems. A process of matching funds or other support can achieve big multiplier effects. Support for industry placement, education, public awareness and support for industry to attend local and overseas scientific meetings can be encouraged.

This raises the important question of succession planning at all levels.

Many of the current generation of pest managers are over 50 years of age. There is a continuous loss of skills and experience from the field. We have perceived that many of the new participants have been educated in an environment of chemical aversion and of ecological complexity so that they are reluctant to take effective actions. This is not always the case and there are notable exceptions. However, the skills base of those who can remember dealing with the massive rabbit plagues of the 1930's and 40's is being lost and the transfer of knowledge and experience across generations is imperfect.

There should be some consideration given to methods to encourage longer term participation in the industry of pest animal management and the retention of skills by the most experience people. A failure to do this will lead to a loss of expertise and experience and the new generation will be reinventing still more wheels.

A second strategy to address the issue of succession planning is to encourage and support more objective and targeted education at many levels. Some of this is at the graduate and postgraduate level and should involve universities and agencies as well as the new CRC. Other education can be focused at the TAFE level for better training of "hands-on" operators. Vertebrate pest management should be a subject within any balanced agricultural or resource management course in much the same way as disease of insect pest management is studied. Industry (such as ourselves)

should be involved with the design or delivery of such training to maximise the vertical integration and we need direct support to do more of what we are already doing for nothing on very thin budgets.

Local and overseas post graduate training should be supported to enable future managers to have the required academic acumen to spot, address or dismiss the inevitable “red herrings” of pest management over time. We have had to do a lot of this over the last 15 years and we are under resourced to perform this role at present. A failure to achieve this will lead, in the long term, to lower industry standards, to confusion and a lack of uniformity towards common approaches that are based objectively on fact.

We need a grand vision for the future and we need to take a view that extends well beyond any electoral cycle or government grant cycle (**see article in Part 3**).

We believe that the future of pest management will require planning that looks towards 10, 20 and 100-year horizons. Some very long term vision is needed now to achieve this. Much has been done and we do already have sufficient knowledge for some pests to plan a long way ahead. For other pests there is a shortage of information to enable very long term planning. In the latter case the plan commences with research and collation of better knowledge while in the former case the plan commences with coordinated application of existing technologies.

TOR 5 Consider ways to promote community understanding and involvement

WE have already recognised the need for greater community involvement in the pest problems of Australia.

There is an enormous amount of mis-information and false information being repeated as fact and many operate in a climate of fear rather than enlightened encouragement.

Unfortunately, the required technical skills are held by a relatively small group of aging professionals (with as usual some notable exceptions to this generalisation). In a vacuum of professional opinion the opportunity for folklore to thrive is great. This folklore has pervaded the pest field at many levels and there is a massive task to re-educate people who are presently ill advised, and also to commence a strategic process of improved education of young people before they are corrupted by folklore. We are not suggesting a brain washing approach here but there is a need to redress the balance by providing proper facts at many levels.

We have put a lot of energy and time into preparing a distributing factual education booklets and training videos/DVD’s throughout Australia. These have all undergone an extensive peer review process prior to release. These have since been the basis of some duplication and re-invention and in some ways this is very flattering. Some of the duplications or reinventions have been handsomely funded whereas we have prepared the originals without often without support.

We are in constant touch with the landowners and wildlife mangers agency staff and also with the regulators. It is a sad fact that the former groups are becoming increasingly frustrated by the actions of the later groups – with the middle groups having a real case of schizophrenia! There is a need for improved communication and steps must be taken to encourage a constructive interchange between groups who are otherwise ideologically opposed.

3 A discussion of the pervasive nature of pest problems

The following section is a transcript of a discussion paper entitled "**Industry perspective on rabbits – what are the main problems?"** given at an informal meeting to recognise the achievements of the pioneering scientists who tested and released the myxoma virus to control rabbits in Australia some 50 years ago. The meeting proceeded under the title "**Rabbit Control Forum – the next 50 years"** and was hosted at the Pest Animal CRC in Canberra during October 2001. The forum was sponsored by the Bureau of Resource Sciences, Pest Animal Control CRC and CSIRO.

Our brief was to celebrate the importance of the achievement of myxoma as a bio-control agent but to also provocatively raise some issues of pest management, with a particular focus on the rabbit. The paper is deliberately "tongue-in-cheek" at times but does seek to tease out some of the shortcomings of the approaches taken. We have included the paper as part of our submission since some of the issues raised are of direct relevance to the terms of Reference of the enquiry into pest animals.

3.1 Summary:

We are an industry group involved in both the research and application of technology for pest animal control, thus our perspective is necessarily focused on outcomes that are desired by the landholders. In this paper we have attempted to steer away from the minutia of technical deficiencies, to focus more closely at what we perceive as 'structural problems' of attitude and approach that may limit our future national endeavours to maintain adequate control, or even eliminate, the rabbit problem in Australia. This paper does not pretend to present a complete list of problems or an exclusive list of potential solutions to those problems identified. However, the solutions suggested, for the most part, do not require great expenditures since they relate to improved communication, cooperation and focus in the short to medium term. **The immediate solutions do not require major new technology or infrastructure. This is not surprising given that one of the main tenants of this paper is that we have a lot of good technology that lacks appropriate application, as distinct from a shortage of appropriate technology.**

Before raising problems, it is appropriate that we first rejoice in the 'biological breathing space' afforded to the nation by release of the myxoma virus some half a century ago. We can acknowledge the importance of the achievement and the pioneering scientific spirit of those who took the risk at the time. However, though undoubtedly the most successful rabbit control technique so far released, myxoma, like all other available or perhaps even proposed techniques, would fail the 21st century *test for perfection* for efficacy, reliability, safety and humaneness as a solution for rabbits. All techniques have their deficiencies and risks but, for the most part, each technique may be applied appropriately where the *balance of acceptable risk* is in favour of use, and provided the overall result of application is positive compared to the risk of doing nothing. Moreover, there are opportunities for greater integration of available individual options (chemical, biological and physical) and for better extension about their proper integrated use, even though no individual option is perfect in isolation.

While encouraging more effective adoption, we must also be aware of the risks of derailment of any component of the suite of control options, or potential control options, by vested interest groups who distract the agenda or promulgate misleading or inaccurate information. Such processes place additional burdens on regulators and reviewers who must have the skill to sort and assimilate divergent inputs. These regulators also have a challenge to establish a more unified approach to chemical regulation across state boundaries and to support and encourage a move towards improved standards in respect to all options and across all jurisdictions.

We must also move away from reactive management of pests such as rabbits and avoid the tendency to decrease effort when pest numbers are low. This reactive approach leads to the traditional boom-bust cycle of infestation and damage and does not adequately alleviate the longer-term aspects of environmental damage by persistent low infestations or periodic plagues. A corollary of this approach is that programs need to be sustained long term and that planning must exceed the traditional government departmental funding cycles of only 3 to 5 years.

Finally, there must be a redistribution of effort slightly away from research and a little more in favour of the extension and application of existing knowledge. This is to ensure that research findings do find an application. Hopefully, with a commercially focused delivery phase, as can be achieved with increased participation of industry groups in the process, there may be an opportunity for further technology changes and extension efforts to be subsidised by both the public and private sectors.

3.2 Introduction

This title was allocated to me as part of a celebratory occasion to mark the first 50 years of the impact of the myxoma virus on the European rabbit in Australia.

Being asked to speak about “problems” is a little different to my normal ethos, which is to focus on successes and achievements. We prefer to write about the positive aspects of the battle with vertebrate pests rather than to dwell on the shortcomings and failures, even though we recognise that we must learn from the latter. Many in industry despair at the present tendency of science to highlight shortcomings of available technology for pest animal management, while failing to fully acknowledge the tremendous work and positive outcomes that arise daily from the same technology.

In this context, and in an attempt to steer away from the minutia of technical deficiencies, I have attempted a more light-hearted, but possibly also controversial view, of what I see as the more structural problems of the present approach to pest animal management in Australia. The paper is presented in the spirit of “*someone had to say something*”, but I am obliged to highlight that the author is a technologist, not a trained philosopher, economist or historian. Given this deficiency of appropriate qualifications, I hope to be forgiven the license of stepping a little outside my normal technical field to ramble over some aspects of the history, economics and philosophy of rabbit control, and to try, by example, to highlight the **structural problems** we see from an industry perspective.

However, before launching into an identification of ‘problems’ it is appropriate on this occasion that we should first celebrate and acknowledge the significance of one of the most successful bio-control initiatives since the unfortunate introduction of the rabbit to Australia.

3.3 Homage

On this semi-centenary of myxomatosis we all stand in the shadow of what must rate as the most effective rabbit control technique yet released in Australia. With all the benefit of half a century of hindsight we may now make judgment on this towering success story of rabbit control.

Has myxoma been effective? – a resounding yes.
Has myxoma been cheap? – a resounding yes.
Has myxoma been target specific? – a resounding yes.
Has myxoma been adopted and embraced by the majority of agencies and landowners? – a resounding yes.
Has myxoma provided a sustained impact? – a resounding yes.

The reason why my generation does not have personal experience of a devastating rabbit plague is due primarily to the impact of the myxoma virus. No other single measure has done so much for so long to save Australia from a menace of breathtaking consequence. We should rightly salute those pioneers of science who had the courage and perseverance to try the introduction of a virus, and by doing so, to give the rest of us half a century of biological "breathing space" to enable the development of supplementary measures to overcome the rabbit menace.

However, like all control options, myxoma is not without shortcomings and it cannot be regarded as a perfect control measure.

Humaneness is certainly questionable. While it is doubtful that any control technique would be entirely stress free for a pest animal, there is little doubt that a bio-control agent that delivers a prolonged clinical phase myxomatosis, characterised by severe malaise and blindness, would fail the accepted hurdles of humaneness that are now imposed and expected. The development of resistance or tolerance and/or the progressive attenuation of the virus appear to have lessened the impact of myxoma over time. Also, since the virus requires appropriate insect vectors, there has been great variability in occurrence geographical scale and impact of outbreaks of myxomatosis.

This means that the myxoma virus cannot be totally relied upon for rabbit control within or between regions or across time.

This is no great surprise!

What self-respecting parasite would annihilate its host and what self-respecting host would fail to mount a protective immune counter attack? Viruses and hosts just are not that stupid, at least not those which are still around. Finally, as a freely disseminating biological control, the myxoma virus is not reversible. Reversibility, we contend, would be a desirable characteristic of the 'perfect' control agent.

Are there lessons here for the future of bio-control?

While others are certainly more qualified to judge the scientific detail of myxoma, we can all see the potential for self-disseminating biological control to *decimate* a pest species. But students of the dictionary will recognise that decimate means to "divide into tenths" or more loosely to "reduce by one tenth". It does not mean annihilate or reduce to one tenth. Thus, by saying that myxoma has *decimated* the rabbit population, we are drawing attention to the obvious fact that some rabbits remain.

Nevertheless, despite these shortcomings, this method of rabbit control has been effective overall and the release of myxoma should rightly be regarded as the most successful of all techniques so far attempted. We have raised the known deficiencies of the technique simply to enable consideration of one of many structural problems that have the potential to paralyse new approaches to management of pests such as rabbits.

3.4 Is the process of risk evaluation balanced and complete?

In the context of my charter of raising problems for discussion, I would suggest that myxoma would not be allowed to be released if it was suggested as a new rabbit control option today.

An army of critics would point out that it is not totally effective (it does not work perfectly so why take the risk) it is inhumane (so fails the welfare test), it requires complex biology (insect vectors are not reliable), it will not provide a long-term solution (resistance/attenuation), it might mutate (to affect non-targets) and it cannot be reversed (so if problems arise they cannot be prevented).

Opportunistic critics would probably also add (usually without substantive evidence!) that the release of myxoma would reduce the food available for desirable birds of prey, cause "prey switching" of foxes to bandicoots and increase the risk of grass fires due to decreased grazing pressure etc. With recent experience there is little doubt that a similar fate would have greeted the calicivirus had not other factors taken the debate out of everyone's hands!

Had the consideration of problems or potential problems for myxoma ruled the day some 50 years ago (as we feel they increasingly do today), the myxoma virus would have stayed in its incubator and Australia would have suffered an environmental and economic calamity. Who would like to stand up today and take responsibility for this, had it occurred? Who would face the angry landowners and environmentalists who would have suffered billions of dollars damage over the last 50 years if the myxoma virus had not been released? Who would have taken responsibility for the empty rural towns surrounded by unusable desert?

The lesson of history is simple here: Some deficiencies in pest management techniques have to be tolerated if the *balance of acceptable risk* is in favour of implementation overall. We perceive a risk that there is increasing failure of process in making this balanced judgment, as the framework for review becomes more complex with many new technologies that involve many more agencies and 'stakeholders'. We further contend that the evaluation of risk should not only consider the direct risk of the technique, but should view this in the context of the risk of "doing nothing".

There is a potential impact from a failure to properly evaluate the *balance of acceptable risk* that may lead to unreasonable restriction of control options.

The process of review is becoming so complex that it becomes almost an intellectual impossibility to adequately assemble the facts and give priority to the key issues. The cynical would note that if enough confusion and mis-information is raised by vested interest groups, the simplest approach for conservative regulators is to do nothing. The 'do nothing' approach certainly minimises the risk of something going wrong with the new technique but, unfortunately, it also fails to solve the original pest problem. It is essential that men and women of good judgment, skill and integrity are able to evaluate projects in detail. The hurdle for acceptance and adoption for any new technology must be set somewhere lower than "absolute effectiveness and safety". A mechanism for accepting imperfections in any technique is needed.

3.5 Are debates on the rabbit problem being derailed?

Before turning to the present and perhaps also to gaze into the future, I would like to beg indulgence to look a moment longer into the past. Historians tell us that gazing into the past can sometimes lead us to better steer towards the future, but being a poor historian, I am also bound to observe that, in my experience, looking in the rear vision mirror doesn't always prevent an accident when driving forward!

Those of my generation, born in the second half of last century (i.e. most of us!), have only read in the history books or watched fading black and white movies about the devastating plagues of rabbits of the first half of the last century. While these plagues provided food and sustenance for rural communities during the great depression, and contributed sport and recreation for later generations, it can be fairly said that rabbits have done little else for the rural economy and Australian environment.

We may occasionally hypothesize from the ivory towers of tenured academia that these lovable critters provide good substrate for hats and coats, help keep the weeds down, form the basis of a hypothetical major meat export industry, and somehow help to deliver Easter eggs. However, the reality is that the rabbit is an introduced pest that has been responsible for inflicting some of the worst environmental mischief ever seen on this finely balanced natural and man-made (read agricultural) ecosystem.

Despite the obvious damage, we sometimes still hear that we should perhaps rethink the problem and review the rabbit as a resource. Somehow this "radical new" concept will define the problem away. Someone has obviously been reading the great texts on lateral thinking. It certainly is a good way of stopping sensible conversations and wasting time at conferences. However, the concept of finding a use for, and thus to justify, this entirely lovable little European in Australia has about the same intellectual merit as suggesting that we plant the noxious weed serrated tussock grass as a bio-control to crowd out thistles! Harvesting a sub-sample is a nice concept of lateral thinking and likely to solve part of the primary problem, but at what long-term environmental and economic cost? It amazes those of us in industry, and certainly those on the land, that these suggestions persist for longer than a coffee break. It is even more surprising that some lucky people are even paid for the privilege of prolonging the discussion beyond lunchtime where possible.

The simple reality is that rabbits do not belong in the Australian environment. There is no ideological problem with setting an objective or "mission statement" to get rid of every last one, however unlikely it is that this goal may be achieved. Defeatism breeds defeat.

Yes, some rabbits do have a role as pets, as food sources, perhaps even as fur coats or as lawn mowers, but in the big picture they are overwhelmingly devastating to the Australian physical, floral and animal systems. There is no doubt where the balance of effort should lie. Though the concept of utilisation of pests should be aired, it is perhaps now time that this and some of the other more esoteric "red herring" debates were curtailed and consigned to the great Australian filing system appropriately established for the storage of bovine scats.

3.6 Are we habituated to reactive pest management?

Let us return again to the fact that there are still many rabbits causing problems. Less perhaps than half a century ago, but then I am reminded that you can't be half pregnant. We still have rabbits and the damage they do is still very serious, albeit that it occurs in a quiet and insidious fashion: A few seedlings this month, a bit more erosion and another bilby lacking a nesting site next month.

Unfortunately it is difficult to get politicians fired up about just a few rabbits. Plagues are what they want! Then they can react in numbers with commensurate force, bring out the big artillery and organise a workshop, start a programme, appoint a coordinator, set up an office and perhaps, for a major plague, christen a whole new government department, and perhaps even win a seat for the national party. Now this is the good old-fashioned reactive management and there is nothing quite like it for engendering "integrated", "strategic", "coordinated", actions between "stakeholders". Of course there is much less requirement for such draconian actions if there isn't a plague…. or is there?

How important are just a few (million) rabbits? I think this question was answered for me in a conversation with amateur rabbit historian and former colleague, Brian Coman, who has considerable empathy for, and long experience of, the Australian landscape. He noted to me, as an elder would pass on wisdom to the next generation, that we are missing the insidious nature of the rabbit problem.

While watching the setting sun from a hill overlooking the picturesque part of central Victoria known as Sutton Grange, he asked me what I saw. I was quick to answer that I saw lush grassland dotted with fine specimens of mature red gums. It was just as I remembered it as a boy on my first rabbit shooting expedition. Nothing had been disturbed. Brian agreed; nothing had been disturbed in my generation. Then, after a pause that held a moment in time frozen for an eternity, Brian asked: "how many red gum seedlings can you see?" The sun was surely setting on the mature forest but there was a gap of perhaps three human generations of regrowth. It will be for our children's children, to marvel at the old stumps amongst the beautiful lush grassland which is just as they saw it on their first satellite-guided digital laser rabbit hunting expedition.

The impact of low and oscillating numbers of rabbits is slow, is insidious and is almost certainly being underestimated. Unfortunately, the traditional focus of pest animal management is focused on the reaction to plagues rather than on the prevention or early treatment of plagues.

More recently, we hear of the impact of new control techniques in reducing rabbit problems. With the advent of the calicivirus many of those rabbits that were starting to defy myxoma have succumbed to the newest viral weapon. Again we rejoice in the biological breathing space this has created and the politicians and agencies can rest assured that everything is, once again, under control. Or can they?

The politicians may relax, but this luxury is not afforded to the poor little seedling that needs four years to reach a size where it is no longer vulnerable to a hungry rabbit! It simply is not good enough to solve rabbit infestations for three out of four years, if the subsequent resurgence of even low numbers can send slow-growing plants back to oblivion.

It is equally not sufficient to obtain "a high level of control" because even low and sporadic rabbit infestations can do enormous ecological damage. This is the insidious nature of the rabbit problem. It is a bit the same for managing mouse or rat infestations in crops. Most landholders, agencies and administrators react to the major plagues when numbers are obviously high. However, very often the most significant crop damage can be done by relatively low-level infestations that are allowed to persist largely unnoticed.

3.7 Is total control a worthwhile objective?

We must not lose sight of the fact that those few rabbits that remain after a chemical, physical or biological control programme have the potential to do much of the damage that the whole population did before the control. Also it remains obvious that the few that remain will, as surely as night follows day, get together to give rise to exactly the same problem again in the future. This is one thing that rabbits do well! This is their survival strategy and they apply it effectively.

There is a tendency to underestimate the importance of achieving total control and the effort deceases prematurely when most rabbits have gone.

Fortunately, this aspect has been recognised by agencies that have seized on the opportunity to mop up survivors of the release of the calicivirus. Medium term follow-up campaigns were launched to stimulate a variety of follow-up measures. These programmes like the multi million-dollar "Rabbit Buster Initiative" in Victoria have much merit and should be applauded. Very often they provide a stimulus for physical treatments such as harbour destruction and ripping of burrows and warren systems that provide expensive but very long-term outcomes for local areas.

However, even when these programmes are diligently applied with great success, they are seldom followed through to conclusion over the very long term. The average life expectancy for a government initiative seems to be about three to five years. Perhaps this relates to the electoral cycle, or is the limit of the commitment possible under forward budgeting, or perhaps it is equivalent to the duration of an individual's appointment to a job before moving to a higher position in administration, or the length of time a department can maintain the same name. Whatever the reason, these timeframes do not relate well to the biology or scale of the long-term problem being addressed.

The durations of most major programs are too short because they are based on short-term expediency rather than proper commitment to ultimate success.

The present decline in support funding for the RCV follow-up work, and for the monitoring of pests including rabbits, when they are not in high numbers, is of concern. Both will ultimately lead to a requirement for reactive management responses in subsequent years. Surely we could avoid this accident by glancing in the rear vision mirror of history!

3.8 Is the balance right between research and application?

A similar commentary applies to the maintenance of long-term support for basic research, even though we would observe that generally the 'research industry' has been better supported over the long term than the effector 'industries'. The advent of new structural models for research have certainly changed the timeframes of funding towards longer-term research programs, but, to our judgment the issue is more to do with the balance between research and application, than quantum or duration of the research itself.

Our concern is that *research* seems to have underestimated the need for *development.* People talk of **'R&D'** glibly but we have a majority of just '**R**', or at the very best '**R&d**' with very little '**D**'. Research, by itself will not solve the rabbit (or other pest) problems. There needs to be adoption and application of practical derivatives of the fundamental research. We are pleased to see a refocus along these lines by the CRC on bio-control and hope that as industry partners we may assist in this process. The principle applies to all aspects of rabbit control.

However, recognising the issue is not as good as doing something about it! We would contend that there is far too much funding emphasis on the 'R' at the expense of the 'D', yet both are needed equally.

Additionally, achieving development only makes it a practical outcome. It does not mean that the practical outcome is adopted. There is another aspect that is required before the 'R' and the 'D' can be applied. This is collectively referred to as extension and training, or the '**E**' and the '**T**' of pest animal management. Once we would have just said extension, but in our decade of involvement with Australia's pest animal problems, we have recognised that there is a need for education and training as well as extension.

Too little emphasis is given to development and extension compared to research, and there seems to be a problem with this imbalance being addressed while the research is largely within commonwealth agencies, while the extension is largely a responsibility of state agencies.

Fundamentally, we have all been trained into a culture that seems to say, "research will address the problem". To us, this is only one third of the response needed. Research without development and development without extension is an expensive folly that the agricultural industries and Australian environment cannot afford.

You will notice that we have identified an issue of the state and federal demarcation of extension and research respectively. We know that this is not absolute. Some good research is done in state agencies and some extension is done by Commonwealth agencies.

We do not believe however that Commonwealth extension initiatives have always been well focused or effective. Sadly, it appears that some Commonwealth pest programs have been driven by ideologies and dogmas that have contributed to confusion about the direction of pest management in this country over recent years. This has been a frustration to the state effector agencies, we in industry and also to landholders who desperately need immediate help rather than ideologies. We have referred obliquely to these issues above as great ways to occupy the time between reading the paper and morning tea, but we do not believe that they should occupy the rest of the day. We think this frustration is felt by landowners also who are generally dealing with immediate problems.

3.8 What is the role of industry?

At the outset of this section, I declare a conflict of interest and bias since I am involved with the 'industry' that services technology for the control of vertebrate pests. So far as I am aware, this is not yet a gazetted crime.

Over the last decade our small corporate team has focused on bridging what we saw as a serious gap between research and application in vertebrate pest management. The gap required development of systematic products of high effectiveness, high quality and with appropriate supporting information to enable high levels of adoption. We have focused on the '**D**' in the R&D process. We have tried to produce better support materials and training aids to assist with extension, training and education (i.e. with 'E' and 'T'). Our seminar programs, videos, technical booklets, pamphlets and newsletters all form a part of this process. Our small team has an impressive track record and most of our work has been self funded.

We also provide a resource for the rural communities and agencies to be able to answer technical matters and to provide other support. A good example of this was our critical role,

under emergency conditions in 538 hours, to fully document the RCV project for regulatory authorities in Australia and New Zealand after the escape of the virus from Wardang Island. More recently, we have prepared submissions for NRA reviews of certain control chemicals and other measures.

As we are largely independent of state and federal political issues, we are perhaps also able to raise unencumbered commentary on issues of pest animal management, such as in this paper, without being tarred with a vested interest in any particular state or federal camp. We are unashamedly focused on helping landholders to address problems at every level. The concept of being able to raise issues on behalf of industry and farmers is a vibrant part of interchange that may help overcome barriers and stimulate cooperation, even if some issues are unpalatable.

Unfortunately, however, despite a total commitment to quality and ethics over many years we believe the role of industry has been both underestimated and mis-interpreted by some in the vertebrate pest arena. We sometimes encounter prejudice and dogma that 'all companies want to do is make money from the pests', or that 'companies can't be trusted to do things right' or that 'pest control techniques are too dangerous or too difficult to allow them to be handled by private companies'. This is a very sad view held, fortunately, by very few. But it does arise from time to time. It would be easy to dismiss this as simply more material for the aforementioned storage system for bovine scats! However, it is an attitude that has the potential to undermine and devalue a lot of good work, so must be addressed.

Clearly there must, in the past, have been some unfortunate interactions between some private and public sector agencies that engendered a climate of mistrust. But not all companies are alike and the vast majority of companies, especially these days, hold to the highest standards of technical and commercial ethics. To do otherwise would severely prejudice their commercial success in the long term.

Fortunately, only a few members of a few agencies take a shortsighted negative view of the private sector. However, in the interests of achieving a joint approach to very major problems, those who make such naïve comments should think carefully about calling the 'pot black'. We do not deny that some commercial operators fail to reach the pinnacles of excellence to which most of us ascribe, or even that errors of judgment are not made in good faith. Equally, as one who has occasionally been required to professionally review and investigate technical, scientific and regulatory aspects in certain public sector agencies, I am in a good position to observe that the public sector is not without its deficiencies or errors. Whilst never above proper criticism or challenge, we submit that private companies have an increasingly important role to play in the continuum of pest management. Fortunately, I can also report that there is an increasing level of trust and understanding between public and industry sectors.

The traditional response to vertebrate pest problems by government has not taken full advantage of the potential for industry to assist in many ways.

Industry can provide the technology and marketing to help bridge the gap between research and application. Industry can, by virtue of establishing good quality products that are fully approved, bring a new level of confidence and quality assurance to the control of pests. Industry can help develop integrated approaches in which extension information is focused on achieving an IPM approach. Industry can assist in education and training, particularly if, in conjunction with local experts in each state, we can 'train the trainer'. Industry can operate effectively on a national basis or even internationally to achieve economies-of-scale to reduce real costs and to achieve a more unified approach. Industry can bring into the 'R, D, E and T continuum' a greatly increased number of distribution and advisory points to provide an amplification of research results and technologies.

But these are not the only ways industry can contribute. One area, which is overlooked, is that industry can assist in the transfer of responsibility for pest animal management from government to the individual landholder. The provision of products that are purchased directly by landholders alleviates this requirement from government and brings vertebrate pest management into line with all other agricultural and environmental issues. Generally this is the direction of thinking for most agencies in most fields. However, in the vertebrate pest field some rise in horror and indignation at such a thought, given the long-standing role of some agencies in providing these services.

However, the smart thinkers recognise that the provision of technology is generally done more efficiently by the private sector. Moreover, if this component of pest animal management is undertaken by the private sector the resources of the government agencies are freed up for more strategic activities. Handing some activities to private industry should not form a basis for a reduction in public sector input…far from it. The transfer of some responsibilities simply allows a redirection and refocusing of the public resources to where they are most effectively engaged.

A good example of this has been in the area of fox control, where it is far more valuable to have a local authorised officer coordinating a group campaign than having the same operator's time absorbed in the process of purchasing bits of offal for a day of injecting on the back tray of the utility. The coordination activity is a far more valuable application of skilled local expertise than casual bait production, since it will lead to a regional coordination as distinct from the local service of an individual landowner. This also applies to mice, rats and of course to rabbits.

Although the task is far from complete, the work of our own company (with acknowledged and appreciated involvement and assistance of many collaborating agencies) has led to safer, more effective and more systematic methods of fox control in rural areas (FOXOFF®); new techniques for humane destruction of urban foxes in dens (DENCOFUME®); improved low-dose methods of using pindone to control rabbits (RABBAIT®), and provided regulatory dossiers for the emergency approval of RCV. Perhaps most importantly, in terms of short-term impact on protecting large areas of crops, we have introduced zinc phosphide technology for the control of plague rats (RATTOFF®) and mice (MOUSEOFF®) while reducing the non-target and residue risks from previous anticoagulant control of rodents in crops. These achievements stand as testimony to the potential contribution of industry to the vertebrate pest problem.

Having taken the liberty of the plug for our own activities we do not ignore the contributions of others. We have been fortunate and privileged to receive excellent cooperation by many agencies with whom we interact and there is no doubt that such interactions enhance our ability to help and deliver quality outcomes and good technology. Nevertheless, we are not so bold as to suggest that any of these technologies can be classified as 'perfect'. Just as the myxoma virus has some problems, so do the techniques in which we have played a major role. None are 'perfect', none are totally without risk and none have entirely solved the pest problems they address. All we can say is that the new products are well founded and overall, if used wisely and appropriately, the benefits from their application far outweigh the costs and risks of their use.

3.9 Can industry solve Australia's pest animal problems?

With the list of successful products above, and technologies provided by other industry groups, the casual observer might conclude that we must be right on top of the rabbit

problem (and other pests). Yet everyone knows we are far from this utopia. In fact, having the technology is only part of the solution. As we have stated earlier in respect of myxoma, one of the features of ideal technology is that "it is adopted and embraced by the majority of agencies and landowners". This ideal has not been achieved by the vast majority of alternative control techniques.

Bulldozing and harbour destruction is an excellent option in some parts of Australia, but impossible in others. It is expensive and cannot be done well in granite country or some high value lands. Equally, 1080 carrots cannot be used in semi –urban areas and is difficult to manage in some regions where access to and instability of carrots present problems. Pindone bait is generally more expensive and, because of a multiple dose requirement, may be unsuitable for large-scale control in Australia, yet is ideally suited to control of rabbits in the semi-urban fringe or where bulldozing is impossible. Fumigation with aluminium phosphide tablets is cheap, effective and relatively risk-free, but does not provide a long-term solution and is not able to be used in sandy country where rabbits do not always burrow. Fumigation with chloropicrin is hazardous and almost certainly inhumane and should probably be phased out even though it is highly effective. Explosive destruction of burrows or perhaps even putative deoxygenation via propane gas ignition may have merit, but also are not proven and not without operator and environmental hazard. The ethics of death by explosion are questionable if alternatives are available. Control of reproduction does not stop rabbits eating.

The list could go on, but the point is that every one of our current control options is imperfect, just as myxoma has been imperfect for 50 years. This does not mean that the techniques should not be used but it does place a requirement for stewardship and guidance.

The products themselves can provide some supporting guidance by way of approved labels, instructions and instructional materials. However, this is not enough to achieve adoption by a majority of landowners. Industry and products generated by industry cannot alone supply the 'magic bullet' of rabbit control. Something else is needed.

The essential additional component is an extension network that is well funded and pro-active. This can be organised on a state or regional basis but must be empowered locally. There is an ongoing requirement for application that should not be overlooked by any agency or politician.

The loss of extension services and the decline in landcare support has weakened the ability to effectively deliver rabbit control options to landholders.

3.10 Structural problems that inhibit national approaches

Finally, I respect of structural problems we should raise the complexity and inconsistency of the state and federal regulatory controls across Australia. One thing that every industry groups strives for is economies-of-scale. This means producing the most products through a fixed overhead and following an initial outlay of development capital. Overheads include the physical facilities, stockpiles and regulatory servicing costs (termed 'compliance overheads' in industry jargon). These costs can tie up skilled staff and are a very expensive component of any registered product. Achieving greater uniformity of the approach over larger jurisdictions helps to spread overheads and results in both cheaper products for landowners and better levels of technical support.

The problem in Australia, throughout the vertebrate pest area, is that we face inconsistencies across state boundaries. The most ridiculous example of this arose for us in the nature of

the warning sign to be placed on the gate of properties conducting fox control. We recognised that the offset printed cardboard signs used by many agencies did not last well (often becoming unreadable in a single day), were often too small to be noticed, could not be reused and carried a slightly different warning for each state. We sought to overcome this by printing the A3-sized FOXOFF® sign onto corflute plastic and silk -screen printed in waterproof and UV resistant inks. Such a sign was larger, more visible and lasted for the duration of a programme. Moreover, it could be re-used and, if printed on a large scale, could be produced and supplied cheaply (even supplied free with the product). We collated the various wordings of all the various signs from different states and prepared a combination of words that covered the main points. This, together with all existing signs, was submitted to the Vertebrate Pest Committee in about the mid 1990's for comment. We expected that this peak body would be able to assist in standardising or harmonising the wording for the gate signs on fox control projects. Although agreement was required on only about 10 words, to this date we have waited more than five years for a response to our letter!

Regulatory requirements differ in detail between various state boundaries. This reduces the potential for economies-of-scale that would arise from a national approach.

This example illustrates the problems of trans-border difficulties faced by industry. The problems for more detailed recommendations and restrictions are even greater. The number of agencies that can become involved is large and may include the national bodies such as the national Registration Authority, Environment Australia, and the Drugs and Poisons Committees. There are established procedures for obtaining review and approval via these national agencies that have the capacity to consult widely in formulating policy and direction. Industry supports this national approach.

However, we often find additional overlap when it comes to working with the five states and two territories. State environment agencies, chemicals branches, state departments of Health, Lands and Agriculture, local Boards, and other statutory and non-statutory bodies each have their own perspective and requirements. Achieving uniformity is difficult in such a complex milieu. When the state agency is itself in the business of producing its own products while at the same time acting as regulator, the potential for blatant conflict-of-interest also becomes a factor.

Industry is caught between agencies that seek conflicting requirements within single state and also when different restrictions or permit processes arise across boundaries. Landolders who face the same pest doing the same damage in the same situation on both sides of an arbitrary border view these confusing regulatory differences with derision. They highlight the need for greater cooperation across boundaries, and we would suggest that many state agencies should defer some of these responsibilities to the appropriate national bodies that have been established for this purpose of unified standards.

3.11 What are the directions for the future?

This is a difficult area. We are so busy with effectively achieving the present priorities that we tend to leave the future in the hands of others with long-term research funding. Nevertheless, my paper on "problems' would not be complete if it did not contain at least some constructive suggestions for overcoming the structural problems we have identified.

1 Firstly, I hope that there will be a drift away from the hypothetical and a refocus on the practical. From our own industry perspective, driven in part by a need to deliver immediate outcomes, we must adopt a simple three-phase strategy as follows:

a If it works safely then apply it wisely,

b Understand the problem before fixing it, and
c Take the most obviously simple approach first and only complicate if required

We must avoid the destabilising consequences of "jumping at shadows", even if we encounter isolated outcomes that do not fit the general rule. Nor should we blindly accept industry dogma without checking the basis first.

This seems to be a sensible approach and one that we have focused upon. It seldom takes us to international research conferences but it has been estimated to have yielded a benefits of several hundred million dollars worth of lambs, other stock and crops for Australian farmers. The benefits to wildlife cannot be valued easily.

This approach is, of course, focused on more effectively applying existing knowledge. It does not mean that we should not support or, where possible, be involved with longer-term research on new techniques. Long-term research will gradually contribute to improved approaches to the rabbit and other pest problems. It is just a question of timing, emphasis and balance, as we have stated above.

2 Secondly, let us encourage a cooperative approach involving public and private sectors working together to address some of the structural problems that I have highlighted in this paper. This has already been an important feature of what we have achieved and I doubt that there has been a single project that has not involved excellent teamwork from most agencies, particularly at the state level. The concept can be taken further however, particularly in the process of risk assessment and review. This process needs to become less adversarial and there needs to be mechanisms for dismissing some of the red-herring arguments that are often raised for mischievous purpose and for improving constructive dialogue.

3 Thirdly, we should not resign to defeat and surrender the Australian environment to any pest. We should not allow the next generation to lose the wisdom of the last in recognising that the problems of the first half of the last century can and will re-emerge if we relax.

4 Fourthly, we must strive to move away from reactive (crisis) pest management, that has characterised the past, and to move towards proactive strategic management. Lethal control, where needed, can be used early to prevent pest build-up rather than to knock down high pest numbers. In this way, the use of pesticides is preventative not curative. Ultimately, fewer chemicals are required; control can form a sensible part of an integrated approach (IPM) and crop or stock damage is minimised. The biggest challenge is to encourage adoption of this approach in broad-acre crops and pastoral industries against a highly variable occurrence and course of plagues and infestations.

5 Fifth, we must act to break the climate of fear and misunderstanding which has the potential to bring many of Australia's pest management programs to a standstill. Folklore takes time to fade, especially when perpetuated by those who have a limited understanding of the true risk and are motivated by a philosophy that doing nothing is the safest option.

6 Sixth, there is a need for better balance between the rush for "new and improved' techniques against better application of existing technology. The latter is too often ignored for the former and we must be careful to ensure that existing and proven technologies are not lost in the rush to explore new horizons. We need to rejoice in the many successfully run programs with outstanding outcomes for farmers and the environment.

7 Seventh, we should be more critical of those who see logic in finding problems with existing products and technology as a justification for the next method, and we must critically

appraise some of the lateral thinking that diverts resources away from the primary issues. This approach has no end, and will undermine any commitment to new technologies if they, in turn, are to be undermined in this way. At worst, a failure to recognise this threat could leave Australia's pastoral and cropping industries with no confidently applied pest control techniques.

8 Eighth, we must continue the present trend towards improved quality assurance and standards. It is simply unacceptable to allow potent chemicals or other control measures to be released in packaging that does not meet appropriate standards imposed on chemicals in all other applications. We should also strive for greater uniformity and standardisation across boundaries and jurisdictions that, unfortunately, are not observed by the pests we are trying to manage.

9 Ninth, we must support and recognise that responsible industry groups have an important role in bringing existing or new technology to the rural communities. This applied aspect is crucial for the successful application of pest animal management technology and has been much neglected.

10 Tenth, we must recognise that the development of simple, safe and effective products for pest management is but one part of the approach to Australia's significant problems. There remains a need for these technologies to be embraced objectively, for problems to be worked through as they are found and for a sustained effort on information transfer, education, extension and local service. The latter requires vibrant local effector agencies organised on a regional or industry basis, so it is imperative that advisory structures remain in States to provide local service and advice.

Hopefully, by these processes, we will overcome some of the structural problems that appear to be restricting a comprehensive long-term approach to management of the rabbit and probably to the management other vertebrate pest species. With improved focus, better utilisation of, and support for existing resources and some commitment to outcomes, we hope that future generations will applaud our efforts in the same way as we can now applaud the pioneers of myxoma.