Proceedings of the Feral Pig Action Agenda

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5- 20







MEAT & LIVESTOCK

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<u>Contents</u>

FOREWORD	4
SESSION 1- A threat to Australia	5
Threat Abatement Plan for predation, habitat degradation, competition and disease	6
transmission by feral pigs	
Mike Braysher	
Feral pigs: an industry perspective	8
John Stewart	
Two hundred years of effort has spread not controlled the feral pig	9
John Auty	
The feasibility of eradicating feral pigs from mainland Australia	11
Quentin Hart	
Eradication – some principles for consideration	13
R W Gee	
The relative importance of feral pigs in potential exotic disease outbreaks	15
Chris Bunn	
Feral pigs and foot-and-mouth disease	17
R W Gee	
Transcript of Session 1 discussion	19
SESSION 2- Current research and control methods	22
Feral pig research in north Queensland	23
Jim Mitchell	
Cape York Peninsula feral animal survey (feral pigs & brumbies)	26
Jamie Molyneaux	
Adaptive management and demography of feral pigs in southern Queensland	28
Steve Lapidge	
How did pigs of Noorama make a living? A molecular-ecological approach to feral	31
pig management	
Peter Spencer	
The feral pig situation in NSW and recommendations for future action	33
Glen Saunders	
The Rural Lands Protection Board System in NSW and feral pig control	35
Chris Lane	
Feral pig management by NSW National Parks and Wildlife Service	38
Chris Banffy	
Transcript of Session 2 discussion	41
SESSION 3- Improving control methods	44

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The National Feral Animal Control Program and its involvement in feral pig research <i>Quentin Hart</i>	45
Target-specific delivery systems for alternative feral pig control toxins Bob Parker	47
Economics of feral pig control in north Queensland David Smorfitt	50
Feral pig control and research activities in Western Australia Laurie Twigg	53
Virally vectored immunocontraception is <u>not</u> a viable option for feral pig control <i>Tony Peacock</i>	56
Understanding the level(s) of control required to minimise the threats posed by feral pigs to native species and ecological communities	58
Transcript of Session 3 discussion	60
SESSION 4- Improving coordination	62
Improving coordination- Electronic data collection and transfer <i>Tom Garret</i>	63
Transcript of workshop on improving feral pig management coordination throughout Australia	64
SESSION 5- Priority issues	67
Transcript of workshop on identifying priority issues on feral pigs	68
SESSION 6- An Action Agenda	71
Transcript of workshop on producing a Feral Pig Action Agenda	72
A Feral Pig Action Agenda	74
Outcomes from the Research Meeting	
PART A: Key issues with feral pigs.	75
B: Feral pig control measures.	76
C: Current Australian Pesticides & Veterinary Medicines Authority reviews relating to feral pig toxins.	78
D: Registration of a commercial bait.	80
APPENDICES	
A: Print media articles relating to the Feral Pig Action Agenda	81
B: Radio media articles relating to the Feral Pig Action Agenda	87
C: Parliamentary letters resulting from the Feral Pig Action Agenda	90
D: Ministerial responses from the Hon. Ministers Kemp and Truss	92
E: Update - Cattle Council lobbying activities regarding Feral Pigs	94
F: List of participants	95

Foreword

This workshop agrees:

In recognition of the damage caused by feral pigs to animal welfare, the economy and the environment, and the potential for the animal to serve as a host of several endemic and exotic diseases of livestock and humans, the largest ever national workshop on feral pigs was held in Cairns June 2-3, 2003. Representation at the workshop included scientists, veterinarians, state and federal government representatives, private enterprise, and industry representatives. The general consensus of the meeting was that:

- 1. Eradication of the threat from feral pigs is the long-term goal. This will require the development of more effective control techniques and technologies.
- 2. The immediate objective is to minimise economic, agricultural, public health and environmental impacts and risks through development and implementation of a National Strategy and Action Plan for the management of feral pigs through the use of currently available techniques.



Feral Pig Action Agenda Chairman, Dr Jack Giles, leading discussions.

Session 1

Feral pigs

A threat to Australia

Draft Threat Abatement Plan for predation, habitat degradation, competition and disease transmission by feral pigs

Mike Braysher¹ and Robert Moore²

¹University Of Canberra ²Environment Australia

The Threat Abatement Plan for feral pigs sets the national framework to guide the coordinated implementation of the objectives and actions to contain the spread of this threatening process and to manage the impact on threatened species and ecological communities as listed under the *Environmental Protection and Biodiversity Conservation Act*, *1999* (EPBC Act).

The Plan recognises that feral pigs are but one of a number of landuse and other factors that can impact on nationally listed threatened species and ecological communities. Successful management of the environmental threat due to feral pigs requires an integrated approach that also addresses a range of threatening processes and other sustainability issues associated with land management practices.

Feral pigs are common and widely distributed over large sections of Australia. While their environmental impact is not well quantified, based on the threats listed for nationally threatened species, they threaten the long-term survival of several species of native plants and animals. Their impacts may be direct through predation of native animals or consumption of native plants or less direct, for example by facilitating the distribution of the root-rot fungus *Phytophthora cinnamomi*.

Except on islands, it is not possible to eradicate feral pigs with currently available technology. Consequently, management needs to aim for sustainable control of the damage caused by feral pigs based on current or realistically predicted levels of resources. Knowledge about the biology of pigs, their impact, distribution, social and economic consequences, regulatory controls, management techniques and strategies and research need to be incorporated. The Commonwealth Government has contributed to developing current knowledge in this area with \$513,000 being allocated to feral pig research and management since 1994/95.

The Plan recognises that community perceptions of feral pigs vary. Feral pigs are viewed as an agricultural pest, an environmental pest, an animal of cultural value, a food resource, a commercial resource, an endemic and exotic disease hazard and a recreational hunting resource. Some of the methods used to control feral pigs also raise animal welfare concerns. While the depth of concern and the range of groups with an interest will vary, a local/regional feral pig management plan is unlikely to be successful unless the full range of interests and concerns are identified and the relevant groups and individuals are fully consulted.

Five main objectives are proposed to manage the threat by feral pigs:

- 1. Prevent feral pigs establishing in areas where they currently do not occur and where they are likely to pose a threat to nationally listed threatened species and ecological communities.
- 2. Quantify the impact that feral pigs have on nationally listed threatened species and ecological communities.
- 3. Increase awareness and understanding of the damage that feral pigs cause and what can be done about it in both the general community and amongst relevant land managers.
- 4. Promote a coordinated and integrated approach to managing the damage that feral pigs cause that takes account of the issues and restrictions due to all land users in the area.
- 5. Improve the effectiveness and humaneness of techniques and strategies for managing the damage due to feral pigs.

It is recommended that, where practicable, an adaptive management approach be adopted to managing feral pigs. The aim is to formulate management programs in a way that will increase knowledge about the responses of ecosystems and take into account people's attitudes and consequently, to progressively improve policies, and better design studies and management programs. This approach can be applied by designing each feral pig management program as an experiment from which to learn and build on existing knowledge. It has the potential to greatly improve our knowledge about the damage that feral pigs cause and how best to manage it. Critical elements of an adaptive management program are stakeholder consultation, the use of models of how management and ecosystems interact, the use of experimental design principles, monitoring of results and on going review as understanding grows.

The Threat Abatement Plan will be reviewed in five years or earlier if significant new information indicates that an urgent update is needed.

<u>Inclusion by Editor</u> *The draft feral pig threat abatement plan is available from* <u>*http://www.deh.gov.au/biodiversity/threatened/tap/pigs/*</u> Public comment period will close on <u>Monday 10 November 2003</u>. Written comments on it should be sent to: The Director, Threats and Threatened, Environment Australia, GPO Box 787, CANBERRA ACT 2601 or email: threats@ea.gov.au.

Feral pigs: an industry point of view

John Stewart

Executive Councillor, Cattle Council of Australia and Vice President, AgForce Cattle

My background over the past fifty years has been in property management in the Kimberley, the Northern Territory and North and Central Queensland. While the worst populations of feral pigs that I have been aware of are in the Gulf country of North Queensland, I am very much aware that the problem is a nation-wide one.

AgForce participated in the Draft Queensland Feral Pig Management Strategy and understands that other States either have or are developing strategies. Cattle Council of Australia (Cattle Council) is making every effort to initiate a workshop where the Commonwealth, the States and Industry work together to establish a National Feral Pig Management Plan, which not only establishes strategies but deals with both on-going management and funding. Industry believes that while control is vital, eventual eradication should be the goal.

Industry believes that feral pigs are as much of an environmental hazard as the concern over their ability to spread disease with an exotic disease incursion into Australia.

Cattle Council has been advised that our estimated feral pig population of 23 million is the largest in the world. This means that there are nearly as many feral pigs in this country as there are cattle. If an exotic disease was to take hold in the feral pig population we would be facing a massive eradication operation followed by many years of intense surveillance before our trading partners and the international health body, the OIE, were convinced any disease had been eliminated.

Cattle Council's immediate concern is the environmental and economic havoc feral pigs are inflicting on Australia's farming and rural communities. This needs to be addressed.

The Queensland Strategy has five desired outcomes:

- 1. Effective management of feral pigs.
- 2. Effective feral pig management is supported by appropriate resourcing.
- 3. Effective and strategic use of resources through collaborative and co-ordinated pest management planning.
- 4. Strategic research is directed towards more accurately defining the problem and effective management solutions.
- 5. The community accepts that feral pigs are everybody's concern.

Industry supports these desired outcomes.

While it appears that this workshop has been initiated to discuss research, both current and desired, industry expects to see discussion as to how to progress a National Feral Pig Management Plan.

Industry looks forward to being part of the processes.

Two hundred years of effort has spread not controlled the feral pig

John Auty

Sus scrofa the wild boar of Europe and the old world generally, the putative ancestor of the infinite variety of domestic pigs, and hence the feral pig of Australia, has become extinct in the wild form over much of its former range. This has resulted from destruction of habitat, closer settlement, competition by organised husbandry, and hunting pressure. In Europe preservations has had to be active. It is clear that given the intent and the creation of suitable conditions the feral (wild) pig can be eradicated. In his paper Bill Gee explores the necessary methods.

The pig accompanied the first white settlers to Australia and became the livestock of the smallholder. It was grazed in the unfenced forest and supplemented with household waste and spoilt grain. These essentially primitive breeds became uncontrolled and essentially feral very early. In November 1795 Governor Hunter brought in an order to control wandering pigs, the most heavy sanction being confiscation by government. By the end of the 18th century pig numbers could only be guessed at because of flooding of the Hawkesbury but their nuisance was such that Hunter on May Day 1799 ordered confiscation of pigs found within the paling protecting the Tank Stream Sydney's water supply.

As farming spread throughout the continent the pigs became feral wherever the environment suited them. This distribution resulted at first by carriage by man, but populations spread to the physical limits of habitat suitable for the pig, or until deserts, mountains, or water acted as impenetrable barriers. To overcome such barriers man was necessary. And just as pigs spread into suitable environments they died out, or rather were killed out as human occupation became more intensive.

As it became obvious that the pig was a serious problem to the agricultural industries, attempts were made to control them. These usually took the form of bounties and if populations were high and concentrated, (they) were a useful addition to the wages of stockmen. Naturally it was good economics not to shoot breeding females, these kept the population up.

In 1950 and 1953 Murray Pullar recorded current knowledge on feral pigs. He concluded that pigs were a serious problem and required combined action. After reduction of numbers in controlled areas these should be protected by quarantine barriers. There was no follow up action.

As motor transport became more readily available sport hunting with dogs and rifles became commonplace. This has had two negative outcomes: shooters have reseeded or seeded, new areas and hunting dogs have escaped to replace the solitary dingo over much of its range, with serious secondary effects on the pastoral industries.

Sporting shooting in turn has generated the industry of export of feral pig meat to countries where the wild pig has become virtually extinct. This industry which encourages the maintenance of populations will attempt to discourage any attempt at eradication. It should receive the same treatment as the rabbit industry.

As an example (pilot) of what can be achieved I in 1948 had responsibility for 12000 stud merinos on 16000 hectares of Barcoo river country including scrub country and river frontage. The area was securely fenced and watered form frontage water holes, earth tanks and flowing artesian drains. Taking advantage of a failed rainfall the pig population was eradicated (determined by lack of sightings and spoor on water frontages) using a combination of baiting and shooting, with meticulous attention to fence patrol, destruction of carcasses, and oversight of supplementary feeding points.

Since 1960 the feral pig has colonised new areas including the east Kimberley. Control is clearly not working. It is time to come to an understanding that the only control possible is that which is directed at eradication. All sectors with the exception of the feral pig meat industry, and the apparent exception of the feral pest authorities desire that we address a realistic program based on the methodologies which proved successful in the eradication of the feral (hunted) cattle which were infested with animal diseases which severely constrained our export markets.

The feasibility of eradicating feral pigs from mainland Australia

Quentin Hart

Bureau of Rural Sciences, Canberra

Despite the fact that no widely established, common pest animal has been eradicated from the Australian mainland, there continue to be sporadic calls for the eradication of various species – the most recent of these being the proposed eradication of feral pigs based on the belief that this will reduce the risk of exotic disease spreading and being maintained.

Definition

We need to be clear what we mean by the term 'eradication' as many people use the term loosely to mean what is more accurately described as high level population knockdown. Eradicating feral pigs from mainland Australia means the *complete and permanent removal of the entire population by a time-limited campaign.*

The requirements for feral pig eradication

Six criteria (Bomford and O'Brien 1995) can be used to assess the feasibility of eradicating exotic species:

• Rate of removal exceeds rate of increase at all population densities

This will clearly be difficult for feral pigs which are fecund and occur in a wide range of habitats, many of which are remote and/or montane and heavily forested. The range of available control techniques will also be limited in areas where there is poor vehicle access and/or which do not lend themselves to aerial shooting or baiting. Disease eradication may require a reduction in the density of host/carrier animal to a density at which transmission is virtually eliminated. However, animal eradication requires reduction in density to a level at which successful mating is compromised and reproduction is less than mortality and this density is usually considerably lower.

• Immigration is zero

Feral pigs are a mobile pest animal which occur over a wide range. Given the labourintensiveness of current control techniques (given that aerial baiting and shooting will not be appropriate for many situations) it is simply not possible to intensively target the entire feral pig population over a short time period to avoid immigration from no/low-intensity control areas into neighbouring high-intensity control areas. Reintroduction of pigs from escaped/released domestics and wild pigs moved around by recreational hunters will also act as an ongoing 'immigration' source.

• All animals are at risk

Feral pigs are intelligent and often secretive animals and we know from current programs that some pigs are difficult to remove using the range of current control techniques. The fact that in some parts of the feral pigs range there are no or very few appropriate control techniques makes it highly unlikely that all animals can be removed with current technology.

• Animals can be detected at low densities

Not feasible given the remoteness and vegetation cover of much of the feral pigs range.

• Discounted cost benefit analysis favours eradication over control

The above criteria suggest that eradication is extremely unlikely and the attempt would be prohibitively expensive.

• Suitable socio-political environment

Compared to say, feral horses, there would be minimal public and therefore political resistance to the concept of feral pig eradication. However, given that private and public expenditure on pest animal (excluding rodent) management in Australia is probably only around \$100 million per year, and a feral pig eradication attempt would cost many times this, it is unlikely that there would be political support.

Conclusion

Based on the above, the most prudent use of public resources is targeted management in those areas where pigs are currently causing unacceptable levels of agricultural and environmental damage whilst preserving funding for the possibility of more widespread population knockdown if there is an exotic disease incursion in the future. This is combined with enhanced barrier protection to reduce exotic disease incursion risks and contingency planning to ensure targeted management of feral pigs as required in the event of an incursion.

Ref: Bomford, M & O'Brien, P (1995) Eradication or control for vertebrate pests? Wildlife Society Bulletin 23: 249-255.

Eradication – some principles for consideration

R W Gee

Australian Veterinary Association

There is little Australian experience in animal species eradication, except with species eliminated or endangered by habitat destruction. The Tasmanian Tiger may be an unfortunate example but is unlikely to present an answer to feral pigs. Restriction of dingo populations by the dingo fence and rabbit abatement through myxomatosis and calicivirus may offer some clues. Feral cattle and buffalo numbers were substantially reduced in tropical regions in the BTEC programs.

The author was fortunate to have had practical participation, as a shooter, in a Northern Territory Top End feral pig control program on a single station in 1967. This was conducted as an exotic disease exercise. Six riflemen accounted for 600 pigs on the first day, 1700 in the first week and 2300 over a fortnight. It showed that we could put a serious dent in a population in friendly country. We surmised that follow-up to wider clearance would be protracted but hopefully not impossible.

However, the author has also had 50 years' more useful experience in animal disease control technologies and it is possible that such programs may offer some assistance.

Major successful Australian national eradication initiatives include

- contagious bovine pleuropneumonia
- bovine tuberculosis and brucellosis (BTEC)
- foot-and-mouth disease from Indonesia

These three programs were considered near-impossible by overseas experts.

Unsuccessful programs directed at major diseases include

- cattle tick
- Johne's Disease

These two programs, so far are unsuccessful, due to inadequate technologies and divided producer support.

From this experience, some principles and criteria have emerged which could serve as a basis for the eradication of feral pigs.

It is most unlikely that any overseas experience can be easily transferred to the Australian environment and our political culture.

Principles for future schemes must include

- community recognition of the need for the program and acceptance of its downside and costs
- funding from governments and all direct and indirect stake-holders
- justification by cost-benefit analysis
- satisfactory technologies for eradication surveillance

clear area protection from re-infestation

- animal welfare considerations

Based on these political principles, program strategies would need to include

- delineation of the pig numbers and geographical distribution
- natural and regional boundaries
- establishment and protection of pig-free regions
- reduction in pig populations by a nationally co-ordinated program using all acceptable destruction methods available
- long term research into eg biological control methods
- cessation of the export of ' wild pig meat' (without compensation)
- heavy penalties for harbouring
- stricter bans on swill or waste feeding of all pigs
- establishment of a national co-ordinating body to manage the program

It is inconceivable that Australia will be prepared to live with the feral pig menace in perpetuity. The sooner we move towards a national program, the less will be the continuing damage and risks, the lower the eventual costs and the higher the benefits.

The relative importance of feral pigs in potential exotic disease outbreaks

Chris Bunn

Office of the Chief Veterinary Officer; Agriculture, Fisheries and Forestry — Australia

Considerations

- The likelihood of feral pigs being involved in the introduction of infection
- The likelihood of feral pigs being involved in the establishment of infection
- The potential role of feral pigs in maintenance and spread of infection.
- The potential difficulty feral animals would pose with respect to regaining diseasefree status, either regionally (zoning) or nationally

Ecology of feral pigs

- Population of ~13.5 to 23.5 million
- Wide range of habitats
- Group behaviour (commonly 1-10, occasionally >100)
- Range (females 1.5 19.4km² males to 43km²)
- Density
- Scavengers, feeding on refuse and carcases
- Wallowing habits may increase the probability of disease transmission
- Dispersal limited by lack of water and shelter

Potential exotic diseases

Foot-and mouth

Infection through ingestion (danger of feeding swill)

Potential amplifying host, but: short period of infectivity; no carrier status; disease effects will reduce risk of spread

Classical swine fever

Spread through swill feeding. Because of the carrier status likely to persist in the wild. Could kill many feral pigs

African swine fever

Dependent whether competent ticks are present – thought unlikely

Aujeszky's disease

Latent infection occurs in pigs - could become a long term problem

Japanese encephalitis

Needs close pigs/bird interaction. Certainly could establish in Australia, but less likely to persist than in overseas countries.

Swine influenza

Potential to cause epidemics of acute respiratory disease

PRRS

More a disease associated with intensive piggeries

Nipah/Hendra

Questionable whether spread from pig to pig would continue long-term

TGE

Disease tends to be self limiting

Vesicular stomatitis

Dependent on vectors being present

Swine vesicular disease

Spread is erratic, hard to predict how the disease would behave.

Screwworm fly

One of many potential hosts

Trade and market access

OIE compartmentalisation

Recognition of epidemiologically distinct populations ('compartments'). Zoning or regionalisation is one way another is wildife/livestock separation being recognised in principle:

Preparedness

- Planning:
 Wild Animal Management Manual
- R&D: wildlife and exotic disease program (WEDPP)
- much work on pig ecology and population reduction
- shift to broader surveillance issues

Monitoring and surveillance:

- Wildlife Health Network
- Northern Australia Quarantine Strategy etc.

Enhanced biosecurity

- to reduce contact between feral animals and livestock
- targeted feral animal control (higher risk areas)

Conclusions

The probability of feral pigs playing a major role in the spread of FMD is not high. The high consequences of FMD drive perception. The potential role of pigs is often over-rated. Goats may be more of a problem than pigs. In an incursion, resources should focus on control in livestock with situation-specific assessment of populations of feral animals and any possible need for local control Nevertheless, it is prudent biosecurity to minimise contact between feral animals and livestock and especially where there are high concentrations of livestock (e.g. feedlots)

It is also prudent to break potential exposure pathways (e.g. auditing control of swill-feeding) and to continuing exploring modelling approaches further (epidemiology and wildlife population)

AUSVETPLAN

Feral pigs and foot-and-mouth disease

R W Gee

Australian Veterinary Association

Feral pigs are clearly a threat to our environment, native flora and fauna, human health, animal health and to our export and tourism industries. There is a plethora of reasons to eradicate these pests, but the consequences of major exotic disease raise a significant economic justification.

More than **20** diseases exotic to Australia can affect pigs. These include many transmissible to other domestic species and some to humans. Vesicular stomatitis, vesicular exanthema, Aujeszky's disease, Japanese encepalitis, rinderpest, rabies and Nipah virus are prime examples. But the most significant threat is foot-and-mouth disease (FMD).

The potential cost of FMD to Australia was most recently estimated by the Productivity Commission (report of 12 June 2002) and its estimates have not been seriously challenged

- losses of export revenue from over \$3billion for a short outbreak to over \$9 billion for a 12 month outbreak
- additional losses of revenue from domestic sales from \$2 to \$3 billion
- total cost to the national economy (reduction in GDP) \$2 to \$13 billion
- control and compensation costs from \$30 to \$450 million.

There have been some misguided attempts to minimise the potential role of feral pigs in FMD establishment and transmission, but there are several incontrovertible facts –

- pigs are susceptible to FMD as are the other cloven-hoofed species
- FMD is generally most severe in cattle and pigs
- infected pigs exhale vast quantities of airborne FMD virus 300 times as much as infected ruminants
- FMD outbreaks classically commence in pigs accessing animal feed wastes eg the UK in 1968 and 2001
- feral pigs scavenge on garbage tips in rural areas and on the seashore
- feeding of animal wastes to pigs is legally banned in Australia but some will be taking place
- pig shooters are well known to trap, relocate and feed feral pigs for subsequent release and hunting
- feral pigs roam in very close proximity to domestic ruminants at least in the eastern States

Pigs are most commonly infected by ingestion of FMD-infected material but they transmit FMD mainly by respiratory aerosols. In the 2001 UK epidemic, direct spread by aerosol or fomites from the index property, a piggery, is believed to have led to at least 14 of the additional 70 infected properties in the Northumberland group.

In light of this knowledge, it is reckless to suggest that feral pigs are unlikely to play a part in an FMD outbreak in Australia. They might not be involved if a primary case were quickly detected and remote from feral pig populations. But if an FMD case were even near a feral pig interface we would have serious difficulties in FMD control and in convincing overseas trading partners of eradication success. There are no satisfactory international codes or guidelines to cover this type of situation.

Australian experience has shown the difficulty of satisfying overseas trade countries of emerging disease problems that can affect exports.

Prime examples followed our discovery, in 1977, of bluetongue virus infected insects in the Northern Territory. This led to the USSR banning shipments of frozen sheepmeats and China banning imports of our wool. Codes go out the window under the pressures of livestock industries' lobbying and quarantine insecurity. Canada threatened us with bans on beef imports (as a retaliation to our bans on pork and salmon imports) unless we could prove that our cattle arboviruses, exotic to Canada, were not transmissible through meat.

It would be extremely difficult to satisfy trade partners that feral pigs were not involved in FMD epidemiology in more remote areas. If feral pigs were suspected to be involved, extensive pig control and long-term surveillance would be essential to prove FMD eradication. The process could take years.

The risks of terrorism through FMD infection of feral pigs adds even more compellingly to the case for action.

It is surely in the national interest, as part of our exotic disease risk-minimisation strategy, to reduce numbers in a controlled program on the path towards feral pig eradication.

Transcription of Session 1 discussion: A threat to Australia

*Discussions not listed were generally because speakers could not be heard or did not identify themselves.

JACK GILES: Can we make a start please. I would like some guidance as we proceed with these workshops as to how you are most comfortable with them being run. I would really like us to focus on the outcomes of this workshop to get some real items to address and some real progress forward. I recognise, I think we all do, that there is some polarisation in positions relating to objectives. I would like us to recognise that they both exist and that all of us would share in common goals, but the degree to which they can be achieved will be a matter of some real debate.

From my experience, eradication of feral pigs is very difficult. I was involved in a program on Lord Howe Island that was successful. It is a tiny island. I used bribery of the locals and shame to get them active and offered to pay \$10,000 for the last pig shot on the island and no one ever claimed it. So it is very difficult to not only achieve eradication on any sort of scale, it is also very difficult to know when you have achieved it.

TONY PEACOCK: I am interest in to know whether anyone is arguing whether it is impossible?

JACK GILES: I put that to the floor. Hands up those who think it is impossible.

JOHN STEWART: Well aren't we full of a country of losers!

JACK GILES: I would like to be constructive in this. I just wanted to get that point. It was well made.

MIKE BRAYSHER: Can we just focus on the issue and keep the personal side and labelling out.

PETER KENNY: Where we start is with the connotation of the word eradication. Definition of a feral pig is one that is not in captivity. There is an understanding that of course we can never get rid of every pig that is in the wild. We need to come to an understanding as to what we actually mean by eradication.

BILL GEE: I think this definition of eradication needs a bit of fiddling. You tend to think eradication means total eradication from the whole nation. I think you have to relate it spatially.

JACK GILES: I think resources are something we are going to have to address, and how to get resources irrespective of the objectives that we set.

BILL GEE: It is a starting point towards eventual eradication. With all these disease programs that I mention we always started of with regions, but our goal was always eradication. You always start at the easy places, you don't start at the hard bits.

STEVE LAPIDGE: Eradication should be discussed in terms of its dictionary definition. That being the total removal of feral pigs from Australia. Reducing feral pigs to a low level is not eradication.

BILL GEE: That doesn't matter. We have accepted that we have eradicated TB, but we also accept that it can keep spring up.

STEVE LAPIDGE: But a low level is not eradication.

JACK GILES: The reality is that we proceed in stages over time on well-coordinated and integrated programs and carefully chosen priority areas. If we do that we will know whether or not eradication has been achieved with current technologies or future technologies.

ANONYMOUS: Discussions about BTEC and taking steps towards eradication. Changing the mindset of people is the only way to go as eradication not achievable tomorrow or even in the next 5 – 10 years but a change of events leading to possible eradication.

JOHN AUTY: Once a program is in place and the real problems emerge then the research money will flow. That has been our experience with such exercises.

LAURIE TWIGG: Example of feral goat eradication campaign in W.A. Rate of increase was greater than the rate of removal. Landholders realised eradication was not possible, lost interest and within two years the program collapsed due to lack of support at the grass roots level. So I think we have to be careful about setting unrealistic goals.

JACK GILES: Need for a group of objectives that we can address and work towards. We need to define a goal.

PETER KENNY: Concentrating on control means that is where we will stay. There is accountability in the word eradication because it is a finite thing that we are aiming at.

ANNE PORTEOUS: Concentrate on some interim steps, which is the what, who and how, with

eradication as something in the future. Need for achievable stages to start, and then map out some medium and long-term priorities.

JACK GILES: What are the key elements that limit effectiveness of feral pig management at this stage.

JOHN MUMFORD: Hunters are a resource. Small criminal element of hunting fraternity relocating pigs, not general law-abiding hunters. We need to get serious about enforcement. Wildlife can be a resource.

TOM GARRETT: Current annual export value of feral pig meat is about \$40M, or \$18M in Queensland. 365,000 carcasses per annum, 2,300 accredited harvesters in Queensland.

SHAUN SEYMOUR: Areas need to be prioritised.

STEVE LAPIDGE: Many landowners want feral pigs as an economic resource, creating reservoirs left to breed up and making eradication not possible.

CHRIS BANFFY: Pig seeding out of control in NSW National Parks. Needs to be addressed.

KEVIN STORY: There is no national feral animal control strategy as there is with weeds. Start at getting National Feral Animal Control Strategy signed off at the highest level, then the resources will start coming in.

JOHN STEWART: All members may not support a program. Small group from workshop required to talk to governments and industry. It is what is good for the industry as a whole that concerns industry.

MICHAEL HARTMANN: Need to come to an agreement on desirable end point and an achievable objective.

KEVIN DOYLE: Need for Australia to define something suitable for most people and an objective. Different techniques can be used in different parts of the country. Program can be defined according to the available technology.

LAURIE TWIGG: We are premature in discussing goals after only one session.

ERIC DAVIS: Basic objective is to minimise agricultural and environmental impacts and risks.

JOHN AUTY: Are there any people here from WA, SA, NT prepared to make a statement that they can declare areas pig free? This can be used as a starting point.

JACK GILES: Lets put it to the meeting for inclusion on the agenda for discussion at a later time.

MIKE BRAYSHER: 60% of agricultural production comes from the Murray Darling Basin, and this is the area that attracts most government resources. We must realise that we are competing with these causes for funding, which is limited.

BILL GEE: Long-term objective must be eradication of feral pigs, with an immediate priority to minimise the agricultural and environmental impacts and risks.

LINTON STAPLES: Progress towards localized eradication is a worthwhile national goal to minimise agricultural and environmental damage.

JACK GILES: Localised eradication worthwhile, but I have some concern over the time and money spend on managing localised areas to the detriment of other areas. Fundamental problem of coordination and organisation.

GLEN SAUNDERS: Need to add one word to statement, sustained. Any strategy needs to be sustained, otherwise we are wasting our time and the situation often ends up back to where it started or worse.

GRAHAM ALEXANDER: Strategy needs an end point as an ultimate objective.

JACK GILES: An objective I would further to this one is to make the best use of available skills, technologies and resources.

KEVIN STRONG: As a step forward we need to decide who is going to take on this national strategy.

ANONYMOUS: Need to support Commonwealth Feral Pig Threat Abatement Plan.

JOHN STEWART: Industry has very little input into feral pig control. We need a national approach.

BILL GEE: Animal health authorities have more experience and get more political support.

JACK GILES: I don't think there is the political acceptance that the problem is severe enough to warrant support.

ANONYMOUS: Need to raise the profile of feral pigs to get community and political support.

LAURIE TWIGG: Most states do not rate feral pigs as the same problem as Cairns.

KEVIN STRONG: Need list of pest animals of national significance signed off at the highest level, irrespective of where they occur. Example of Rubber Vine in Queensland.

ERIC DAVIS: Vertebrate Pest Committee being reviewed. National strategy needs to get national Resource Management and Primary Industries Standing Committees working together, not in isolation.

TONY PEACOCK: Kevin's suggestion is an excellent one. The number 1 thing we should take from this workshop is that we need a National Vertebrate Pest Animal Strategy in order to form a guide to a National Feral Pig Management Strategy.

JOHN STEWART: Agree with Tony, but need to identify goals, who should be involved and how best to achieve this.

KEVIN DOYLE: Agree with Tony Peacock about the need for a National Strategy, and need to form a group and define who does what.

JOHN MUMFORD: Need to identity the definition of industry.

ANNE PORTEOUS: 'How' needs to be included in the goal i.e. through the development and implementation of a national feral pig strategy.

ANONYMOUS: Sustained needs to be incorporated into the goal.

LINDY SCOTT: I would like to end on a lighter note with a limerick.

Will we kill the last feral pig If this is only rhetorical who gives a fig Lets agree on a plan to act and then scan The results of national strides that are big.

Session 2

Current research and control programs

Feral pig research in north Queensland

Jim Mitchell

Dept. Natural Resources and Mines, Charters Towers

INTRODUCTION

Feral pigs (*Sus scrofa*) are a significant problem in Queensland. Research programs have been undertaken to enhance control effectiveness, and to provide information to develop best practice management strategies. Feral pig "research" in north Queensland has basically been restricted to the past 12 years. A number of research projects have been undertaken, some completed, some still underway and some just starting.

1. PAST RESEARCH

1.1 Feral Pig Digging within the Wet Tropics World Heritage Area

The association of feral pig ground digging activity with a range of environmental variables were examined in the wet tropics. Approximately 4% of the World Heritage Rainforest soil has been disturbed by feral pig diggings. Significant differences in the amount of diggings were detected between highland and lowland areas and between habitat types. Diggings were more prevalent in lowland areas and coastal swamp habitats. Diggings were positively associated with roads, tracks and moist drainage lines. *Mitchell, J. (1993). Systematic assessment of feral pig damage and recommended pig control methods in the wet tropics World Heritage Area. Final report to the Wet Tropics Management Authority. Mitchell, J. (1997). Diggings by feral pigs within the wet tropics WHA of north Queensland. Wildlife Research.24(5) 591.*

1.2. The Effectiveness of Aerial Baiting for Feral Pig Control.

This study assessed the proportion of a feral pig population that consumed aerially distributed baits incorporating a non-toxic biomarker (lophenoxic acid). Baits were distributed at a rate of 18 baits km⁻² over 70 km⁻² of a seasonally inaccessible habitat. 63% of the pig population were considered to have consumed at least one bait. *Mitchell, J. (1998). The effectiveness of aerial baiting for control of feral pigs in north Queensland. Wildlife Research.* **25** (3) 297.

1.3. Aerial Baiting: Aerial Baiting with Contrasting Intensities and Seasons.

A second aerial baiting study to determine the relationship between baiting intensity and bait uptake during both wet and dry seasons. Approximately 12 baits/pig (50 baits/ km⁻²) were required to be distributed in the wet season and 52 baits/pig (150 baits/ km⁻²) required in the dry season to achieve a theoretical 100% population control. A significant difference in baiting effectiveness (population control) was observed between the seasons, 81% for the wet season and 49% for the dry season. *Mitchell, J. (1999). Aerial baiting of feral pigs in north Queensland: Effectiveness compared under contrasting baiting densities. Report to Wildlife and Exotic Disease Preparedness Program. Bureau of Rural Sciences. Canberra.*

1.4. Ecology and Management of Feral Pigs in Rainforests.

Introduced feral pigs have become established and widely distributed throughout all WHA habitats and are perceived to have a severe negative impact on the conservation values of the WHA. The general aims of this study were to obtain quantifiable information on selected aspects of feral pig ecological impacts, to evaluate parameters of feral pig ecology and to utilise this information to develop a preliminary management strategy for feral pig control within the WHA. The major findings were

- Identification of spatial and temporal patterns of feral pig diggings. Diggings were positively related to seasonal rainfall (soil moisture) patterns. Most diggings occurred in the early dry season and predominantly in moist (swamp and creek) microhabitats. The majority of diggings were concentrated in only a small proportion of the total WHA area.
- Feral pigs were not shown to have an overall impact on the survival of tree seedlings. However diggings did significantly increase the death rate of seedlings within specific moist microhabitats and decreased the germination levels of seedlings within specific dry microhabitat. Some evidence was found that seedling survival rates were recovering after being protected from pig diggings for the 2 year study period. No significant effects of pig diggings were detected on leaf litter, root and earthworm biomass or on soil moisture levels.
- No evidence of the hypothesised large-scale seasonal migration was found in this study. Pigs were sedentary (mean movements 1.03 km) and stayed within their defined home ranges. Pigs on the rainforest/crop ecotone have established home ranges that vary in size due to seasonal influences. Males (7.9 km²) and females (7.3 km²) both have larger mean home range size in the dry season (7.7 km²) compared to the wet season (2.9 km²). The aggregate mean home range size was 5.5 km². No difference in home range size was detected between the sexes.
- A sample of 336 pigs were trapped, most (56%) were less then 12 months of age with less then 5% of the population older than 5 years of age. Females have an all year breeding pattern, birth peak in the start of the wet season. The prevalence of pregnancy was 41% with 1.64 pregnancies per year; average litter size was 6.4. Mortality of 81% for the first year of life was found. The pig population has the general characteristics of a young healthy, fecund population, with a potential capacity to expand rapidly. Population densities in the lowland area were 3.1/ km².

1.5. Integrated Feral Pig Baiting Strategy

Feral pigs have been widely perceived as the wild animal species constituting the highest risk for the establishment of exotic diseases in Australia. Two aspects of feral pig exotic disease contingency planning are being addressed - Disease Surveillance and Alternative Toxins. *Mitchell, J. (2003). Alternative baiting Strategies for Feral Pig control and Disease Monitoring. Final Report to the Bureau of Rural Sciences.*

- The potential use of cyanide in disease surveillance techniques under field conditions is still speculative, although some potential has been shown. Significant problems were encountered in the delivery system in field situations.
- The potential of the novel one shot warfarin tablet in a meat bait for broad scale feral pig control programs is still unresolved.
- This project demonstrated that problems can be encountered when testing alternative toxins in different bait materials, specifically meat baits.
- This study demonstrated that testing of alternative toxin formulations should progress through pen testing prior to field trials.
- No non target deaths could be attributed to the testing of toxins in this study.
- This study acquired a large data set on biological information on feral pigs in the dry tropics of Queensland.

1.6. Monitoring systems for feral pigs

Agricultural industries in the wet tropics of north Queensland region identify feral pigs as a significant pest species due to the economic damage they cause. Thirty farms were selected as a sample of the two main agricultural industries, (sugar cane and banana

production) in this region. Each farm was regularly surveyed over a 28 month period to assess feral pig population levels, to quantify the associated economic damage they cause in terms of actual on farm dollar costs and to quantify the costs associated with control techniques employed. A feral pig population monitoring technique was established to assess temporal trends in pig populations. Pig populations fluctuated in response to climate, crop maturity and control operations. Feral pigs were estimated to cause, on average, direct economic damage of \$1824 / banana farm / annum and \$5352 / cane farm /annum. This represents 0.08% of the value of banana production and 3.5% of the cane production value of the sampled farms. From sugar cane harvest data, feral pigs caused damage to 16,147 tonnes (valued at \$377,517) or 5.65% of the sugar crop. No significant relationship between pig population levels and the economic damage they cause could be detected. The total on farm costs of feral pigs damage and costs of control averaged \$4099 / annum for each banana farm and \$10,633 / annum for each cane farm. Control techniques cost, on average, \$4010 / farm / annum. In total 1,122 pigs were destroyed at an average control cost of \$250 / pig. The most cost effective control technique employed was trapping. Mitchell, J. & Dorney, W. (2003) Monitoring Systems for Feral Pigs: Monitoring the economic damage to agricultural industries and the population dynamics of feral pigs in the wet tropics of Queensland. Final Report to the Bureau of Rural Sciences Canberra.

2. Current research

2.1. Diet analysis

This project is quantifying the diet of feral pigs and specifically examining their effects on threatened species. Small-scale trails are establishing the potential of feral pigs to distribute pond apple seeds. A component of this research will also establish if conditioned avoidance of foods technique can be used to protect rare and threatened species from pig predation.

2.2. Trapping strategy for the wet tropics

Management techniques for feral pigs in rainforest environment are poorly developed and restrictive in scope. Trapping is considered the most effective technique for controlling pig populations. This project aims to further enhance this control technique by increasing the capture rate, target specificity, encounter rate, and envelope of control and by decreasing trapping effort and associated costs. A trapping strategy will be developed which will examine components of a trap baiting package i.e. carrier material, attractants, presentation and delivery systems.

3. FUTURE RESEARCH

3.1 Target-specific bait/delivery systems for alternative feral pig control toxins.

The primary objective of this project will be to develop pig-specific delivery systems for warfarin tablets, cyanide and zinc phosphide before undertaking further field trials. In the case of warfarin, a further aim is that the bait can be aerially distributed.

3.2. Best Practice Feral Pig Management in the Burdekin River Catchment

This project will demonstrated the cost benefits and control effectiveness of three feral pig control techniques – Aerial baiting, Aerial shooting and Trapping in the dry tropics of Queensland.

Cape York Peninsula feral animal survey (feral pigs & brumbies)

Jamie Molyneaux

Feral Animals Officer, Cape York Weeds & Feral Animals Project, Cook Shire Council

<u>BACKGROUND</u>: Cape York Peninsula has a total land area of 207 000 sq kms made up of a diverse pattern of ecosystems: savannas, woodlands, open plains, dense forests, extensive swamps, heaths, palm forests and large meandering riparian systems.

There are large numbers of feral animals, including pigs, horses, cattle, dogs and cats on Cape York Peninsula. These animals have never been accurately surveyed in Cape York. Previous feral animal surveys have relied on landholder input for numbers and distribution density and have never been checked for accuracy by any other means.

Cape York Weeds and Feral Animal Project intends to undertake a ground and aerial survey of Cape York Peninsula to determine the population and density of feral pigs and feral horses.

With the current national focus on feral pigs through the Feral Pig Threat Abatement Plan together with pest management planning at the Local Government and property levels, there is a need for an accurate and scientifically based survey of Cape York Peninsula to determine feral animal populations and distribution.

The information gathered would help in the planning of any response to an exotic disease incursion within the Cape as well as providing all stakeholders with valuable data on which to develop control strategies.

Project Objectives:

- To determine the population and distribution of feral pigs and brumbies on Cape York Peninsula;
- To develop effective management regimes of feral animals in all land-types of Cape York Peninsula;
- To improve existing and possibly develop additional control techniques;
- To investigate role of game meat harvesting as an adjunct to feral animal management;
- To promote continuous improvement in feral pig/horse management;

SURVEY TECHNIQUE

Selection of survey areas

Cape York Peninsula is made up of around 30 different vegetation types. These range from mangroves to open marine plains through to woodlands. Cape York Weeds and Feral Animal Project staff have selected 8 main types of vegetation that are found over a wide area of the Cape. These 8 areas were condensed from existing vegetation maps of Cape York and represent the most dominant areas of Cape York in terms of area represented.

These areas are:

- Closed Forest
- Open woodlands
- Open woodlands/Forest
- Grassland
- Heathlands
- Mangroves
- Woodlands (Eucalyptus)
- Rocky/Bare Sandy

Three surveys per vegetation type will be flown with the exception of Heathlands, Closed Forest and Mangroves. These will be done from the ground, as aerial surveys in these areas are impossible due to the vegetation cover. A minimum of 13% of each survey area will be covered to ensure consistency and accuracy.

2. Flying survey

This survey will be flown using a Cessna 182 aeroplane. This type of plane gives good visibility and economy. Staff are familiar with the type of aircraft having used it before with excellent results.

The surveys will be flown at a speed of 100 knots and at a height of 300 feet. The observers sit behind the pilot and navigator and record the number and type of animals sighted within the transect width. Transect widths are demarcated by 2 streamers attached to the wing struts to suit each observer. The navigator is responsible for ensuring that the transect routes are flown correctly and that the observers know when to start and stop counting during each transect.

Transect widths will vary between 200 and 400 meters depending on the topography and vegetation. For example the transect width on Marine Plains would be 400 meters compared with 200 meters in Woodlands with medium timber coverage. To keep observer bias to a minimum, the same aircrew and spotters will be used throughout the survey.

3. Ground Truthing

Ground truthing will be carried out within the areas that have been surveyed from the air. This will help with the correction factors and visibility bias that are accommodated in the final results to ensure accuracy and validity of the survey.

4. Interpreting survey results

Once the aerial surveys have been flown and ground truthing carried out, CYWAFAP staff will then collate the results and using a simple mathematic formula, (Caughley and Grigg 1981) and be able to determine the feral animal density and distribution of Cape York with confidence.

These results will then be made available to all CY stakeholders for analysis and use in feral animal management and control.

Adaptive management and demography of feral pigs in southern Queensland

Steven Lapidge^{1, 2}, Melissa Derrick² & John Conroy²

¹Pest Animal Control Cooperative Research Centre ²Queensland Department of Natural Resources & Mines

Introduction

Depending on one's perspective, feral pigs (*Sus scrofa*) are both a burden and economic resource in southern Queensland, but for agriculture predominantly the former. While this pest animal species damages crops, lamb production, water quality, and grazing pastures, it can also provide an economic resource to farmers in the form of hunting (both through carcass sales and paying hunters) and as a 'farm cleaner' of carrion. Although there are numerous methods to manage the impact of feral pigs, few neighbouring properties agree on the best method and consequently truly integrated feral pig management is rare. Similarly, while 1080 poisoning is the most commonly used management tool, many properties consider its use too controversial, and rather opt for less well publicised toxins such as SAP® (yellow phosphorous) or Luci-Jet® (organophosphate). This paper reports on two distinct feral pig monitoring and management techniques adopted in two different habitats in southern Queensland.

Methods

In the forestry leases near Inglewood feral pigs predominantly feed on surrounding crops (wheat and sorghum) while watering and sheltering in the thick cover of the forest. In this area the most productive monitoring method was deemed quadrat foot-print sampling around forestry leasehold cattle grazing waterholes. In the state forests of Eena and Whetstone (~400 km²) 100 5x1m quadrats (70 in baited areas, 30 as controls/non-baited areas) were established around dams to monitor feral pig activity prior to possible 1080 grain baiting. Pre-baiting with non-toxic wheat was undertaken for five days to attract feral pigs and to determine the precise amount of grain likely to be taken at each dam. This saved both on additional grain and toxin being dispensed, and potential latter take by non-target species. 1080 wheat baiting occurred at numerous dams in October 2002 at pre-determined amounts. Changes in feral pig activity were monitored for five days. Results were used to decide on additional baiting or trapping (non-baited/grazing areas). Monitoring is now undertaken on a three-monthly basis to determine feral pig activity and the justification for further baiting or trapping.

The Noorama Bestprac Group was formed by eight property owners to improve lambing percentages in the highly productive livestock breeding country south-west of Cunnamulla. The group (now 54 properties or 6,000 km²) was successful in obtaining National Feral Animal Control Program funds in 2000 to undertake integrated exotic predator control through the area via aerial 1080 meat baiting and predator monitoring (feral pigs, foxes and wild dogs). In 2002 monitoring was increased prior to the third round of aerial baiting. Three baiting and three non-baiting open-plain properties were monitored through duplicate 3x10 km spotlight transects on each property prior to and following baiting and at three monthly intervals thereafter for changes in predator and other pest animal abundance. Due to the impact of the drought, and numerous losses of working dogs, a large-scale aerial feral pig survey and shoot was conducted instead of the forth aerial baiting so as to determine the density, demography and genetics of remaining

feral pigs. Aerial surveys were conducted prior to the shoot to ascertain the initial feral pig density and location of mobs. All pigs shot were GPS-waypointed from the air then ground located for demographic and genetic sample data collection. This paper reports on spotlighting and aerial shoot results, as well as costs and demography of shot feral pigs.

The aim of both management programs was not to eradicate feral pigs, as it was known that immigration from inaccessible outlying areas would soon fill the void, but rather to reduce the short-term impact of feral pig damage on agricultural production in both areas and to collect data that would assist in refining management techniques.

<u>Results</u>

The first forest baiting resulted in a 56% reduction in feral pig activity at baited dams, but a 14% increase at control dams. The overall decline in tracks (and possible decline in population) was 38% at all dams. A second round of baiting at forest dams and trapping at active stock/control dams resulted in a further 82% reduction in activity, or 93% from pre-baiting levels. All dams were re-checked for feral pig activity three months postbaiting, with activity up from 2.3% to 15.5%. Activity still remained lower than prior to baiting (36.4% or an average of 36.4 out of 100 quadrats contain fresh tracks daily over 5 days) and after the first baiting (27.0%). Results indicated a feral pig population of less than 10 animals or 1 pig per 40 square kilometres. The damage being caused by these remaining pigs was deemed far less than the costs associated with controlling them and thus further baiting was unjustified at this stage.

Pre- and post-1080 aerial baiting Noorama spotlight surveys indicated a significant decline (P<0.05) in fox (down 100%) and feral cat (down 80%) sightings on baited properties, no significant change in rabbit numbers (calicivirus still prevalent), and proportionally fewer feral pigs on baited properties (58% less on average). While fox and feral cat sightings remained rare on baited properties in the following six-month period, feral pigs sightings increased exponentially to three-fold by 3 months and 14 fold by 6 months post-baiting. Aerial surveys conducted at this time indicated a feral pig density of 0.09 km² or approximately 1 pig per 11 km². The total Noorama population was calculated to be in the order of 402 ± 446 feral pigs (95% confidence interval). Incidentally, feral goats were recorded at a density of 3.2 km² or over 18,000 in the same area. Aerial shooting of feral pigs occurred for 26 hr (flying time) over 4 days with a professional aerial shooter and helicopter pilot, during which time 174 pigs were shot. Results indicate a 43% reduction in the overall feral pig population, however shooter/pilot experience suggested much higher. A total area of 4,430 km² was inspected, equivalent to a cull density of 1 pig per 25.4 km². On average a pig was shot every 9 minutes at a cost of \$76 per head. The sex ratio of collected pigs was near unity (52M:66F), with males weighing 30.1 ± 23.8 kg and females 24.5 ± 15.2 kg, although numerous near 100 kg boars were shot. Pigs were 9.6 ± 7.4 months of age, with the oldest being no greater than 3 years according to aging equations formulated for semi-arid zone feral pigs. Colour variation was 43% black, 35% brown, 9 % black and white and 13% variations in between. Despite the drought, pigs were in excellent condition with most sows breeding due to the abundance of sheep carrion, hand feed (cotton seed, sugar cane and molasses) and water in bore drains and little competition from other carnivores.

Discussion

Disparity occurred in feral pig re-invasion rates between the Inglewood forest and Noorama grazing areas. This was likely due to the forest being a small relatively isolated population, and the population being driven lower through supplementary baiting/trapping. Feral pig populations do however have the ability to recover exponentially given the right conditions, as was observed on baited properties in the Noorama area, thus unless all animals are destroyed feral pig populations are highly likely to rapidly recover.

Feral pigs remained in excellent condition in both the Inglewood and Noorama areas despite the drought. Most sows were either pregnant or had piglets at foot, and larger boars had fat layers exceeding 1" thickness. Noorama pig mobs were evenly dispersed throughout the area and occurred in all types of habitats, including lignum swamp, open black-soil mitchell grass floodplains and red sand hills. All pigs shot were however within 2 km of water.

Previous aerial baiting campaigns in the Noorama area were no doubt successful in reducing the adult feral pig population, as 70% of individuals shot were less than 1 year of age. Feral pigs have however managed to survive and rebuild their population despite repeated baiting campaigns over two years. This indicates some adult pigs were either avoiding baits (possibly as a result of a prior sub-lethal 1080 dose promoting bait aversion), had a high tolerance to 1080, or had immigrated from outlying areas. It is likely that holes (non-baited properties) in the baiting area provided refuge to feral pigs, allowing for rapid population re-establishment.

Results from the current study indicate baiting, shooting and trapping are all effective management techniques for feral pigs, but none (conducted at typical levels) is likely to reduce a local pig population to a point below which they will not recover. Although this is unfortunate news for disease preparedness, the implications of feral pigs being a disease vector should be put into perspective. For example, feral goats, at a density 40 times greater than pigs, would be a far greater threat to the spread of disease such as foot and mouth should it occur in the Noorama area.

How did pigs of Noorama make a living? A molecular-ecological approach to feral pig management

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The "molecular revolution" has had an enormous impact on biology. As this has gained momentum, population biologists may not have fully appreciated what molecular markers can reveal about populations. It has contributed so distinctly to disciplines within the broad field of ecology that they have been collectively referred to as a new sub-discipline, molecular ecology.

Molecular ecology can be used, for example, to identify intentional releases (a major problem perceives in SW WA), follow relative successes and failures of individuals in populations, to estimate dispersal that occurs amongst populations, and to gauge the level of relatedness within groups of individuals. However its most valuable contribution can be made by amalgamating demographic and the genetic information, particularly where genetics can resolve information that is not immediately identifiable using traditional field-based approaches.

Although not widely applied in feral species management (there are notable exceptions), molecular ecological data can make a valuable contribution in the management of pest and problem populations, particularly in estimating pig contact (mating system, group structure, relatedness etc) and dispersal rates which would allow inferences to be made about potential disease transmission ('diffusibility') rates. Disease transmission rates can be very difficult to measure in field studies, and probably vary considerably in different regions of Australia. For instance, are pigs 'behaving' in the same way in the south-west forests of WA, as they are in tropical wetlands or in agricultural areas of NSW? The genetic profile of a population will be influenced by its spatial and temporal 'biology and the circumstances of the individuals through which it passes' and we can gain an understanding of these circumstances by genotyping individuals and analysing genetic data across populations.

These genetic relationships among feral pig populations would therefore be relevant to both their management and for exotic disease outbreak preparedness. One major finding from this approach would be whether populations show a degree of mixing and gene flow (or are genetically isolated). This distinction would obviously have strong implications for population management, where a thorough understanding of dispersal amongst feral pigs and their rates of social contact is critical to understanding the role of feral pigs in disease transmission in Australia. The use of molecular approaches to ecological questions, accompanied with new analytical procedures are expanding in biology, utilising novel and potent molecular tools to answer applied ecological problems.

The main aim in this brief synopsis is to focus on the potential stimulus that these "markers" could make in furthering our understanding of feral pig biology. For example,

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how investigating the population genetic structure and relatedness within and among feral pig populations and could be used to improve estimates of gene flow social structure of existing populations. We will present the data from a small, initial study of feral pigs that were shot in the Noorama area in southern Queensland. It is anticipated that the approaches outlined below, when complemented with available ecological, demographic, and behavioural data will provide agencies with powerful models in the management, surveillance and control of wild pigs, not only at a regional (local) scale, but also nationally.

The feral pig situation in NSW and recommendations for future action

Glen Saunders, Eric Davis, Peter Fleming and Steve McLeod

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- A pest animal survey conducted by NSW Agriculture in early 2002 found that feral pigs occupied over 60% of the state; up by 20% from the previous 1996 survey.
- This increase most likely associated with a run of seasonal conditions. Current levels would be much lower as a consequence of drought and control programs.
- The most commonly used control techniques are trapping (29%), recreational hunting (22%), poison baiting with 1080 (18%), and ground shooting (14%).
- Current control techniques are adequate for strategic control of feral pigs when numbers are low and pigs congregate at feed and water but are limited where feral pigs are dispersed during good seasons.
- Broadscale control techniques which can be implemented in exotic disease emergencies need to be continually refined as opportunities arise.
- Pigs are susceptible to a variety of important diseases not currently present in Australia. Many such diseases are also capable of infecting other species of livestock and man, with potentially serious economic and public health impacts.
- It is not yet technically feasible to eradicate feral pigs from any substantial mainland area of Australia. The notion of a pre-emptive eradication campaign against feral pigs on the pretext of eliminating the perceived long-term exotic disease risk is therefore rejected.
- There is a growing tendency to down-play the potential involvement and importance of feral pigs in an exotic animal disease emergency. This is mostly based on assumptions, overseas experience and imperfect knowledge.
- Australia needs to avoid creating incorrect international perceptions regarding the exotic disease risks posed by feral pigs as this could unreasonably increase international expectations in terms establishing disease freedom. This should not absolve us from the need to take adequate precautions and have appropriate strategies in place should the need arise.
- Modelling is a useful means of increasing our understanding of the likely behaviour of wildlife and exotic disease interactions but should not be solely used for policy or strategic decisions.
- The AUSVETPLAN 'Wild Animal Response Strategy' addresses wildlife control activities for key species as part of exotic disease emergency operations.
- The Wild Animal Response Strategy is not overly prescriptive but requires the ongoing availability of a complementary knowledge base to be effective.
- Some issues of wildlife and exotic disease contingency planning and preparedness require continuing and/or additional attention. These include ongoing pest animal surveys, carcase disposal, training and wildlife disease surveillance measures.

- In exotic disease terms, what is required is an ability to respond rapidly to real shortterm threats such as suspected focal outbreaks or the likelihood of a disease occurring as a consequence of an outbreak elsewhere.
- A risk assessment process should be applied to current knowledge of feral pig (and other important pest animal) distribution and abundance. Where risk is considered to be unacceptably high, ongoing control programs should be encouraged.
- Feral pig control in all instances must be seen to have the advantage of reducing both the ongoing impact (agricultural and environmental) as well as the potential or long term disease risk.
- Research and development priorities should include:
 - Establish a set of national guidelines for monitoring the distribution and abundance of key pest animals and implement such monitoring programs on a regular basis.
 - Any such monitoring will by necessity be mostly subjective. To further enhance the reliability of risk assessments and disease models, verification of population estimates using accurate census techniques should be undertaken in key risk areas.
 - Develop and test techniques for reliable and accurate and if necessary, rapid disease sampling procedures in wildlife populations.
 - Expand risk analysis research on pest animals and exotic disease as currently being developed in NSW.
 - Improve our human resource capacity to deal with wildlife and exotic disease emergencies by providing computer and lecture based training.
 - Conduct field based simulated exercises which are multi-focused ie. test decision making processes as outlined in the AUSVETPLAN Wild Animal Response Strategy, provide training, develop disease and wildlife surveillance strategies, develop and test control strategies, determine the need and/or means for carcase disposal, and collect data which can be used to further refine wildlife disease models.
 - Provide a forum for the continual refinement and revision of the AUSVETPLAN Wild Animal Response Strategy.

The Rural Lands Protection Board System in NSW and feral pig control

Chris Lane

Pest Animal and Insect Manager, State Council of Rural Lands Protection Boards

Who are the Rural Lands Protection Boards?

The Rural Lands Protection Board (RLPB) system is unique to NSW. RLPBs are constituted under the *Rural Lands Protection Act 1998* and carry out many of the functions of that act.

There are 48 separate RLPB Districts across NSW (excludes the Australian Capital Territory). All RLPBs carry out four main functions of management. They are; corporate, animal health, Travelling Stock Route and Reserve (TSR) and pest animal and pest insect management.

The RLPB system is funded solely by rural ratepayers of which there are approximately 130,000. The RLPB system is not a Government agency, however, is accountable to the Minister of Agriculture and Fisheries.

The Role of RLPBs in Pest Animal Control.

The *Rural Lands Protection Act 1998* (the Act) imposes an obligation on all owners, occupiers and managers (land managers collectively) of all land in NSW to control pests. The Act sets out the conditions under which pests are "declared" and provides the process and mechanism for the control of such pest species.

RLPBs have the primary responsibility for the oversight of pest animal and insect management in NSW. They assist land managers to carry out their obligations under the Act and ensure that the most efficient and cost effective means of pest animal control are available for this purpose. RLPBs also actively encourage coordinated group pest control programs. This allows the participants to strategically apply less bait material over a larger area and ensure appropriate coverage for the particular pest species. This coordinated approach also reduces the financial impacts associated with the land manager carrying out the program. It can reduce other impacts that pest animals cause, such as attacks on livestock, damage to property infrastructure and crops and environmental degradation. Coordinated pest control is vitally important in protecting and enhancing native fauna and their habitat.

Over 120 RLPB Rangers provide land managers with information on all facets of pest animal control, materials such as poisons, indemnity and signage and equipment and machinery for them to carry out the control program or use in follow up control efforts. Where required, Rangers also undertake inspections of land to ensure that control requirements under the Act are being fulfilled. RLPBs have powers under the Act to enforce pest control on land managers, however it should be noted that these powers are only exercised as a last resort measure.

The Minister for Agriculture and Fisheries has declared rabbits, feral pigs and wild dogs to be pest animals in NSW under the Act. While not formally declared, foxes are also controlled to minimise their agricultural and environmental impacts. The effectiveness of feral pig control also has important implications for endemic disease control and exotic disease preparedness.
RLPBs work on vertebrate pest control with assistance from NSW Agriculture. This assistance involves matters such as the provision of research, training in vertebrate pest control, certain policy issues and the coordination of pest animal control activities.

Feral Pig Control in NSW.

Feral pig populations and activity in NSW had dramatically increased over the three years prior to the current drought due to ideal seasonal and environmental conditions, particularly across the north-west slopes/plains and far west regions. This created more challenges for RLPBs and land managers where there was a need to increase assistance and focus on the problem over a larger area.

During 2001, RLPBs spent approximately one million dollars on feral pig control alone while it was estimated that land managers spent in excess of \$2.5 million. This cost to land managers only takes into account the direct costs of control and doesn't include the indirect costs of environmental and agricultural impacts such as crop damage, stock losses, changes of management practises, erosion mitigation and the like. Despite this expenditure, the feral pig problem on average was reported to be increasing on average by 15% each year in those RLPBs where feral pig problems occur.

The magnitude of the problem was brought to the fore of the RLPB State Conference in 2001. The delegates resolved that all RLPBs should increase resources and commitment to the feral pig problem and that each Board through their local and regional pest management plans would formally address cross district coordination of control programs during 2002.

Another significant event also commenced during 2002. The current drought has been reported as one of the worst experienced in NSW. The State Government announced a \$1 million drought feral pig and fox control initiative for Western NSW in July 2002, in which 17 RLPBs were provided with the funds to carry out on ground control programs. The funds are being used solely for on ground control programs. RLPBs are providing their own financial and in-kind contributions to the initiative. Landholders, the NSW National Parks and Wildlife Services and NSW Agriculture also provided direct and indirect resources for the control programs.

The funds for the project became available in November of 2002. RLPBs had at that stage carried out monitoring of feral pig distribution and densities, ordered materials for the manufacturing of over 400 feral pig traps, implemented feral pig poisoning and trapping programs and a fully planned a coordinated three phase aerial feral pig control program. The aerial control program commenced in Walgett a week before Christmas and finished in the Balranald District in mid March 2003.

The timing of the aerial control program was opportune, as the drought had worsened which forced most of the feral pigs to congregate in areas with limited access to water and feed. The number of feral pigs that required control were much lower than in previous years which allowed the program to cover most of the problem areas. It also meant that the chances of feral pigs being missed in the areas covered by the Feral Animal Aerial Shooter Team (FAAST) accredited shooter was minimal, in turn reducing the reinfestation rate of the pest. The impact of dust storms and high temperatures during the summer were minimal much to the delight of the controllers and crew.

Over 10,000 feral animals were culled in the aerial control program of which more than 90% of the tally were feral pigs. This number includes feral pigs controlled on National Park Estates in the Western Division of NSW as part of that coordinated program. RLPBs are now carrying out further monitoring and strategic trapping and poisoning programs.

Additional aerial feral pig control programs will also be carried out further east in NSW in the coming months due to 26 RLPBs securing federal funds through the Pest Animal Management Grants Program administered by the Bureau of Rural Sciences. RLPBs will receive \$730,000 of the \$1 million made available to administer feral animal control programs in drought Exceptional Circumstances areas. \$345,000 will go directly into coordinated feral pig control programs.

Feral pig management by NSW National Parks and Wildlife Service

Chris Banffy NSW National Parks and Wildlife Service, Katoomba

Background

NSW National Parks and Wildlife Service (NPWS) administers over six hundred reserves covering an area of 5.9 million ha. This is approximately 7.4 % of the landmass of NSW. Feral pigs inhabit a wide range of habitats across the state. Some of the habitats colonised by feral pigs include alpine environments, wetlands, rainforest and ephemeral river systems in the far western region of NSW. In some areas feral pig colonization of Service estate is continuing at an alarming rate. Many reserves previously free of feral pigs are being subjected to illegal feral pig releases, which is thought to be associated with illegal pig hunting activities. In fill colonization of suitable habitat in many reserves is a trend that has been occurring across the state over the last two decades. The Blue Mountains Region has 840,000 hectares of declared reserve. Feral pigs were first reported in the southern Blue Mountains Region in the early 1980's. About 40% of this estate has now been colonised by feral pigs.

The NPWS aims to manage feral pig populations to minimise their adverse impacts. There is a clear recognition that the eradication of introduced pest species over large areas is rarely, if ever, possible and resources must be directed to those species/localities where the benefits of control are likely to be greatest.

NPWS feral pig management programs aim to apply best practice, humane and cost effective methods that will have minimal impacts on the environment. In general this requires careful planning to ensure an integrated approach is adopted using a range of techniques at critical times of the year. Integrated pest management is likely to result in the most effective long-term reduction in pest animals as it is less likely to select out tolerant animals.

Objectives of NPWS Feral Pig Management Programs

The overriding objective of NSW NPWS feral pig control programs is to conserve biodiversity and cultural heritage. Programs aim to

- Increase community understanding of the adverse impacts of pest animals on biodivesity and Aboriginal and historic cultural heritage.
- Manage feral pig populations to minimise their movement into and out of NPWS estate where they may impact on agricultural production.
- Satisfy legislative responsibilities e.g. *Rural Lands Protection Act 1998* and *Threatened Species Conservation Act 1975*
- Support cooperative approaches to pest animal management with other agencies and the community
- Foster Community support for pest management control.

Control Methodologies

Cooperative and integrated feral pig management approaches are applied across the state. The methodology, scope and size of cooperative efforts will vary according to the habitat, reserve type and tenures that are colonized by feral pigs.

Baiting using grain poisoned with 1080 is considered to be the most effective control option in habitats that have dense canopy cover and are not associated with urbanised environments. Many successful vehicle based feral pig 1080 poisoned grain programs have been implemented across the state.

In the Blue Mountains area, which includes rugged wilderness terrain, free feeding is undertaken by aerial drops of grain. Helicopters and horses are then used to transport NPWS staff to bait hoppers located in very remote areas.

A program using anticoagulant pesticide, warfarin has been trialed in a cooperative crossborder pig baiting program between ACT Parks and NSW. This program has proved to be highly successful.

Cooperative helicopter culling of feral pigs is very efficient over large areas. The NPWS uses aerial shooting as a technique to control feral pigs over very large areas of western NSW, or in inaccessible country on the tablelands. All aerial shooting by NPWS is undertaken by personnel trained under the guidelines and protocols of the NSW Feral Animal Aerial Shooting Team (FAAST) Management Committee. During 2002/03 the NSW Government provided \$1 million to farmers for feral pig and fox control as part of a drought relief package. The NPWS has supported this program by providing FAAST trained shooters and by increasing the level of control in conservation areas near the programs being undertaken by rural lands protection boards and farmers. It has been estimated that more than 10,000 feral pigs have been culled during this operation.

The NPWS will also support the Commonwealth Government's recent announcement of a \$730,000 package for farmers.

Trapping of feral pigs can be an effective method, but results are often variable, being affected by season, trap type and site, and trapping frequency. Trapping is used most often when poisoning is impractical or in conjunction with poisoning.

Radio collaring is used in a number of reserves across the state to better understand feral pig home ranges and movements. This information is then utilized to improve integrated and cooperative control programs. As with most feral animal control programs an integrated approach is usually most effective. Some pigs will not enter a trap, some will not eat poisoned grain and others will successfully avoid helicopters. It is common practice for the Service to use integrated programs where two or more techniques are used.

Hunting and dogging are not undertaken in any of the reserves managed by NPWS because they only kill a small percentage of the population, they disperse pigs through regular disturbance and are only effective on relatively small, easily accessible areas.

Funding for Feral Pig Control NSW NPWS

The NSW NPWS has substantially increased its recurrent funding for feral pig management over the last five years. During the 2002/03 financial year, NPWS estimates that it will spend approximately \$423,000 on feral pig control. Over the last two years, NPWS funding for feral pig control has increased by 48%. In addition to this the NPWS participates in many cooperative pest management control program such as the NSW Government's drought relief program.

Research for feral pig management

The NPWS has acknowledged that the impacts caused by feral pigs to the environment, economy and native biodiversity are very hard to quantify. The impacts of feral pigs will vary widely depending on a range of variables including season, habitat, the resilience of native species to feral pig predation, competition and disturbance within each habitat, the density of pig populations within each habitat etc.

To obtain a better understanding of the impacts of feral pigs the NPWS with the Sydney Catchment Authority has commenced a five year research project which aims to quantify the impacts of feral pigs on biodiversity and other environmental parameters.

The aim of this research project will be to develop a model which predicts the effects of feral pigs on a range of habitats. It is hoped that this model will then be used to actively monitor feral pig damage, triggering management actions at either a set feral pig density or environmental variable.

Transcription of Session 2 discussion: Current research and control methods

JACK GILES: Are there specific questions of the speakers in the last session?

LYN HINDS: What percentage does the 14,000 feral pigs controlled during recent feral pig trapping exercises in Queensland represent?

JIM MITCHELL: 14,000 pigs over the 8 years the trapping program was conducted or 2000 feral pigs trapped per year. With ~20,0000 – 30,000 feral pigs in the world heritage areas, this represents a figure of about 10%. However, the objective was for community involvement not eradication.

JACK GILES: Jamie, what is your sightability for feral pigs on Cape York?

JAMIE MOLYNEAUX: In the open plains we have no problems. Through the timbered country this will be harder, but we reduce the transect width to compensate.

LYNDY SCOTT: Chris, can you give us any more details on the likely proportions of the RLPB feral pig control exercise?

CHRIS BANFFY: Exact proportions not known. Monitoring is still being done to help determine more precise percentages.

GRAHAM ALEXANDER: Jim, what is the reproductive or replacement rate of feral pigs?

JIM MITCHELL: A sow will rear 6.4 piglets per year. They can breed like rabbits.

JOHN STEWART: Quentin, does every state have a map of feral pig densities?

QUENTIN HART: No, not as recent as those (Queensland and New South Wales) two.

PETER KENNY: Chris, the map you showed seemed to have no pigs in the wheat belt. Is there any particular reason for this?

CHRIS BANFFY: A good question. If there are pigs there they are in low density.

GLEN SAUNDERS: Surveys are based on subjective estimates, as related to impact, and do not represent real numbers.

JOHN STEWART: Surely with these maps we can mark the clean areas of feral pig areas of Australia.

LAURIE TWIGG: It must be remembered that these maps are not static, they are ever changing.

GLEN SAUNDERS: In monocultures it is often easier to control feral pigs. In tablelands populations are more scattered, and in the Riverina many of the pigs have been removed.

JOHN AUTY: In NSW, higher pig densities seem to relate to low human population levels.

JACK GILES: The moveable feast- during good seasons pig populations rose by 90-95% per year. What we need to address in this session is what research needs to be done? What work is essential?

GLEN SAUNDERS: Can we qualify this as shortterm and long-term? This also depends on whether you are concerned about exotic disease risk or agricultural and environmental damage. With exotic disease risk, we need in place a method to monitor and evaluate exotic disease status. In the long-term we need to monitor the effectiveness of control programs.

JACK GILES: Do we need better survey methodology, particularly for low-density populations?

GLEN SAUNDERS: Absolutely. The biggest problem is subjectiveness; this needs to be able to be corrected for.

TONY PEACOCK: Are we collecting samples? Should we be testing these samples for more things than we currently are?

JACK GILES: Do we need a special program of sampling or can we tap into collection by commercial harvesting operations?

LAURIE TWIGG: Pig samples in W.A. are currently screened by Department of Agriculture and genetic screening is undertaken by Peter Spencer.

GLEN SAUNDERS: We need a standardised national monitoring system.

JOHN MUMFORD: We need an easy to use generic sampling kit for commercial hunters to use and pass on results for survey purposes.

GLEN SAUNDERS: Has proven successful in the past, provided information and motivation maintained to ensure samples keep coming in through feedback to hunters.

LYNDY SCOTT: Jim, do you use any near infra-red screening of pig poo? In the states they are using this technique to screen for nutritional status, gender, age and reproductive status.

JOHN AUTY: Sociologists needs to be working in the field; expertise needed.

BILL GEE: Pig population varies so much, we never have up to date data current enough to determine exact status. Disease sampling is useless unless done by a reputable person e.g. experienced pathologist, not a commercial hunter or ranger.

GLEN SAUNDERS: Maps are required for a study on risk analysis and we need resources to do that.

ROBERT HEDLEFS: DNA analysis important to show contact between pigs and cattle.

JACK GILES: Other areas yield to research, including toxins and other control techniques. There are few large-scale studies on success and cost effectiveness of these techniques. For example, studies have shown limited water supplies will help manage feral pigs.

MIKE BRAYSHER: Short-term requirement is to develop and implement coordinated control programs.

JOHN AUTY: Ways to reduce the growth reproduction rate would be a step forward. Pigs reproduction rate is reduced during drought, we need to find another way to reduce the growth reproduction rate.

JACK GILES: The rate of increase is 0.6 or 180% per annum. This changes dramatically if the survival of young is high as in good seasons.

JOHN AUTY: Protein supplementation (roo and sheep carcasses) must have a substantial effect on recruitment rates.

CHRIS BUNN: Do we lower high-density down or do we look at low-density numbers and clean them out first?

JACK GILES: These are potentially two conflicting strategies. For damage mitigation it should be the high-density populations. Practically however you really need two programs.

GLEN SAUNDERS: Need for risk analysis for both agricultural and environmental impact or disease risk or both. Start and target areas that are most critical to what the goal is. Attach risk analysis at both state and national levels. JACK GILES: Has any prior exotic disease simulated outbreaks yielded a positive result?

GLEN SAUNDERS: In terms of poisoned baiting, yes we would have. Although there are many variables.

TONY PEACOCK: Jim, can you give us some more information on feral pig attractants?

JIM MITCHELL: 20 years of experience in feral pig attractants. Creosote works a treat, however the success of any attractant or bait medium depends on the area and season of where you are. They seemed to be specific to a region and to a time of year.

JACK GILES: Bait acceptability is a huge variable dependent on seasonal conditions.

BOB PARKER: Mammals learn from experience, making it difficult to come up with baits or attractants they will continue to be attracted to.

JACK GILES: You cannot underestimate the intelligence of pigs.

BILL GEE: Urea works well for poisoning feral pigs. Research needs to be done into its use and to ensure it is target specific.

PETER KENNY: This is a fairly touchy issue as someone is already in trouble for poisoning kangaroos with urea.

JOHN AUTY: Pig re-seeders are terroists, and need to be dealt with appropriately.

PETER KENNY: Research required into FMD immunity in feral pigs for possible use in cattle industry.

GLEN SAUNDERS: We were talking about developing a long-term strategy for feral pig management in Australia. I think something needs to be done along those lines. Is that an option?

ERIC DAVIS: Many of the issues we have raised, such as risk analysis, are long-term questions not short-term. Urea should not be explored as a toxin.

JOHN STEWART: Who is going to draft the National Feral Pig Strategy? Try to identify group of people from this meeting to do this.

KEVIN DOYLE: We also need to identify where it goes.

CHRIS BUNN: We need clear objectives of what we are sampling for with test kits if we are going to use this.

LYN HINDS: We need to address agricultural and environmental issues and determine priorities for hot spots and address these.

ERIC DAVIS: I agree. The risk assessment process is one of the essential elements to the cost-benefit analysis. As for sampling, we need to set parameters for use of results and determine how these are going to change our management decisions.

RUPERT WOODS: Biosecurity CRC will be represented tomorrow and will discuss such testing.

FIONA MANDELC: Is there a need for the risk analysis to include environmental impacts separately to quantify degradation?

JACK GILES: We have identified agricultural, economic and environmental impacts of feral pigs as part of our draft objective. So my answer would be yes.

CHRIS BANFFY: Monitoring is required in areas without feral pigs.

TONY PEACOCK: W.A. described NSW cat impact studies as useless and a waste of money. There is sufficient evidence already.

JACK GILES: This comes back to the idea of why monitoring it when we can destroy it.

BILL GEE: Impact studies are justified when seeking backing for large-scale pig control.

Call for volunteers for National Feral Pig drafting committee.

PETER KENNY: Requested that a representative of Cattle Council be on the committee.

LYNDY SCOTT: Requested a representative from the Australian Veterinary Association be on the committee.

LYN HINDS: Are we talking about a National Feral Animal Strategy or National Feral Pig Strategy?

JACK GILES: We have to have technical expertise, state and commonwealth representation and indigenous representation.

QUENTIN HART: BRS indicated they would be interested in such a document. However it was agreed seven years ago that such a document was not desired, although I realise that this would now be a Feral Pig Strategy. Also suggested that if the document is to have any weight politically Vertebrate Pest Committee should also be involved. Scott Spencer, current chair of VPC and on Land and Water Biodiversity Committee, should be on the committee.

JOHN AUTY: Representatives should be present at this meeting. Such a document needs to be taken to the Prime Minister then passed on to appropriate ministers stating appropriate objectives.

ERIC DAVIS: A representative from Primary Industry Standing Committee also needs to be involved.

JACK GILES: Suggested that a writing group of 2– 3 people be formed, as well as a reference group of a greater number of people with central interests as well as broader interests with the view to take the draft to the appropriate bodies, including the aboriginal community.

PETER KENNY: Nominated Kevin Strong and John Stewart.

TONY PEACOCK: Nominated Steve Lapidge. Absent during final session.

JOHN STEWART: Nominated Bill Gee. Declined. BILL GEE: Nominated Graham Alexander. Accepted.

JACK GILES: Accepted on Steve Lapidge's behalf.

Drafting Committee nominated:

Graham Alexander- Australian Veterinary Association Kevin Strong- Queensland Department of Natural Resources

John Stewart- Cattle Council of Australia Steve Lapidge- Pest Animal Control CRC

List of Essential Research identified during Session 2

Short-term

Genetic sampling to monitor feral pig movement/translocations

Exotic disease

- Monitor and evaluate disease status in population
- Develop test kit for disease sampling

Long-term

• National monitoring/surveys of pig populations

Session 3

Improving control methods

The National Feral Animal Control Program and its involvement in feral pig research

Quentin Hart

Bureau of Rural Sciences, Canberra

The National Feral Animal Control Program (NFACP) is a Natural Heritage Trust program administered by the Bureau of Rural Sciences (BRS). BRS published national feral pig management guidelines (Choquenot et al) in 1996 and this document set the following general research priorities for funding under NFACP:

Biology

Important ecological information required from a management point-of-view includes:

- The role of habitat and other factors in governing the seasonal distribution, abundance and movements of pigs; and
- Seasonal diet, availability of food and the effect of this on reproduction and population dynamics in different areas.

Agricultural impact

Need for density:damage relationships to be determined for different situations to guide cost-effective management strategies.

Environmental impact

Lack of quantitative data on environmental impact and means to value such impact, either in an absolute sense or in a relative way using a ranking system.

Impact of diseases and parasites

Lack of information on the factors likely to affect the progress and control of outbreaks of exotic diseases amongst feral pigs in different environments.

Assessment of non-target impact of CSSP

Lack of information on the non-target risks and humaneness of CSSP, although there is a strong perception that both are a problem and there is little justification for it's continued use in favour of 1080 and other control techniques.

'Real world' costs of feral pig control

Lack of reliable data on the cost of controlling feral pigs in normal on-property control programs.

Since 1996 some progress has been made on the above issues through NFACP and other projects:

Existing projects

Monitoring systems for feral pigs (Jim Mitchell, Qld Dept of Natural Resources and Mines) - completed

- Established a populations assessment monitoring system for the QId Wet Tropics
- Established baseline impact assessment levels for sugar cane and banana industries

- Derived a relationship between pig population and impact
- Quantified the costs:benefits of various control techniques

Economic evaluation of feral pig control strategies in North Queensland (Steve Harrison, University of Queensland) – awaiting final report

Project was linked to Jim Mitchell's monitoring project and will provide a more detailed economic analysis of the cost:benefits of feral pig control.

Alternative baiting strategies for feral pig control and disease monitoring (Jim Mitchell, QId DNRM)

The objectives of the project were to evaluate the use of cyanide and zinc phosphide as a disease surveillance and research population monitoring technique and warfarin for routine feral pig control. Objectives were not fully achieved but further investigation of these toxins is continuing as will be discussed at the workshop.

Develop and test a practical method for prioritising pest animal management areas across a region (Mike Braysher, University of Canberra and Glen Saunders, NSW Agriculture) – completed

A guide and toolkit called PESTPLAN has been developed which will help groups rank/prioritise the management of pest animals including feral pigs.

New projects

Further development of feral pig baits and control strategies (Laurie Twigg, Dept of Agriculture, WA)

Stage 1 (2003/04):

- Investigation of potential bait mediums for feral pig control with emphasis on improved target specificity.
- Determine effect of burying bait on feral pig uptake.
- Examine the potential of bait additives for attracting pigs.
- Undertake preliminary efficacy trials with the most promising bait medium (using 1080 toxin).

Depending on project progress and availability of NFACP funding, project may progress to Stage 2 (2004/05-2005/06):

• Continue bait development program (bait additives, manufactured bait, aerial bait application) in conjunction with other States (particularly QId and NSW) for different land systems.

Best practice feral pig management in the Burdekin River Catchment (Jim Mitchell, Qld DNRM and Dalrymple Landcare Committee)

Establish feral pig monitoring system and test three management strategies for a grazing (dry tropical savanna) land system.

Target-specific bait/delivery systems for alternative feral pig control toxins (loe Scanlan et al, QId DNRM)

Project will look at bait substrate, attractants, toxin, presentation and delivery. Project will aim to develop pig-specific delivery systems for warfarin tablets, cyanide and zinc phosphide before undertaking field trials. In the case of warfarin, a further aim is that the bait can be aerially distributed.

Ref: Choquenot, D., McIlroy, J. and Korn, T. (1996) Managing Vertebrate Pests: Feral Pigs. Bureau of Resource Sciences, Canberra.

Target-specific delivery systems for alternative feral pig control toxins

Parker, R.¹, Scanlan, J.¹, Mitchell, J.¹, Saunders, G.³, Twigg, L⁴. and Lapidge, S.^{1,2}

¹Queensland Department of Natural Resources and Mines ²Pest Animal Control Cooperative Research Centre ³New South Wales Department of Agriculture ⁴Western Australian Department of Agriculture

Introduction

Feral pigs (*Sus scrofa*) inhabit near 40% of Australia, from subalpine grasslands to monsoonal floodplains, and are found in all habitat types in Queensland. Feral pigs damage crops, stock and property, spread weeds and transmit floral and faunal diseases such as rootrot fungus and Leptospirosis, and potentially Foot and Mouth disease. They also cause environmental damage through rooting up large areas of native vegetation and soiling waterways. Damage to Australian agriculture alone is believed to be in excess of \$100 million annually.

Five control methods for feral pigs are currently utilised: poisoning, trapping, shooting, hunting and exclusion fencing. Of these, poisoning is the most practical and effective control method for large areas and is widely employed in rural communities. Five different toxins have previously been used, either legally or illegally, for feral pig control: sodium monofluoroacetate (1080), anticoagulants (warfarin), yellow phosphorus (CSSP), strychnine, and organophosphates (Luci-jet and phosdrin). Of these, 1080 is the most widely recommended and employed, with the later three either illegal or not recommended due to humaneness and target-specificity issues. However, the use of 1080 for feral pig control carries a high risk of non-target poisoning due to the large doses required, the incidence of vomiting, the risk of secondary poisoning, and the fact that it has no antidote. Furthermore, feral pigs are known to develop bait-shyness towards 1080-laced bait and also survive apparent lethal doses. The use of 1080 for vertebrate pest control is currently under review by the National Registration Authority.

Warfarin has been demonstrated in New South Wales and the Australian Capital Territory to be an effective toxin for feral pig control, achieving high kill rates in the field (> 90%). The benefits of this toxin include its potency to feral pigs compared to many other species, its reduced risk of secondary poisoning due to its rapid decline in tissue, it does not cause vomiting, it is cheaper than 1080, and it has an antidote (Vitamin K1). Disadvantages of warfarin include that it is slow acting, is more potent to avifauna than 1080, its use is labour intensive with pigs requiring repeat doses, and that in its raw form it is unsuitable for use in meat baits (the most widely accepted bait in rural Queensland), and thus is also unsuitable for aerial broadcast. To overcome the two latter drawbacks the Queensland Department of Natural Resources and Mines (then the Department of Lands) developed and trialed a one-shot slow-release warfarin tablet in 1995 suitable for numerous bait types, including impregnation in meat baits and aerial application. Warfarin tablets were designed to chronically poison an animal, with death occurring several days after bait ingestion. The rapid bio-degradation of warfarin in the animal would mean that negligible residues would be present when the animal succumbed to the effects of the toxin. This result should further reduce the likelihood of secondary poisoning through non-target carnivores scavenging on carcasses.

Ideally, toxins for vertebrate pest control should be fast acting and target-specific, however these two objectives are rarely complimentary. Two fast acting toxins proposed for feral pig control, in particular for disease surveillance, are cyanide and zinc phosphide, although neither toxin is target-specific for feral pigs. Both toxins produce rapid intoxication and death and have the potential to provide unbiased samples for tracking the disease status of pigs in infected or potentially infected populations. This will be an integral part of any disease eradication strategy for outbreaks involving feral pigs. Pen trials of both toxins, along with one-dose warfarin tablets, resulted in 100% mortality in feral pigs. Thus, if each toxin could be delivered with target-specificity then they would be useful alternatives to 1080.

Using socio-ecological differences between target and non-target animals derived through niche theory analysis it is possible to refine delivery systems for generalist toxins that greatly reduce the risk to non-targets. Hence, the issue to be addressed in this study is whether a feral pig-specific delivery system can be developed for warfarin tablets and cyanide and zinc phosphide capsules that does not compromise the toxins' effectiveness, nor limit its applicability in the field.

Project outline

Permission was granted in 2002 by the National Regulation Authority for the Queensland Department of Natural Resources and Mines to undertake field trials on one-shot warfarin tablets, cyanide and zinc phosphide (Permit no. KP20F255). Field trials of cyanide tablets were undertaken in July and August 2002 on Lillyvale (Cape York) and Taemas (Charters Towers) Stations. No deaths were recorded in the trials, either of feral pigs or non-targets, due to problems encountered with the bait delivery system. Cyanide capsules were inserted in large pieces of fresh meat and presented in the confines of a pig trap converted to a low walk-through pig feeder. To attract feral pigs and repel non-targets highly odorous fermented grain was poured over traps. A combination of the hardness of the cyanide capsules (designed so few animals could crack the shell) and the ease at which they were dislodged from baits meant that all capsules were found discarded within the feeder.

More recently warfarin tablets in meat baits were trailed in the same locations. Preliminary results indicate a 47-50% feral pig population reduction (J. Mitchell, *pers. comm.*). This is somewhat less than population reductions reported with warfarin in grain and was possibly due to the toxin in some baits being compromised by moisture (exposed warfarin readily binds to meat proteins). Consequently the field delivery system needs refinement.

The primary objective of this project will be to develop pig-specific delivery systems for warfarin tablets, cyanide and zinc phosphide before undertaking further field trials. In the case of warfarin, a further aim is that the bait can be aerially distributed. The steps that will be taken to achieve this will include:

- 1. identification of non-target species likely to be adversely affected by feral pig control activities,
- identification of socio-ecological differences between feral pigs and potential nontargets that can be exploited (as per O'Brien 1986, 12th Vertebrate Pest Conf., USA, pp. 247-52),
- 3. use socio-ecological differences to design features that can be used to produce pigspecific baits and a pig-specific feeder,
- 4. develop prototype baits and feeder for initial pen trials at Robert Wicks Pest Animal Research Centre (RWPARC), Inglewood, Queensland,

- 5. trial successful prototypes, or prototype combinations (i.e. effective bait and nontarget repellent), in large forested enclosures at RWPARC,
- 6. trial most successful toxin delivery systems in the field as per NRA permit KP20F255,
- 7. produce a decision tree for the local applicability of different delivery systems,
- 8. examine the commercial applications of the delivery systems, and
- 9. publish results in both scientific and popular article format.

Methodology

Using socio-ecological differences in feral pig and potential non-target animal behaviour O'Brien (1986) identified numerous prototype attributes that could assist in producing a pig-specific baiting system. These include placing baits in tough packing, using pheromonal or dietary odourants, dying grain/masking visual signals, using bait types most favoured by omnivores, burying baits, separating them widely and placing baits in the afternoon. However, feral pigs vary widely in their dietary choices, with preferences most akin to local food availability. For example, feral pigs born and raised near wheat crops are less likely to take meat baits than a conspecific from a grazing area. Hence, for project results to be widely applicable research must focus on developing pig specific delivery systems that are locally adaptable.

Bait delivery systems and subsequent pen trials will take two forms. Static delivery systems, in the form of stationary pig-specific feeders, will be manufactured and trialed. Dynamic delivery systems, in the form of ground and aerially broadcast baits, will be developed and trialed. Delivery systems will take the form of different bait types (fresh, dried or rotten meat; fruit; grain; commercial diet), attractants/non-target repellents (continuation of prior research conducted at the RWPARC), bait placement (exposed, buried, tethered), and bait timings (dawn, dusk), and combinations of the above. Initial trials will occur in small enclosures so criteria such as acceptability, palatability, toxicity (time to death), humaneness, and effectiveness (% kill) can be closely monitored. The potential of analgesics, including the feasibility of incorporating a slow-release analgesic, will be considered if pain management is identified as an issue during testing. All trials will be conducted with 10 experimental animals and 10 control animals.

Successful delivery systems, where high results were achieved for each criteria, will then be trialed in large forested enclosures at RWPARC were non-target activity can be monitored. Final field trials of the most promising static and dynamic delivery systems will be conducted in Whetstone, Eena and Inglewood State Forests near RWPARC (non-poison trials or 1080) and in 3 possible areas of the dry tropics near Charters Towers (Taemas and Darlymple N.P.), Etheridge (Carpenteria Downs) and Mulgrave (Artamus). Wild feral pig populations will be monitored using a range of indicators including footprint plots, diggings, mark (micro-chip)-recapture and mortality ear-tags. Target specificity of each toxin and delivery system will be closely monitored through non-target feeding at bait stations, and the collection and necropsy of all animals found dead near trial sites.

Economics of feral pig control in north Queensland

David Smorfitt¹ and Steve Harrison²

¹James Cook University ²University of Queensland

Scope of the Project

A project is being undertaken under NFACP funding and in collaboration with Jim Mitchell and Bill Dorney of NR&M on the economics of feral pig control in the Wet Tropics, and forms the basis of a PhD project by David Smorfitt. The research forms the basis of a PhD in the economics of feral pig management. Since eradication is not a feasible option, the project is concerned with the 'optimal' level of control in terms of the tradeoff between damage costs and control costs.

The research examines the damage costs to crops (cane and banana), the management techniques – hunting (shooting and dogging), trapping, exclusion fencing and baiting – and the costs of these management techniques. Research will also be conducted on the closely associated aspect of sustainable harvest of feral pigs in regional areas with the resulting employment and flow-on effects for the economy, as well as the export market generating foreign exchange. The potential for combined or community efforts also need to be considered (as an alternative to individuals attempts to control feral pigs). The role of various Municipal, State and Federal bodies in the management – as landholder, legislator and policy setter – will also be considered. There is also the costs associated with feral pigs acting as vectors for various diseases some of which directly affect on human health (e.g. Japanese encephalitis) and others affecting animals and their productivity (e.g. FMD). The potential for FMD to impose costs on other industries such as tourism is also very relevant. The above data combined with biological data associated with patterns of animal movements, population density and replacement capacity will be represented in a computer model.

Research to Date

a) Cane and banana farm damage costs and feral pig management costs

A method of data capture for on-farm impacts of feral pigs was developed and applied on banana and sugar farms in North Queensland by Jim Mitchell and Bill Dorney as part of a NFACP project. Crop damage and feral pig management activities were captured as were indices reflecting feral pig presence. On the basis of these data, the damage and costs associated with feral pig management were converted to dollar values. Initial sensitivity analysis of the parameters such as sugar and banana prices and cost of labour has been undertaken. Initial findings are that the impact is greater for cane farmers as opposed to banana farmers. The losses or damage suffered by cane and banana sectors of the farming industry are relatively small compared with some of the other pests such as cane grub. However, for individual farmers the losses sustained can be high and thus of great concern and cost for to these farmers.

(b) Potential costs of exotic diseases (Foot and Mouth Disease, FMD)

The risk of feral pigs acting as vectors for a variety of diseases, both those affecting humans as well as those affecting other animals, has recently come to the fore with the

FMD outbreak in the UK. There have been outbreaks of FMD in Taiwan, Japan Korea, the United Kingdom, France and South Africa in the last five years. Various assessments have been made of the potential costs to Australian rural industries of an FMD outbreak, e.g. by the Productivity Commission and the Qld. DPI. A lesser known fact is that in the UK, the FMD outbreak had a greater impact on tourism than it did on agriculture. We have undertaken a desktop analysis of the potential impact that a FMD outbreak in the Cairns region is likely to have on the regions economy.

(c) Collective or group action

The role that collective action by landholders can play in the management of pests is well documented. What role collaborative action could play in the management of feral pigs is an area requiring further research. Initial contact has been made with two groups, one near Ingham and the other near Julattin. In both these instances attempts have been made to undertake management of the pigs on a collaborative basis. In the Ingham case all participants border the Wet Tropics World Heritage Area and their efforts have centred around the establishment of an electric fence of approximately 7 km in length. In addition, the participants undertake coordinated trapping on their land on the WTWHA side of the fence. Hunting is also needed for pigs which breach the electric fence. Farmers acting individually would simply move the problem to neighbours; collective action provides more cost-effective pig control. In the Julattin area, whilst one farmer has established box fencing as a management technique on part of his property, the collaborative action is more one of trapping.

Further Research Planned

(a) Management techniques

It would appear there is no one best method for feral pig control in all situations and thus combinations of control techniques (or control strategies) need to be evaluated. This will involve an analysis of the costs associated with the various integrated techniques as well as an appraisal of their relevance and success rates.

The opportunity for treating feral pigs as an economic resource and sustainable harvesting is closely associated with recreational as a sustainable tourist activity involves a conflict with the objective of reducing pigs to as low a level as possible. In both instances, the contribution of hunting and harvesting for export markets as 'wild boar' to regional economies could be an important factor. Their contribution to the overall economy is quite well documented. If feral pigs are to be harvested sustainably, the numbers have to be managed at a particular level in order to make the harvest economically viable. The potential for conflict to arise increases as environmentalists, authorities and farmers may want reduced numbers below the sustainable harvest levels. There is also the potential for conflict with indigenous groups who may see the feral pigs as a food resource and thus not want numbers reduced which would make harvesting more difficult.

(b) Collective action

More research is to be conducted into the potential for group action in terms of baiting, trapping and hunting, especially at favourable times, for instance during dry times when pigs tend to gravitate towards scarce water supplies. A concerted effort by all parties at critical times could prove to be greatly reduce pig numbers, and reduce the need for and cost of control measures during intervening periods.

(c) Modelling of pig populations

Based on the data captured covering the analysis of the management techniques and associated costs as well as documented animal movements and capacity to multiply, a dynamic model will be developed to simulate population numbers and damage costs under various control strategies.

Feral pig control and research activities in Western Australia

Laurie E Twigg

Vertebrate Pest Research Section (VPRS), Department of Agriculture, Western Australia (DAWA)

General

The importance of feral pigs as a pest species in Western Australia is not well defined. In the past, they were thought to have had a minimal, localised impact. However, in recent times, anecdotal information suggests that feral pigs are both increasing in numbers and in their range. Feral pigs are now known to impact upon agricultural production and/or the environment in habitats ranging from the jarrah forest in the south, to the river systems in the north of the State. *Ad hoc* control programs are increasing in frequency as various interest groups attempt to alleviate the impact of feral pigs. However, these efforts can lack coordination and are inhibited by the lack of suitable documented control techniques. These efforts are also hindered by the lack of a reliable, relatively cheap method for measuring the relative abundance of feral pigs, and hence the effectiveness of control programs.

There is no doubt that feral pigs are perceived to be an increasing problem in many areas of WA (eg. Northampton, Albany, Fitzroy River region). However, at present, with our current level of knowledge, it is difficult to reconcile these perceived problems with a real change in the distribution and/or impact of feral pigs across the landscape. The potential role of feral pigs in an outbreak of an exotic disease like Foot and Mouth Disease (FMD) has been well recognised for many years. In the past, the WEDPP has allocated considerable monies towards evaluating Australia's ability to respond to an exotic disease incursion. However, to date, had these exercises been 'real', then the disease would have established, mainly because of the failure of current systems to deal with the logistics involved in mounting the necessary response. Because of these real and potential threats to WA agriculture and the environment, the Animal Pests & Emergency Services program within the DAWA has instigated a number of initiatives, mainly overseen through the Vertebrate Pest Research Section, concerning the current status and control of feral pigs in Western Australia.

Feral Pig Initiatives

1. A survey of pest animal distribution and abundance in the Agriculture areas of WA. This survey, which includes feral pigs, involves capturing the knowledge of (field) staff from the DAWA and CALM. The survey, which is due for completion by mid 2003, is overseen by Dr Andrew Woolnough. It has been financially supported by the Wildlife and Exotic Disease Preparedness Program (WEDPP). The methodology of the WEDPP-funded survey is very similar to that used by NSW Agriculture in their state-wide survey of pest animals. The WA survey also compliments a similar survey already undertaken for the northern rangelands of WA. One of the key outcomes of the WA agricultural region survey will be greater preparedness for exotic disease outbreaks involving pest animals. Once the survey has been collated it will facilitate the production of risk assessments for exotic diseases and pest animals, the production of updated maps of pest animal distribution and relative abundance, and provide an insight into any changes in abundance of pest animal populations.

Clearly, such information for feral pigs will be of limited value unless it is accompanied by reliable and cost-effective control techniques for these pests.

2. Development and refinement of current baits and baiting strategies for feral pigs. In the current climate of possible increasing agricultural impact, and an increased awareness of the risks posed by feral pigs with respect to exotic disease, there is a need to develop more cost-effective, pig-specific control techniques. By necessity, in the medium to long term, feral pig control programs will almost certainly continue to rely heavily on 1080 baiting programs. Given the relatively high toxic load of acute poisons required in single-dose baits for feral pigs, including 1080 baits, it is critical that the baits used in these control programs, and their application, is improved so that feral pig control programs become more target-specific. This project is lead by Dr Laurie Twigg, and is to be supported by the Bureau of Rural Sciences through the National Feral Animal Control Program.

3. *'Ground-truthing' of large animal pest survey*. The results of the WEDPP-survey in some areas of WA relevant to feral pigs (eg. Northampton/Hutt River region) will be verified by on-ground inspection/follow up. This will assist with preliminary identification of study sites for future feral pig research. The WEDPP-survey will also provide information on current localised control practices for feral pigs.

4. Census of government agencies and other parties regarding their current involvement with respect to feral pigs. A state-wide database has been collated regarding those people who are currently involved in, or will have a future interest in, the control, biology or research into feral pigs. This database includes State agencies, Universities and other interest groups. It is overseen by Dr Laurie Twigg. Ultimately, it is expected to assist with gaining a more coordinated approach to feral pig research, and feral pig control, in WA.

5. Albany trapping program. A cooperative project managed by Dr Tony Higgs (DAWA). It involves a cost sharing arrangement by CALM, Water & Rivers Commission, DAWA, and Great Southern Plantations Ltd to fund an annual '2-month' trapping program in Albany/Denbarker region (south coast). The Project is in its third year, and is receiving good community support/participation. However, this program is not removing pigs of all ages and will soon be supplemented with 1080-baiting.

6. Sample collection – genetic structure of feral pig populations (Dr Peter Spencer, Murdoch University. VPRS/DAWA staff have facilitated the collection of biological samples from some areas of WA. The results of Dr Spencer's analysis will enable the relatedness of groups of feral pigs to be determined (provides a measure of dispersal). It will also give some insight to the origin of feral pigs in WA. Both these factors are important when developing exotic disease preparedness contingencies.

7. *Control techniques* A number of trapping, poisoning and/or shooting programs are undertaken across the State for feral pig control. However, although coordination of these activities is increasing between some land managers, there is still room for improvement in this area.

8. *Past feral pig research* The VPRS/APB has undertaken a number of research activities in the past, mainly during the 1980s. This included preliminary studies on home range (telemetry), and the effectiveness of 1080-wheat bait. Most studies were in the Northampton and Collie regions. A species management plan for feral pigs was formerly developed by the APB in 1992, and a review of feral pigs in the Kimberely was completed by the VPRS in 2000.

Issues

The deliberate, illegal introduction and reintroduction of feral pigs into conservation areas and other public lands is a very real impediment to successful feral pig control programs throughout Australia, including WA. Such activities would need to be curtailed if any exotic disease containment action is to be successful. Clearly, such transportations have the potential to spread a given disease beyond the containment boundaries.

Virally vectored immunocontraception is <u>not</u> a viable option for feral pig control

Tony Peacock

Pest Animal Control Cooperative Research Centre

The Pest Animal Control Cooperative Research Centre was established in 1991, as the Vertebrate Biocontrol CRC, to test the hypothesis that immunocontraception could be used to control rabbits and foxes. In 1995, the house mouse was added to the CRC's activities and in 1999 the Federal Government renewed the CRC. In its current form, CRC participants include CSIRO Sustainable Ecosystems, the Australian National University, the Universities of Sydney, Adelaide and Western Australia, the Agriculture Protection Board of WA and the Department of Conservation and Land Management in WA.

In the 12 years since its inception, the CRC has made considerable progress towards development of anti-fertility vaccines for pest animal control. The search for an antigen that elicits an immune response has pointed to proteins associated with the coating of the oocyte (zona pellucida) for each of the three species studied. A viral delivery system looks promising for each of the three species: myxoma virus in the rabbit, murine cytomegalovirus (MCMV) in the mouse and the canine herpesvirus (via a bait) in the fox.

In laboratory-based studies, inoculation of wild and lab type mice with recombinant MCMV expressing mouse zona pellucida 3 induces consistent and long-term infertility (>250 days). Results in the rabbit are encouraging (although long-term infertility has never been achieved) and we are yet to test the system in foxes. A regulatory package is under development for presentation of the mouse product to the Office of the Gene Technology Regulator.

The use of biotechnology for pest animal control was a highly ambitious proposal when put forward. Steady progress has been made to the point where it appears clear that a virally vectored anti-fertility vaccine is technically possible. Nevertheless widespread community discussion and debate will be required to determine whether a genetically altered virus is publicly acceptable and can ultimately be used for pest animal control.

Despite encouraging progress, it seems very unlikely that a virally-vectored immunocontraceptive product would be viable for control of Australian feral pigs. This opinion is based upon the following:

- The need for the domestic pig industry to take protective action in the event that a suitable virus was available. Australian pork producers would be unlikely to accept an added impost, particularly one that may have market ramifications such as a a genetically engineered virus. Likely compensation costs would render any proposal uneconomic and the risk of international ramifications would mean that Australian governments would be unlikely to back such a proposal.
- If a virus cannot be used, a baiting strategy must be employed. If baiting is to be used, a welfare-acceptable lethal strategy is far preferable to an immunocontraceptive one.
- Small studies conducted to data indicate that induction of infertility in the pig is no simple matter. Holland, Maddocks and McLaughlin (2001) failed to reduce

ovulation rates in gilts treated with porcine and rabbit zona pellucida antigens. Repeat studies by Holland, Maddocks and O'Leary (2002) also failed to reduce ovulation rates even with the use of Fruend's Complete Adjuvant.

- Pigs are a poor candidate for immunocontraception. Highly fecund animals are very difficult to control through fertility disruption, add to this issue a long lifespan and a general lack of seasonality or population explosions and pigs are one of the least susceptible animals to fertility disruption.
- The prohibitive cost of research and development. The Pest Animal Control Cooperative Research Centre estimates a cost in the order of \$12-20m to take its mouse product from the proof-of-product stage to an on-the-ground solution. It would be foolish to commence an equivalent feral pig program without a good understanding of the potential investors. No Australian R&D investors, be they private, industry-based or public, are likely to spend tens of millions of dollars on such a risky venture.

Pursuing shorter-term R&D and/or control programs appears a far better investment that either virally-vectored or bait delivered immunocontraception.

Understanding the level(s) of control required to minimise the threats posed by feral pigs to native species and ecological communities

David Forsyth¹, David Choquenot², Alan Robley¹ & John Parkes²

We have been contracted by the Natural Heritage Trust to undertake a review of the control required to minimise the threats posed by feral pigs (and also feral goats, feral cats, rabbits and foxes) to native species and ecological communities. The first stage of this process consists of a comprehensive review of all existing control programs across Australia. We will conduct this work by first identifying which 'agencies' (Federal, State, local government, and private organisations) have been, or are presently, involved in control activities in each state. We will visit the key contact person(s) in each agency and attempt to obtain the following information for each pest control operation:

- location and extent (a hard-copy map or GIS file showing the area(s) of control and associated monitoring sites);
- land tenure;
- the agency conducting the operation and the organisation providing the funding;
- control objectives/justification;
- control type, intensity, frequency, and target of control;
- pest species present;
- threatened species and ecological communities present in the areas of control and monitoring;
- the pre- and post-monitoring of pest abundance (type of monitoring, intensity, monitoring design, duration and results);
- the pre- and post-monitoring of native species and ecological communities conducted (type of monitoring, intensity, monitoring design, duration and results).

We will then review how each of the control operations achieved its objectives. A crucial aspect of this work will be determining whether monitoring was sufficient to detect whether or not objectives were met. We will assess whether different levels and types of control activities (i) reduced the abundance of the target pest(s), and (ii) resulted in an increase in the abundance of the native species and ecological communities. We will focus on the 18 threatened species listed under the Environment Protection and Biodiversity Conservation Act 1999 as adversely affected by feral pigs. We will then use several statistical techniques to assess the effect of each control operation on (i) the abundance of pigs, and (ii) native species and ecological communities.

In the second stage of the project we will quantify gaps in existing information on control activities, especially in relation to impacts on the abundance of pigs and native species and ecological communities potentially impacted by those pests. We will recommend priorities for filling gaps in existing knowledge, by (i) adding value to current control programs, and (ii) designing new experiments. We will produce guidelines that can be applied to existing or proposed control programs to aid in filling gaps in knowledge regarding the success of various control methods, with emphasis on the recovery of native species and ecological communities. Finally, we will design and cost experimental control programs to evaluate the effects of different levels of control on single- and multiple-pest

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species, and on the consequences for a range of native species and ecological communities, particularly those relationships that are difficult to identify through monitoring existing control programs.

The third and final stage will develop and implement a method for prioritising pest control within the National Action Plan and Natural Heritage Trust regions, incorporating quantitative relationships between control type and intensity, reduction in pest abundance, and subsequent response of native species and ecological communities. The resulting 'priority distribution' of pest control will then be compared with the current coverage of control programs, and gaps and priorities in control programs identified.

We encourage anyone with information potentially of use in this project to make contact with Dave Forsyth at the workshop, or contact him at the address below:

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Transcription of Session 3 discussion: Improving control methods

JACK GILES: Are there any questions of speakers in the last session?

KEVIN DOYLE: What is the role of electric fencing?

JACK GILES: In 1970 my experience on a property near Bourke was near 100% difference in lamb loss rate; we were not finding any remains in paddock surrounded by electric fence.

JIM MITCHELL: If a pig has a reason for going through a fence, such as water or food, you need a damn good electric fence to keep them out.

MARGARET WOODLAND: From my experience electric fencing has been used to direct pigs into trapping mechanisms.

GLEN SAUNDERS: It is not used widely in New South Wales.

JIM MITCHELL: In the 1960's and 1970's there was 200 km of fencing along World Heritage Areas and this worked well, but not used today for various reasons.

JOHN AUTY: Fencing is used widely in Africa to keep very significant animals out.

JACK GILES: In 1978 a conference at Western Plains Zoo had some outcomes on the use of electric fencing. However, there is also a problem with pigs getting into harbour on the wrong side of the fence and staying there.

BOB PARKER: Use of toxins for feral pig control. Working on registration case for the use of warfarin. No maximum residue level in relation to foodstuffs. Massive harvesting of feral pigs, problems presents some with human consumption of feral pig meat. Worked up a case for an acceptable daily intake of warfarin. Some holes; needs work on human toxicology but biggest problem they have seen with NRA is the residue levels. Currently saying a withholding period of 6 weeks of pigs from effected area, but need to determine where the effected area is, as pigs don't necessarily stay in the one place. combine Interesting exercise trying to withholding periods and exclusion zones around baiting areas.

LINTON STAPLES: There is an expectation of sublethal dosing in those pigs. Are you talking about harvesting pigs that have not been killed by the poison, but which may contain some poison? BOB PARKER: Warfarin does not kill pigs immediately but over several days, so there is a risk of transferring dose to human if consuming a freshly shot pig. The pig would have no signs of haemorrhage and would not be detected at the chiller boxes as an unacceptable product. Humans could quite happily consume that meat and get a secondary dose of warfarin from that pig.

TONY PEACOCK: Surprised about the registration of warfarin on welfare grounds. Does the NRA have an official capacity to seriously consider animal welfare or not?

LINTON STAPLES: It is a serious consideration on use in large animals when they are dying slowly. Unofficial it still comes into the registration and ethically any company dealing with these things, like ourselves, can't hold our head up high and say we are going to kill animals regardless of the welfare issues, we just would not do it. We would always choose the option that had the best welfare outcome.

BOB PARKER: The options are not necessarily that good. 1080 has issues with welfare. Choose your welfare or choose your non-targets; it is a balancing act. Although welfare groups are keen on cyanide, Queensland Health would be unlikely to support its use. I have been working on warfarin for 16 years; at this stage we are two years away from submission to NRA.

IANN BUCKNELL: Don't have secondary poisoning with CSSP. Breaks down and is nontoxic. If used properly it would be very hard to get poison out of a carcass. Pig can only get to it by disembowel the carcass. There are no residue problems with CSSP either.

ERIC DAVIS: All I can say is that cockies will use things as cockies will use it.

IANN BUCKNELL: That is very broad.

ERIC DAVIS: What I am leading to is that there are known impacts with its use. It is obviously being applied in ways non-target species can get access to it.

IANN BUCKNELL: Are you advocating that the department is going to be the only ones doing the poisoning in rural Australia?

ERIC DAVIS: Not advocating those issues at all, I am suggesting that is the sort of consideration NRA requires for its reviews. BOB PARKER: Professionally I have seen a number of cases where I have not been able to find the poison. Wedge-tail eagles can also disembowel a carcass. Looking back now we have been able to trace the deaths back to phosphorous poisoning. They were killed in areas where phosphorous was being used and they were feeding on carcasses.

IANN BUCKNELL: What percentage of cases are you talking about?

BOB PARKER: I have seen a small proportion of animals that die in Australia and a small proportion of wildlife that dies in Queensland. Over the years I have had a number of unexplained animal deaths, particularly in relation to wedge-tailed eagles, that I thought was an O.P., but no O.P. or other poisons was found. I recently came across admissions of use of phosphorous in grain industry for birds. Thinking back these were probably phosphorous as a wedge-tail eagle can get in through a rib cage.

IANN BUCKNELL: Weighing up the pros and cons of the use of warfarin and CSSP; the latter seems to be leaning one way considerably.

BOB PARKER: It is always a balancing act, as none of the chemicals are perfect. Non-target issues for CSSP seems to be the picture that is appearing now, but no residue problems with CSSP.

PETER SPENCER: Is anyone aware of suid specific toxins that are being looked at here or overseas? Has there been any consideration of biological control?

GLEN SAUNDERS: Feral pigs are not an international problem. No one else is developing toxins for feral pigs, apart from us looking at them.

LAURIE TWIGG: CSSP is only registered in QLD and NT, and used under permit in NSW. When the review is called there will be an opportunity for public submission.

JACK GILES: 1080 used in high doses in Queensland. Under serious threat in NSW of being banned (no 1080 meat baits in NSW). Target specificity of 1080 at high doses is low.

ERIC DAVIS: This is one of the reasons for the current VPC-led review of 1080 by the NRA.

TONY PEACOCK: PAC CRC, with Australian Wool Innovation funding, is currently working on developing a canid-specific toxin using an 'Achilles Heel' approach.

JIM MITCHELL: Pigs salt intolerance would be very target-specific and is worth investigating.

JACK GILES: Tried to use it on Lord Howe Island. Not aware of any work being done into salt use.

PETER KENNY: Use of creosote may make CSSP target-specific.

CHRIS BANFFY: What is the risk associated with secondary-poisoning with warfarin?

GLEN SAUNDERS: There have been no problems reported by Jim Hone with using warfarin in Namadgi National Park that I know of.

BOB PARKER: An issue with warfarin is its short biological half-life. Need for pig to return each day to get a chronic dosage. There is no guarantee that non-targets come back.

CHRIS BANFFY: The point I was making is that there is still potential for warfarin to get in to human consumption. If it does, how lethal will it be?

BOB PARKER: By the time a pig dies it has very little warfarin left in the system.

LINTON STAPLES: Second generation anticoagulants accumulate in the food chain. Warfarin, as a first generation anticoagulant, does not have this problem.

ROBERT HEDLEFS: As salt toxicity causes oedema of the brain in pigs there will be welfare issues to resolve before considering salt poisoning as a potential control option.

GLEN SAUNDERS: Registered warfarin would be treated in the same way as 1080 with signage and notification of neighbours, hence limiting human exposure issues.

IANN BUCKNELL: How practical is signage in remote areas?

ERIC DAVIS: It is the same case with most other pest animals control products.

PETER SPENCER: CALM in Western Australia bait 4,000,000 hectares four times a year with 1080 for fox control, so broad-scale distribution is not that much of a problem.

Session 4

Improving coordination

(workshop)

Improving coordination- Electronic data collection and transfer

Tom Garret

Queensland Macropod and Wild Game Harvesters Association

Queensland Macropod and Wild Game Harvesters Inc. represents the needs and interests of those involved macropods and wild game for supply to industry.

There is an identified need for a system that allows for and transfer of data relating to feral pigs (*Sus scrofa*) at taking and at the point of carcass inspection by the trade. Such a system would allow the appropriate interpretation and dissemination of data for the benefit national feral pig management strategy. Such a system the utilisation of wild game harvesters as data gatherers.



Association in harvesting

the recording the place of commercial collation, of the could involve This

information is essential for an efficient and coordinated management strategy.

Does a system already exist?

QMWGH is currently trailing a system of electronic data capture, transfer and storage using a hand held scanning device with a GPS chip.

Bar-coded tags put on the animal at the place of taking will, once scanned, record harvest data of that animal including the exact GPS location. The tag information relating to each animal can then be transferred to a central database for collation and interpretation. Further information can be added for each animal when it is inspected at a processing works including health information if the animal is condemned.

Data of all types can be added or accessed once an animal has been allocated identification by means of a bar-code. Furthermore, the application becomes what the user requires by means of changing software programs.



Transcription of Session 4 discussion: Improving coordination

JACK GILES: There are two workshop sessions listed on the program. I would like to compress these so we can deal with the Action Agenda itself. In this first session I would like to focus on better coordination of management. The two main questions to address are what are the current problems with coordination and what is causing it, and how can we address this.

BILL GEE: Important issue of land owners – most important arm in dealing with feral pigs. What is the extent of landowner's success in control of feral pigs? Vital issue in coordination. There is a big need for extension.

JACK GILES: Biggest effect on pig population is the weather.

CHRIS BANFFY: When representatives of government agencies visited landowners control proved to be successful, showing a 95% reduction of pigs in that area. Landowners will come on board if effective government approach and extension services are present.

PETER KENNY: Coordinated approach to baiting wild dogs in Queensland. AgForce will help coordinate if we have a strategy. Coordinated local planning approach required for feral pigs as with feral dog baiting.

ERIC DAVIS: Landholders are a diverse group of people. A mistake is made if they are put in one basket. Increased coordination requires local stakeholders to do the plan, devise their response to their local problem and implement it. This should be the model applied through this process.

MICHAEL HARTMANN: Need to all strive for same objective and we require agreement on words for National Strategy on feral pig control/eradication.

JOHN AUTY: Drought and flood should be added as control methods.

PETER JAMES: Taking one step up from landholders, local governments in Queensland are the primary authority on pest control and are required to have pest animal management plans. They set the agenda for the level of control.

JACK GILES: In relation to coordination of landholders, you can do this through legal imperatives, social pressure or more subtle means. To me, clear and widely disseminated information on the animal is critical. BILL GEE: Need for a nationally coordinated program for national funding. Where it should sit and how it is tied together I am not sure. Need to involve three government departments; Tourism, Agriculture and Environment.

PETER KENNY: Need to have industry organisations aligned with government.

ANNE PORTEOUS: National coordination needs to be spelt out, exactly what is being coordinated? Interest generated at regional level. No national coordination plan will be successful unless the people on the ground level are willing to be coordinated.

JIM MITCHELL: BRS Feral Pig manual has a section on national coordination.

QUENTIN HART: Coordination still requires dollars, and in the national context feral pig problems do not rate as highly as some other environmental problems such as salinity, all of which are supported out of existing Natural Heritage Trust funds. I also have serious doubts as to the interest of tourism in any feral pig control programs.

JOHN STEWART: We need a driver, such as the Primary Industries Ministerial Standing Committee.

JOHN MUMFORD: 189,000 hunters in NSW are a under utilised resource, yet they have never been approached by any government department. Don't forget hunters as they are keen to help.

JACK GILES: Coordination fundamental. Adequate resources to implement strategy is also fundamental. Coordination from top down and from ground up will yield additional resources. However, we need agreement on statement of intent.

PETER KENNY: Ownership of problem is also critical.

LAURIE TWIGG: Coordination going to depend on resources if it is to work e.g. wool industry levy on growers. How would industry react to a levy to fund some of the pig stuff?

IANN BUCKNELL: Infrastructure is there, it is a matter of linking together.

JACK GILES: Resource are limited; there is not enough money going into it to make it work.

ANONYMOUS: How do we know how much money is required without a structured plan.

JOHN STEWART: Government people are always asking what industry is going to commit to. Industry is committed to many things, but they require a structured plan before funding. Need to set the strategy and ascertain costs before asking industry to commit money.

MICHAEL HARTMANN: We need to make best use of currently available funds through a targeted goal. If additional funding is required then reassess.

GRAHAM ALEXANDER: Try to build a partnership between various industries, stakeholders and government. Put the argument to government that we use current resources in a more directed fashion, supplemented by other funds that will help with the whole coordination of the exercise, then there should be some agreement on where the funds come from. If industry sees Government determined to work with them then they will put their hands in their pockets.

BOB PARKER: Their needs to be some identification of the target. We all agree more and improved control, but is the target no pigs, or target of doubling or tripling our effort to determine where the dollars are to go?

IANN BUCKNELL: Established target yesterday as direct approach to minimise feral pig impacts as much as possible, with a long-term objective of eradication.

JACK GILES: Serious proposals for government funding need to ask for money that can be justified on an annual basis. Need to identity specific targets.

GRAHAM ALEXANDER: Partnership between industry, landowner and government. Landowners need to see an end point, a light at the end of the tunnel, they need some faith, an objective, need to hear eradication.

MICHAEL HARTMANN: In beef industry we have a beef industry strategic plan and strategies to get there, with statement of what we want. Need the same for feral pigs. Need for strategy/focus of where we want to get to. All research must align with the plan.

TOM GARRETT: The Draft Queensland Feral Pig Strategy lists 5 dot points for desired outcomes (pg 9). How have they been progressed? Who is the lead agency? CLYDE McGAW: Draft strategy released last Friday for further public comment hopefully to be signed off by end of year. Have not started implementing. No support for feral pig resource centre in Queensland, but still open for comment.

PETER KENNY: Queensland program the start of national program. Queensland have done their part then look to National program to proceed.

TOM GARRETT: Number 5 states "community accepts feral pigs are everyone's concern" in relation to economic consequences of feral pigs in Australia. Has that been progressed?

CLYDE McGAW: There are things happening a local government level and at catchment levels, now we have a draft state direction. What this group is looking for is a national approach, with each of the other levels built in.

KEVIN DOYLE: Are there any specific objectives in the Queensland strategy?

CLYDE McGAW: Yes, and under each objective is a list of specific actions required.

JOHN STEWART: Need for some action even if it requires scare tactics (foot & mouth disease) to get something done, then so be it.

PETER KENNY: We need landowner ownership, done through the media. Producers need to be informed but also general public. Queensland experience with wild dogs and disease had general public support once the public was informed. Need for the same media publicity for feral pigs. We need to state that it is for the common good, not just for primary production that this has to happen.

STEVE LAPIDGE: Recently the National Feral Animal Control Program received three funding applications, from Qld NRM, NSW Agriculture and WA Agriculture, that were all related to bait development. They showed little communication between the states. This is a critical area of feral pig control and requires coordination between states.

BILL GEE: Pages 13 & 14 contain two sections on suggestions on principles for future schemes. Page 14 lists strategies, but no timeframe. I suggest these two pages act as a focus/starting point.

GLEN SAUNDERS: For a NSW Agriculture briefing paper a series of information articles on feral pigs were prepared and some conclusions. The below suggestions were made:

1. Establish a set of national guidelines for monitoring the distribution and

abundance of all key pest animals, including feral pigs.

- 2. Build reliability into national estimates on where feral pigs are.
- 3. Develop reliable and accurate disease sampling procedures.
- 4. Need to continue training, as eradication is a long-term objective and there is a

Coordination summary:

need for ongoing recruitment and training.

- 5. NSW's limited resources focused on key risk areas. Need for risk analysis to prioritize actions.
- 6. Keep contingency plan as an ongoing process. Need to continually monitor, modify and update.

coordination summary:				
•	Standing committee	•	National training	
•	Landowner extension services	•	Risk analysis/prioritisation	
•	Timing (drought and flood)	•	Hunters input	
•	National coordination	•	Media campaign	
•	National pest survey			

Session 5

Priority issues (workshop)

Transcription of Session 5 discussion: Priority issues

JACK GILES: The focus of this session is on an agreed statement. If a can float a partial draft past you:

In recognition of the current damage fraught by feral pigs on the economy and the environment, and the potential for the animal to serve as a vector for several endemic and exotic diseases of livestock and humans, the largest ever workshop on feral pigs was held in Cairns on June 2 and 3, 2003. Representation of the meeting included... The meeting resolved that... The long-term goal should be eradication of feral pigs. The immediate priority is minimise economic, agricultural to and environmental impacts and risks through the development and implementation of a nationally endorsed strategy for management of feral pigs. This strategy should include...

MICHAEL HARTMANN: Can we add animal welfare in there?

TONY PEACOCK: Now we have heard all the papers, can we go around the room and hear everyone's first priority to moving forward from this workshop.

LAURIE TWIGG: We firstly need consensus on the mission statement.

QUENTIN HART: BRS would not support anything that states eradication is currently possible.

JOHN MacKENZIE: Specific diseases cannot be mentioned.

ANNE PORTESS: An effective management tool is critical, particularly considering currently tools may be phased out. Current toxins should not be removed until suitable replacements are available.

GLEN SAUNDERS: You need grass roots support for a national strategy to go forward as it is the landholders that will carry out the action in the long-term.

JOHN STEWART: Currently landholders are wondering what they are doing, in terms of what tools they have.

TONY PEACOCK: BRS has recognised, as indicated by recent project funding, that we do not have an adequate feral pig bait available to us right now and that this is a short-term imperative.

IANN BUCKNELL: We have effective tools. We are still manufacturing CSSP because landowners are demanding it and using it.

JOHN MUMFORD: Four priorities: 1. a monitoring program to establish feral pig densities and risk assessment, 2. establish a best practice manual for habitat-specific pig control, 3. establish a culture of mopping up in government departments, and 4. development of a clear animal welfare strategy.

ROBERT HEDLEFS: We should look to link pig control with catchment management plans.

JOHN STEWART: Urgently need to map feral pig free areas, and monitor status closely. Monitor translocations.

BOB PARKER: Regionally coordinated feral pig baiting campaigns and a culture of mopping up are essential.

PETER KENNY: Require coordination at the scientific level. We need a useable bait that is affordable, safe and registered as S6, so producers can acquire the bait from the shelf. We also need to promote the message of eradication to get support.

ERIC DAVIS: With respect to legislative backing, in NSW we already have this that forces the onus of pig control on landholders and contains provisions preventing feral pig translocation. However, as a matter or resourcing and landholder understanding no one has ever been prosecuted. As for mopping up, this a landholder issue due to lack of government resources.

JACK GILES: Lets return to this draft statement.

ROBERT HEDLEFS: Pigs are not a reservoir of FMD infection. Host for several diseases would be better wording.

BILL GEE: A farmer reading this would ask what is to be done. Can I suggest that wording be included that actually sounds out what we will be doing other than throwing more paper at the problem. Include national action plan not just strategy.

QUENTIN HART: Can we change "the meeting agreed that" to "the general concessus of the meeting was".

MIKE BRAYSHER: If putting this through VPC and NRM it will be extremely difficult as eradication is against their terms of reference.

PETER KENNY: We need eradication in there as a higher aim or end point, not control.

JACK GILES: Is there someway we can modify this statement to leave eradication in, but still be acceptable to VPC?

MIKE BRAYSHER: We need to place in there "if new techniques become available". I cannot see how with current technology we are going to eradicate feral pigs in Australia.

JACK GILES: What about "Eradication of feral pigs is a desirable goal. However with current technologies eradication is not feasible at this time".

QUENTIN HART: I think everyone in this room agrees eradication is desirable. However, eradication is not a desirable goal with current technologies.

GRAHAM ALEXAN DER: We are hung up on current technologies. We want new technologies to achieve the goal of eradication.

KEVIN DOYLE: Put the qualifier in the provisions, such as "eradication is the goal. This will require new control techniques".

GLEN SAUNDERS: Are we not trying to eliminate the threat posed by feral pigs? This does not detract from the goal of eradication. I would say "the long-term goal is the national elimination of the threat posed by feral pigs...".

ANNE PORTESS: What about "Eradication of feral pigs is the long-term goal and is subject to the development and availability of suitable technologies to enable this. The immediate priority is to minimise the impact of feral pigs on agriculture...".

JACK GILES: The question has been asked, given the possible withdrawal of 1080, would it be worthwhile to include something in the current statement to support it?

GRAHAM ALEXANDER: We are softening the statement all the time. We need a statement with impact.

MICHAEL HARTMANN: Make a third point talking about population minimisation. 'Management' needs to be removed from the statement.

QUENTIN HART: People in this room represent certain agencies that will not accept the word eradication, hence "the general consensus".

LINTON STAPLES: To Mike Braysher and Quentin Hart; If eradication is not achievable, would progress towards eradication be an acceptable goal to you? MIKE BRAYSHER: My passion on this has result from 15 years of trying to change the emphasis from killing pests to addressing the endpoint of damage mitigation. Putting eradication in their puts the emphasis back on the pest. You need to determine the relationship between pest density and damage done; once control effort outweighs return then you stop controlling. We are going back to where we were 20 years ago.

JOHN STEWART: I thought we had an action agenda for this meeting. What I hear behind me is inaction again.

JACK GILES: Tony has suggested we need a further point that lists urgent priorities.

BILL GEE: We need to grasp the word eradication. This will require an enormously expanded research and extension and education program to achieve this.

JACK GILES: We need to sort the list on the board into priorities.

LAURIE TWIGG: In the early days of the CRC for Fertility Control there was much excitement about the concept, however the technique was grossly over sold and false expectations were raised. In the long run that has cost us dearly. My concern is that including the goal of eradication will again raise false expectations and lose people along the way.

JACK WALKER: A clear target needs to be set to be taken on at the grassroots level.

STEVEN LAPIDGE: This is ridiculous Jack, we could be here for years trying to agree on a statement.

ANNE PORTESS: I feel is important to leave the eradication word in there for the believers that represent the landholders, even though I think it is crap. Landholders do all the work of management of pigs on the ground, its not scientists.

JOHN MacKENZIE: What about "while eradication is the long-term goal, it is acknowledged that techniques are not currently available to achieve this".

PETER KENNY: I would agree. We still need to have the desire of getting rid of feral pigs for credability.

LAURIE TWIGG: Rather than eradication put elimination of the threat.

TONY PEACOCK: I know it is hard, but I think it is important that we persist. This is an important and worthwhile exercise.

KEVIN DOYLE: We were going with a successful notion of qualifying that eradication is not possible without new technologies.

GRAHAM ALEXANDER: Is this saying we do not do anything until we get the new technologies?

PETER KENNY: We need to quantify the ultimate and immediate goals.

TONY PEACOCK: Who is happy, or willing to live with the statement that is up there right now. Done.

THE AGREED STATEMENT APPEARS AS THE FOREWORD TO THE PROCEEDINGS.

We now need some concrete statements on what is required. Is there general agreement that the highest priority is the development of a commercial feral pig bait.

ANNE PORTESS: Particularly one that is environmentally friendly.

JOHN MUMFORD: Points do not need to be numbered or ranked.

PETER KENNY: I agree. We need all of them in a strategic plan of attack.

TONY PEACOCK: Rather than an adequate suite of registered poisons, should we firm this up and say a commercial bait by a certain date?

JOHN MUMFORD: No. We may be setting us up for failure if we pin ourselves down.

GRAHAM ALEXANDER: What we are looking at is a document that can go to Canberra, and a series of dot points is all that is required.

KEVIN DOYLE: We need to add the notion of time or performance indicators and also the notion of risk analysis.

TONY PEACOCK: People are furiously agreeing with each other and on that point we are going to stop. I would like to thank Jack for chairing the meeting, and Steve for his work prior to and proceeding the workshop.

QUENTIN HART: Where does this go from now?

JACK GILES: This will be discussed in the next session.

List of priority issues:

•	Disease issues	٠	Legislative backing
•	An adequate suit of registered poisons	•	Translocation
•	Effective management tool	•	Swill feeding
•	Monitoring program to establish distribution and	•	Landholder obligations
	density of pigs/threat of pigs	•	Regionally coordinated control campaigns
•	Best practice manual by bioregion	•	Coordination at science level
•	Delineation of animal rights and animal welfare		
•	Develop culture within government departments	AC	TIONS
	of mopping up	•	Create groundswell interest in feral pig
•	Linkages between catchment management plans	•	Actions to be based on risk assessment
	and feral pig to lead to better community	•	Encourage enforcement of obligations on
	awareness		landholders, hunters and government agencies
•	Map feral pigs in Australia to establish feral pig		
	free area		

Session 6

A Feral Pig Action Agenda (workshop)
Transcription of Session 6 discussion: An Action Agenda

JACK GILES: We would like to talk about what the next steps are. Steve will be producing the Proceedings, with hard copies going to workshop participants and relevant government ministers in the states and commonwealth and to other senior persons of influence. There will be a media launch, and an application will be prepared for funds to develop the commercial bait issue. I propose that the statement be included as a foreword to the proceedings.

LINTON STAPLES: The proceedings will be the papers, but will it also include minutes?

QUENTIN HART: Sending something to the ministers won't achieve anything unless you have a champion to talk it through to politicians in person.

JACK GILES: Having raised this point Quentin, who would you suggest?

QUENTIN HART: I don't know whether it should be AgForce or Cattle Council, but unless someone has good connections I would suggest we are wasting our time.

BILL GEE: I would suggest Cattle Council and the Australian Veterinary Association as they both have lobbying roles. They should be responsible for taking it to the relevant commonwealth ministers.

PETER KENNY: I agree, peak bodies need to take this on initially. We also need ground swell support for producers and people in the street for public demand.

ANONYMOUS: Will the proceedings be on a website?

STEVEN LAPIDGE: Yes, on PAC CRC's (<u>www.pestanimal.crc.org.au</u>, in 'Publications') and Rainforest CRC's websites (<u>www.rainforest-crc.jcu.edu.au</u>).

KEVIN DOYLE: We entered this on the basis that we would take it forward, so we would certainly go along with what Bill said.

CLYDE McGAW: What actually is AVA and Cattle Council taking to the ministers?

JACK GILES: They will be taking the Proceedings of this workshop, which will include the finalisation of that statement.

CLYDE McGAW: So what is it asking?

STEVEN LAPIDGE: To gain political support for what this workshop has been discussing, such as development of a commercial feral pig bait among other things.

PETER KENNY: Once priorities are put in place and we have some sort of strategic plan that will point to where finance is needed to be spent.

QUENTIN HART: Presumably you are also talking about surveying the problem nationally, which is going to be very expensive.

JACK GILES: Within the statement there will be a summary of essential and immediate actions.

BILL GEE: What we need to seek first of all is endorsement of this as a policy objective.

JACK GILES: The next agreed step is the development of a strategy document. That is where we can most appropriately address costs.

IANN BUCKNELL: From what I see we need the plan to be put in place for feral pigs, with the new bait programs for example following up behind. The initial plan is for everyone going forward and collaborating nationwide.

JACK GILES: The objective is to use the Proceedings initially for an awareness exercise.

MICHAEL HARTMANN: The paradigm shift that we are after here is to go to the national level. It needs to involve national coordination. When we can get that onto the agenda of the Prime Ministers Ministerial Councils and other relevant bodies, that is when we can get the support to coordinate the whole thing.

JACK GILES: In my opinion, it needs to also go to the relevant state ministers.

QUENTIN HART: Momentum is critical. Something needs to happen very quickly.

BOB PARKER: A new, improved bait will not do anything in controlling pigs. What we want is increased action and integration in controlling pigs and an elevation of the problem in the minds of politicians and some will to increase the amount of action that goes into feral pig control.

CHRIS BANFFY: We need to be clear from the start when approaching ministers about what their actions should be, such as from this we want a federal plan done that feeds down to state levels. JACK GILES: Additional material that should accompany the Proceedings is a statement signed off by key participants stating desired short and long-term outcomes.

KEVIN DOYLE: The ultimate objective is that it has to go through the ministerial councils, but in order to get focus in the first instance you go to the ministers first.

ROBERT MOORE: The first session yesterday was on our (Environment Australia) Feral Pig Threat Abatement Plan, so as far as I am concerned our minister is already engaged. Therefore it is the other half of the core you need to address, not the environment. BILL GEE: Once the report has gone to ministers it is in the public arena, alloying all to lobby.

JACK GILES: My vision is to get a draft strategic plan drafted and out for critical comment within four to six weeks.

MAUREEN ALEXANDER: Would it be possible to get the document on the web as a PDF once ready?

STEVEN LAPIDGE: As soon as it is finalised I will put it up on our website and send an email out to let people know it is available. I will aim to get the Proceedings out within six weeks.

JACK GILES: If there is no more input, I declare the workshop closed.

PLEASE NOTE

The Feral Pig Action Agenda (FPAA) was proceeded by the Vertebrate Pest Committee Wild Dog and Fox Management Review and Workshop in Canberra on June 4 and 5, 2003. The review and workshop was attended by many of the same participants as the FPAA. As per the FPAA, the review and workshop identified the need for a National Pest Animal Strategy along the same lines as the National Weeds Strategy, and that this would be a recommendation to Vertebrate Pest Committee.

Consequently, although a draft National Feral Pig Strategy was drafted and circulated on June 19, 2003, the completion of this strategy is currently pending on the possible production of a superseding National Pest Animal Strategy by

Vertebrate Pest Committee. Should Vertebrate Pest Committee not be recommended to proceed with a National Pest Animal Strategy by the Land Water and Biodiversity Committee, the National Feral Pig Strategy will be completed and circulated for comment by the nominated drafting committee.

A FERAL PIG ACTION AGENDA

Compiled by Pest Animal Control CRC from outcomes of the workshop. The following goals and objectives do not necessarily represent the views of all workshop participants.

Goals	Objectives
1 Improve the planning, co- ordination and implementation of feral pig management plans	1.1 Adopt the National Feral Pig Threat Abatement Plan as a framework for management plans
	1.2 Establish a national website and depository of information accessible to all
	1.3 Ensure all States, regions and planning groups incorporate feral pig management into relevant land management programs
	1.3 Share and improve feral pig monitoring data and make it widely available
2 Utilise all available resources to eradicate the threat posed by feral pigs	2.1 Gain commitment of land holders and land managers to feral pig management
	2.2 Encourage the use of hunters and the game industry as part of regional campaigns to reduce pig numbers
	2.3 Ensure actions continue beyond "knock-down" phase to gain longer term advantages from control campaigns
3 Improve the range of tools available to effectively reduce the threat of feral pigs	3.1 Develop a commercial pig bait to aid managers in taking action
	3.2 Initiate a "genetic landscape" of Australia's feral pig population to aid control programs
	3.3 Adapt management programs to better apply current technique
	3.4 Improved techniques for removal of pigs at low density
4 Adjust incentives to remove any desire to maintain feral pig populations and to reward	4.1 Integrate harvesting industry and management/ monitoring programs where possible
eradication efforts	4.2 Substantially increase penalties for translocation or maintenance of feral pigs and ensure offenders are prosecuted
	4.3 Provide additional financial incentives for landholders and land managers to take action
	4.4 Establish the benefits and costs of control programs in terms of dollar returns and environmental benefits and risk abatement
5 Implement the National Feral Pig Action Plan in an effective and efficient manner that	5.1 Gain community support to finance a substantial increase in National activity
recognises varying social and cultural values	5.2 Recognise that attitudes and values vary in our society and ensure that the welfare and cultural values are honoured
	5.3 Encourage involvement of all interested parts of our community

OUTCOMES FROM THE RESEARCH MEETING ON WEDNESDAY JUNE 4, 2003

PART A: Key issues with feral pigs.

The below table is a summary of key feral pig issues identified at the Feral Pig Action Agenda research meeting and currently involved organisations that were present at the meeting. The table should be used as a preliminary guide to ascertaining potential links for collaboration, and is far from exhaustive.

Key Issue	Specific issues	Stakeholders involved & present		
Baits	Poison, package, placement	BRS, QNRM, NSWA review, EACT		
	Animal welfare	*RSPCA, NSWA review		
	Strategy for use	QNRN, NSWA, DAWA, BRS, QAF, SPC, ARI		
	Toxin residues	QNRM		
	Defending existing toxins	All current users, industry		
	Toxin reviews	*APVMA, submissions by all stakeholders		
	Commercial bait development	PAC CRC, ACT		
Coordination	Policy	QNRM, NSWA, NSW NPWS		
	Extention/Training	QNRN, NSWA, *CCA, *QAF		
Survey methods	Best practice management	BRS, UC, NSWA		
-	Monitoring	BRS, CSE, NSWA, DAWA, QNRM		
	Mopping up	QNRM		
	Impacts - agriculture/economic	EA, UC, QNRM, NSW NPWS, ARI,		
	- biodiversity	EA, UC, QNRM, NSWA		
	- social	RCRC, NSW NPWS		
	Disease	AFFA (WEDPP), NSWA, DAWA, MU, PAC CRC		
	Genetics	MU, US, DAWA, QNRM, PAC CRC		
	Translocation	MU, DAWA		
Commercial use	Economic analysis	*QMWGHA		
New approaches	Toxins	QNRM, NSWA, DAWA, PAC CRC		
	Biological control	ava, dawa, mu, nsw npws, qnrm		
	Fertility control	PAC CRC (past)		
	Achilles Heel approaches	BRS, PAC CRC		

* Likely stakeholders that were not present at the research meeting.

Acronyms

ACT	Animal Control Technologies Pty Ltd
APVMA	Australian Pesticides and Veterinary Medicine s Authority (formerly NRA)
ARI	Arthur Rylah Institute, Victoria Natural Resources and Environment
AVA	Australian Veterinary Association
BRS	Bureau of Rural Science
CCA	Cattle Council Australia
CSE	CSIRO Sustainable Ecosystems
DAWA	Department of Agriculture Western Australia
EA	Environment Australia
EACT	Environment Department of the Australian Capital Territory
MU	Murdoch University, Western Australia
NSWA	New South Wales Department of Agriculture
NSW NPWS	New South Wales National Parks and Wildlife Service
PAC CRC	Pest Animal Control Cooperative Research Centre
QAF	Queensland AgForce
QMWGHA	Queensland Macropod and Wild Game Harvesters Association
QNRM	Queensland Department of Natural Resources and Mines
RCRC	Rainforest Cooperative Research Centre
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SPC	Stanbroke Pastoral Company
UC	University of Canberra
US	University of Sydney

PART B: Feral pig control measures .

"This workshop agrees...Eradication of the threat from feral pigs is the long-term goal. This will require the development of more effective control techniques and technologies."

This statement, agreed to at the workshop, indicates the interest in developing new control technologies for feral pigs. Below is a list of lethal, biological and fertility control categories, toxins used/approaches possible, and details/current usage.

Control category	Toxin/approach	Details/state usage
Current toxins	*1080- sodium fluoroacetate	Legal in all states; most widely used toxin
(legal & illegal)	*CSSP- yellow phosphorous	Legal in Qld & NT; 2 nd in use to 1080
	Warfarin	Used under scientific permit in ACT &
		NSW
	tother Organophosphates- Brodifacoum	Tested by NSWA; used as rodenticide
	†Alpha-chloralose	Tested by NSWA; synergist with 1080?
	†Urea	Reportedly used in the past
	†Strychnine	Reportedly used in the past
	†Paraquat	Herbicide
Potential toxins	1080	Possibly in combination with analgesics or
		antioxlytic agents
	Warfarin	QNRM investigating one-shot baits
	1081	More humane that 1080?
	Zinc phosphide	Used in Pakistan in encapsulated form
	Cyanide	Suggested as an alternative to 1080 by
		welfare groups
Achilles Heel	Bite force differen tials - spp. specific baits	To limit native non-target exposure
approaches	Low salt tolerance	Potentially pig specific
	Skin delivery	Potential unknown
	High water & protein requirements	Potential for manipulation
	Cytokines	May have potential
	Stomach acid concentration- spp. specific	To limit native non-target exposure
	baits	
	‡Deficient sulphation	Inability to bio-transform certain toxins
	‡Lack of functional glucose transporter	Inosine produced by liver- a site for
		inhibition and haemolysis
	‡Larger brain size	Selective bait delivery with mechanisms
		that require problem solving
Biological control	African/classical swine fever	Problem with diseases or parasites
	Parasites	spreading to domestic pigs
Fertility control	Immunocontraception	Unlikely, see Peacock (Section 2)
	Persin	Arrects vasculature of mammary gland
	ыралы аларынан аларын Солуунун аларынан алар	Sterilization agent being investigated in
	1	Ladas & Dossums

* Currently under review by the Australian Pesticides and Veterinary Medicine s Authority (*PART C*). † Illegal or unregistered as feral pig toxin.

‡Identified in Marks C.A. 2001. The Achilles heel principle. Pages 330-335 in Proceedings of the 12th Australasian Vertebrate Pest Conference. Department of Natural Resources and Environment, Melbourne.

Desirable characteristics of a feral pig bait:

- Target-specific
- Humane
- Easy to use
- Shelf stable
- Cheap
- Field stable in short-term
- Odourless & tasteless
- Available toxin

- Readily accepted
- Effective antidote
- Take home poison
- Low carcase residue
- Low environmental residue
- Rapid death
- Suitable for aerial broadcast
- Safe for users

Table from O'Brien, P.H. (1986) An approach to the design of target-specific vertebrate pest control systems. *Proceedings of the 12th Vertebrate Pest Conference*, Davis, California, pp. 247-52.

Table 3. Design of a prototype system for feral pig control in Australia using poisons. Socioecological differences between the feral pig and potential nontarget species are summarized in the left column. Design features which can be derived from these differences are listed in the middle column. Corresponding attributes of a possible prototype are found in the right column.

SOCIOECOLOGICAL DIFFERENCES	DESIGN FEATURES	PROTOTYPE ATTRIBUTES
target is large, powerful animal	toxic bait available only to a large animal	place bait in tough packing
target has highly sensitive olfaction	odourants to increase attractiveness	use pheromonal or dietary odourants
target relatively less sensitive to visual input	mask visual stimuli to make unattractive to montarget spp.	dye grain bait green; use packaging to mask visual signals
target omnivorous: combine 'meaty' and 'vegetable' components to discourage obligate carnivores and herbivor	make bait unattractive to herbivores and carnivores es	use grain bait; add "rotten meat" odourants
fossorial foraging significant for target only	subterranean bait placement available only to target	bury bait
target has very large, nearly completely overlapping home ranges	distribute baits at low density	use widely separated bait stations
target crepuscular/nocturnal	decrease diurnal availability	place bait in late afternoon

Summary of current feral pig toxin/bait research

1. Assessment and future options for a broad-scale approach to feral pig control in NSW. *Proponents:* NSW Agriculture.

Contact: Hedy Bryant and Dr Glen Saunders, Vertebrate Pest Research Unit, New South Wales.

Timeframe: Report soon to be released.

2. Investigations into one-shot Warfarin, encapsulated cyanide and encapsulated zinc phosphide baits.

Proponents: Queensland Natural Resources & Mines, New South Wales Agriculture,

Department of Agriculture Western Australia and Pest Animal Control CRC.

Contact: Dr Joe Scanlan, Robert Wicks Pest Animal Research Centre, Queensland.

Timeframe: 12 months National Feral Animal Control Program funding.

3. Further development of feral pig baits and control strategies

Proponents: Department of Agriculture Western Australia and New South Wales Agriculture *Contact:* Dr Laurie Twigg, Department of Agriculture, Western Australia. *Timeframe:* 3 years.

4. Development of commercial feral pig baits (multiple packages).

Proponents: Pest Animal Control CRC, Animal Control Technologies Pty Ltd, Queensland Natural Resources & Mines, Environment ACT and the National Feral Animal Control Program. *Contact:* Dr Steve Lapidge, Pest Animal Control CRC, Canberra. *Timeframe:* 2 years.

5. Independent expert feral pig alternative toxin and 'Achilles Heel' review.

Proponents: Pest Animal Control CRC is currently seeking funding. *Contact:* Dr Steve Lapidge, Pest Animal Control CRC, Canberra. *Timeframe:* Immediate future. *PART C: Current Australian Pesticides & Veterinary Medicines Authority reviews relating to feral pig toxins.* Reproduced with permission from AVPMA.

RECONSIDERATION OF PRODUCTS CONTAINING SODIUM FLUOROACETATE (1080) AND THEIR LABELS

July 2002 -Scope document available at <u>http://www.apvma.gov.au/chemrev/1080_scope.pdf</u>

Summary

The NRA has initiated the review of registration of products containing the vertebrate pest poison 1080 and the approval of associated labels. The purpose of this scope document is to request the data necessary for the NRA to conduct a comprehensive scientific assessment of 1080. It is based on information received from the public, product registrants, community groups, government departments and other sources. It outlines concerns raised in relation to the continued availability of 1080 products and specifies what aspects of product registrations the review will examine.

1080 is being reviewed because of concerns raised by community groups, individual citizens and a government agency over the possible poisoning of non-target animals both native and domestic. The purpose of this review is to ensure that the continued registration of 1080 products meets current environmental safety standards and that approved labels contain adequate instructions.

The anticipated completion dates for the key stages in the review are noted below.

Technical data due	23 August 2002
Assessment period	From August 2002
Draft report preparation	Expected late 2003
Draft report release and public comment	At least 8 weeks (Dec 2003)

It is expected that a final report for the review of 1080 will be available mid 2004.

The NRA's review will examine the following aspects of 1080 product registrations and label approvals:

- Environmental aspects, including
 - Persistence of 1080 in baits and poisoned animals.
 - Effects on non-target animals.
 - Poisoning incidents associated with 1080.
 - Effectiveness of 1080 as a vertebrate pest control agent and its role in environmental protection.
- Animal welfare concerns.
- Assessment of product labels and associated extension material.

Data addressing the identified gaps in available information as detailed in Section 7.1 should reach the NRA by 23 August 2002.

THE RECONSIDERATION OF APPROVALS AND REGISTRATIONS RELATING TO CARBON DISULFIDE

July 2003

-Scope document available at http://www.apvma.gov.au/chemrev/CS2_scope.pdf

Summary

The APVMA has initiated its reconsideration of the registrations of products containing carbon disulfide and the approvals of associated labels. This document defines the scope of the matters of concern to the APVMA and outlines the kinds of information the APVMA requires to conduct a comprehensive scientific assessment of products containing carbon disulfide.

Products containing carbon disulfide and associated labels are being reviewed because of toxicological, occupational health and safety and residue concerns.

The reconsiderations will be made after the APVMA assesses all the data and other information provided to it for this purpose – the assessment process is hereafter referred to as 'review'. It is anticipated that a draft report of the APVMA's review will be made available for public comment prior to the APVMA making its decisions.

The APVMA will review the following aspects of product registrations and label approvals for carbon disulfide:

- Toxicology, including:
 the potential for acute and chronic effects that might pose undue hazards to human health.
- Occupational health and safety, including:
 the potential for undue hazards to workers.
- Residues in food, including:
 acute and chronic dietary exposure estimates.
- The adequacy of instructions and warnings on product labels.

A decision on the reconsiderations will be made after the APVMA has reviewed all the data and other information provided to it for this purpose.

4.1 Products

At the commencement of the review, there was one suspended and one registered product containing carbon disulfide. These products will be considered in this review.

Product Number	Product Name	Registrant	Label Approval Number
41130	C.S.S.P. Phosphorous Pig Poison (Registered)	F.H. Treweeke Pty Ltd	•
41185	Ajax Carbon Disulfide Grain Fumigant Ready-To-Use Liquid (Suspended)	Asia Pacific Specialty Chemicals Limited	*

* Labels transitioned from the States and so not having an approval number

PART D: Registration of a commercial feral pig bait.

Linton Staples, Animal Control Technologies Pty Ltd.

Develop of new pest management products

FOXOFF® Project

- Commenced in 1992 with \$20,000 grant from Australian Wool Innovation. The rest was self-funded.
- Cornerstone of many systematic fox control programs.
- Responsible for saving \$millions & protecting much wildlife.

Considerations for registration of a commercial pest animal control bait

Efficacy

- 1. Is it eaten by most pigs? Pen then field tests
- 2. Does each pig die? Pen studies (regurgitation, aversion/neophobia)
- 3. What is the application rate?
- 4. When to use, how to follow-up (IPM)?
- 5. Is it/they reliable in all situations?
- 6. What is the claimed success rate?

Safety

- 1. Is the bait able to kill other an imals/birds?
- 2. Will the use pattern pose a risk (size, toxin,
- placement, distribution, frequency, density)?
- 3. Presence of non-targets and their risk

(casowarries vs water rats)?

- 4. Users look at benefits vs risks.
- 5. Regulators look at risks!

Residues

1. Environmental breakdown, movement, metabolites etc?

- 2. Food chain (crops & game pigs-MRL's)?
- 3. Persistence?
- 4. Possible accumulation (secondary poisoning
- issues related to both the carrier and the toxin)?
- 5. Quarantine, safety (weed spread etc)?

Humaneness

- 1. Does it kill quickly?
- 2. What consequence of sub-lethal dose?
- 3. What consequence of super lethal dose?
- 4. Mechanism of toxicosis?
- 5. Antidotes and treatments?
- 6. Humaneness for non-target accidents?

Occupational Health and Safety

- 1. Is it safe to manufacture?
- 2. Is it safe to transport (DG? Status?)
- 3. Is it safe to store?
- 4. Is it safe to apply i.e. releasing phosphine in
- planes, leaking 1080 in utes etc?
- 5. Storage consideration (freezer, locking)?
- 6. Accumulation risks (thallium, lead etc)?

Stability

- 1. Stability of the poison in the bait?
- 2. Breakdown in environment?
- 3. Storage conditions and shelf life?

4. Must test in final packaging (accelerated and real time & test variety of situations – wet/dry etc for field evaluations).

5. Validated assays for active ingredients (sensitivity, specificity, reproducibility and accuracy)

6. Also validation of extraction procedures.

Manufacture and Quality Assurance

1. Incoming ingredients- sterility, contaminants, risks.

- 2. Consistency of manufacture (<10% variation).
- 3. Plant hazards emissions, safety and approvals
- (S7 license etc).
- 4. Label version control, QA sampling.
- 5. Generally moving to GLP/GMP for ag chem.

Bait package

- 1. Does each bait need a label?
- 2. Bulk packs, air drop issues
- 3. Is it attractive? (may need 2-3 varieties)
- 4. Is it target specific i.e. meat flavour reduces herbivore risk etc
- 5. It MUST BE CHEAP & convenient
- 6. It must be accessible to landholder (Merchants, agencies, RLPB's etc)

Labels

- 1. Need national consistency.
- 2. Measure pack may be simple with supporting leaflet.
- 3. Need to consider poisons scheduling.
- 4. Bait may be different from pure technical grade active constitutes.
- 5. Need integration with other IPM.
- 6. Cut out the folklore.
- 7. Specific legal document- liability management.

	Product	Started	Released	Years
Time taken, from development to	FOXOFF	1989	1993	4
release, of current Animal Control	RABBAIT	1994	1997	3
Technologies products.	Mouseoff ZP	1996	2000	4
5	DOGGONE	1997	1997	1
	RATTOFF	2000	2003?	3

APPENDIX A: Print media and journal articles relating to the Feral Pig Action Agenda. *Please note that not all articles are likely present.





Letters to the Editor- The Canberra Times, Wednesday June 25, 03

No magic bullet in sight to control feral pigs

WHEN I read Nigel Stork's article in the Science and Technology section (CT, June 12, p. 19) on the workshop in Cairns that discussed management of feral pigs, I thought that there must have been two workshops because the conclusions that Nigel drew from his were very different from what I remember.

No willing coalition was formed at Cairns for action on feral pigs and no general consensus; only an uneasy truce. Nor did we agree that science can develop a magic bullet; to the contrary, a senior researcher in the field believed that it was most unlikely.

A group at the workshop wanted the Government to provide funds (it would cost billions, even if it were possible) to eradicate all feral pigs from Australia, ideally with some form of magic bullet. This is at odds with what state and Commonwealth pest-management agencies have been promoting, namely an integrated, coordinated and strategic approach based on managing the damage in priority areas.

I have run workshops with landholders throughout much of Australia on how best to manage pests such as feral pigs. Thankfully, most of the landholders are realistic and realise that they can't afford to sit back and hope that science will find a magic solution. As for eradication, most landholders agreed it was impossible to eradicate any established pest from mainland Australia.

If we really want to help private and government land managers control the damage due to feral pigs and other pests, we need to get out into the field and listen to them and their issues and concerns and then help them address their problems in a sensible and pragmatic way.

Giving them false hopes about a magic bullet can only divert their attention from what for them is a difficult and complex management issue but one which, if attacked strategically can and has been addressed in many areas. MIKE BRAYSHER

83

Narrabundah



Feral pig eradication requires national approach

By Graham I Alexander

A significant step towards the ultimate eradication of feral pigs was taken at a workshop initiated by the AVA in Cairns last month. The consensus of participants was that feral pigs represent a major threat to most rural industries, to the environment and to many native species. Above all, feral pigs are a likely host for some serious exotic diseases, including FMD.

A coordinated nationwide effort with the objective of eradicating the feral pig is essential to achieve any worthwhile result. Any program would include the development of new and improved technologies and techniques.

The workshop attracted the largest number of participants ever to attend a session on feral pigs. It included livestock producers, veterinarians, research workers and pest control specialists. This reflects widespread concern about the significant increase in the number of feral pigs, which are estimated to total about 23 million. Allied with the AVA in sponsorship of the workshop were the Rainforest Cooperative Research Centre, the Pest Animal Control Cooperative Research Centre, the Cattle Council of Australia, and Meat and Livestock Australia.

Let's summarise the current situation with feral pigs. For a start, feral pigs can act as hosts for a number of endemic diseases, of which leptospirosis is important as it can infect cartle and humans

through contaminated watering points. Feral pigs can also act as hosts for a number of exotic viral diseases, including FMD, Japanese Encephalitis and Swine Fever. Pigs infected with FMD excrete the virus in great quantities in their breath, becoming a potent source of infection of cattle and sheep. In the western areas of Queensland and New South Wales, feral pigs live in close association with cattle and sheep congregating at common watering points and so are well placed to pass on infection to these animals.

Participants at the workshop were also alerted to the risk of feral pigs being used as a basis for bio-terrorism. The virus potentially could be smuggled into Australia and numbers of feral pigs then

infected with it. Such an attack could bring our livestock, meat and dairy exports to a standstill.

Besides their capacity to spread disease, feral pigs cause serious damage to the sheep industry due to their predation of lambs. They also affect agricultural industries such as grain, sugarcane and banana. Due to their habit of wallowing, they ruin watering points as well as damaging the environment. The effect of feral pigs can also be more widespread than damage to farmers and graziers as they are found on northern beaches, in national parks and on aboriginal lands. As shooters are prohibited from national parks, these become havens for feral pigs, which then invade neighbouring farms and properties. National park habitats are also being devastated, ruining their important role as tourist destinations.

In Far North Queensland, where tourism is more important than any other industry, feral pigs are becoming a serious impediment, ruining the pristine nature of national parks and placing many of our native species under threat of extinction. Being omnivores, feral pigs in northern Australia search for food on beaches, eating any food they find, robbing turtles' nests, crocodile eggs and, in

Aust Vet J Vol 81, No 7, July 2003

national parks and forests, eating the eggs of ground-nesting birds. In the tropical rainforest, pigs root around swamps and streams and other damp areas seeking earthworms, promoting the spread of weeds and also Phytophthera cinnamomi, a cause of forest dieback.

The current control measures for feral pigs are trapping, baiting and shooting, either on the ground or aerially. These are generally orchestrated on a local or regional level by landholders and local government with support from State governments. Some federal support has come with funding through the National Heritage Trust. However, these measures have proved to be relatively ineffective as the feral pig population has steadily increased and expanded into new areas. This spread has been assisted by frequent translocation of pigs into areas previously feral-free.

These difficulties point out the need for a different approach to attacking the problem. The ultimate objective should be eradication of the pest utilising a nationally coordinated program, rather than the current control programs organised on a local basis. It should involve landholders, local, State and federal authorities, for a collaborative commitment both functional and financial to the desired outcome. While the States most affected are Queensland and New South Wales, all States except Tasmania face a feral pig problem.



A nationally coordinated eradication program would apply accurate demographics to help delineate areas of high, low and nil population. The program could expand the areas of nil population with measures to prevent incursions of pigs into the free areas. Account would also be taken of the natural avenues of feral pig spread, particularly river catchments, and natural barriers to their movement which can be used to advantage. Legislation would be required to ensure the staccess of these measures.

These coordinated programs, initiated using the current technologies of baiting, ground and aerial shooting and trapping, should be supplemented by new technologies as developed. Among these new approaches will be highly targeted and species specific baits, more sophisticated methods of monitoring, and methods of protecting areas from which feral pigs have been eliminated.

 Dr Graham Alexander, AVA National President in 1977-78, was formerly the Director-General of the Queensland Department of Primary Industries. He works closely with sheep and cattle vets, and both he and his wife have witnessed the awful devastation that feral pigs wreak on lambs (pictured).

REPORT: Feral Pig Workshop 2-4 June 2003

In the July AVJ, Dr Graham Alexander gave a graphic description of the damage being wrought by feral pigs on Australia, and the threat they pose as a possible host of serious exotic diseases. He mentioned the workshop on feral pigs that was held in Cairns shortly after the AVA Annual Conference. In this month's AVJ, AVA Veterinary Director Dr Kevin Doyle reports on what came out of the workshop and how the AVA is pursuing this issue.

More than 60 people from many disciplines and stakeholder groups held in Cairns which was sponsored by the AVA, the Pest Animal Cooperative Research Centre (CRC) and the Tropical Rainforest CRC.

It was apparently the largest workshop ever held on feral pigs. Besides the AVA and the CRCs, the Federal Department of Agriculture, Fisheries and Forestry was present, as well as Environment Australia, State Governments, the Vertebrate Pests Committee, manufacturers of chemicals for control, and industry and other stakeholder groups.

AVA participation followed a motion passed at the AGM in Adelaide 2002 (*Aust Ver J* 80 7 p397) recommending to the Board and Policy Council that AVA assume a leadership role in progressing the feral pig initiative. This meant "the need for a thorough examination of the research conducted and information collected to date by a meeting of government authorities, livestock industries and environmentalists with a view to determining an appropriate national program for containment and ultimate eradication of feral pigs".

The AVA recognises that the veterinary profession can make a major contribution to feral pig control, but also that many other disciplines and stakeholder interests are involved. A successful outcome to this problem can be achieved only if everyone works together. Drs Gee and Alexander, sponsors of the AVA motion in Adelaide, attended the Cairns workshop and presented papers as did, inter alia, Dr John Auty. Drs Lyndy Scott and Kevin Doyle attended on behalf of AVA. Dr Jack Giles, formerly head of the NSW National Parks and Wildlife Service and the first person to be awarded a PhD for studies on feral pigs, chaired the workshop.

The delegates reached agreement on this statement:

"Eradication of the threat from feral pigs is the long-term goal. This will require the development of more effective control techniques and technologies. The immediate objective is to minimise economic, agricultural, public health and environmental impacts and risks through development and implementation of a National Strategy and Action Plan for the management of feral pigs through the use of currently available techniques." including:

- A national monitoring program to determine distribution and density of feral pigs.
- Best practice manuals aligned to geographic areas.
- A culture of mopping up after control programs.
- 4. A strategy on animal welfare.
- An awareness program linked to catchment areas.
- A map of feral pigs to be used to establish which areas are free.
- 7. Legislative backing,
- 8. Enforcement of the ban on swill feeding,
- Obligations of landholders to control feral pigs.
- Regional coordinated campaigns to mop up survivors.
- Enforcement of current landholder obligations.

A list of priority research projects was also made. The workshop recognised that current control measures have proved ineffective in reducing feral pigs, and that the techniques and instruments to achieve eradication do not yet exist.

The consensus was that we should aim at ultimate eradication of the pest using a nationally coordinated program. It was accepted that landholders have the primary responsibility, that the States have legislative responsibility, but that national coordination and leadership, and the support of the Federal Government, is required.

Letters signed by the CEOs of the two CRCs and the Presidents of the Cattle Council and the AVA were sent to the Prime Minister, Minister for Agriculture, Fisheries and Forestry, Minister for the Environment and Heritage, Minister for Education, Science and Training, and Minister for Science. The letters emphasised the economic impact of feral pigs on a range of agricultural industries, the damage they cause to fragile environments and native animals, and associated public and animal health issues (for instance, feral pigs are agents for the spread of leptospirosis to cattle and humans).

The letters proposed a meeting of Commonwealth, State, regional and industry authorities to address the problem of feral pigs and development of a national strategy to achieve this objective.

They also agreed on a list of priorities

Aust Vet J Vol 81, No 8, August 2003

APPENDIX B: Radio media articles relating to the Feral Pig Action Agenda.

*Please note that not all articles are likely present.



NT Country Hour Summary

Tuesday 1/4/2003

Call for feral pig management strategy - Robin McConchie

There are renewed calls for a national strategy to combat feral pigs. A former senior bureaucrat with the Queensland Department of Primary Industries, Dr Graeme Alexander, says all efforts to address the problem have failed. Dr Alexander says pigs are a massive problem in all states including the Northern Territory and he says the bill to manage them could be as high as a billion dollars. Dr Alexander's hoping an Australian Veterinary Association workshop in Cairns in June will push the issue forward and not just bok at research needs. He says ideas like shooting for a feral game market is not the solution.

Dr Graeme Alexander: formerly from Queensland's Department of Primary Industries

SA Country Hour Summary

Tuesday 1/4/2003

New calls for feral pig control - Robin McConchie

There are renewed calls for a national strategy to combat feral pigs. A former senior bureaucrat with the Qld Department of primary industries Dr Graeme Alexander says all efforts to seriously address the problem to date have failed. Dr Alexander says he's now hoping that an Australian Veterinary association workshop in Cairns in June will take the issue forward and not just look at research needs. Dr Alexander says pigs are a massive problem in all states but particularly the Kimberlies, the NT, NSW and Qld. He says the bill to manage them could be as high as a billion dollars. In this state they are a serious problem on Kangaroo Island and around the sensitive Coongie Lakes in the far northeast. Dr Alexander says shooting for a feral game market is not a solution. "It's a bit like harvesting kangaroos, nobody shoots small kangaroos they only shoot big ones - because of costs. So you find that with feral pigs the only ones they shoot are the big males, not the females or babies so they're not doing anything towards getting rid of them. The key to a strategy is trying to eradicate feral pigs from different catchment areas, they always have to stay very close to water. They really are a major menace. We spent nearly a billion dollars on getting rid of brucellosis and TB – maybe we might have to spend that."

Dr Graeme Alexander: Queensland Department of Primary Industries

QLD Country Hour Summary

Tuesday 1/4/2003

New calls for feral pig control - Robin McConchie/Kate O'Toole

There are renewed calls for a national stategy to combat feral pigs. A former senior bureaucrat with the Queensland Department of Primary Industries, Dr Graeme Alexander, says all efforts to seriously address the problem to date have failed. Dr Alexander says he's now hoping that an Australian Veterinary association workshop in Cairns in June will progress the issue not just look at research needs. Dr Alexander says pigs are a massive problem in all states but particularly the Kimberlies in Western Australia, the Northern Territory, NSW and Queensland and he says the bill to manage them could be as high as a billion dollars. But, Dr Alexander is certain on one point, that shooting for a feral game market is not the solution.

Meanwhile, the Mackay region has been approved to run a feral pig culling trial in national parks, which is the first of its kind in the state. Currently strict legislation makes pig control in national parks virtually impossible but the legislation is being waived for this trail. Allan Royal from the Mackay Cane Protection Board says if all goes well, the program could be extended.

Allan Royal: Mackay Cane Protection Board

Dr Graeme Alexander: Former senior bureaucrat, Qld DPI

QLD Country Hour Summary

Thursday 24/4/2003

Dirrinbandi home of pig bait - Robin McConchie

As we've spoken about in recent times, there is a push to seriously tackle the ever growing feral pig problem across Nothern Australia. In fact feral pigs have been named a threatening process under Commonwealth Law and thererefore a national management strategy must be developed. The matter will be addressed at the Australian Veterniary Assosication Conference in Cairns in early June. There are millions of feral pigs in Australia and they cause untold damage to the environment, they kill livestock, particularly lambs, and can spread weeds and disease. One man who's heavily involved in the feral pig industry is lan Bucknell of Dirrinbandi, he is the only manufacturer in the world of the registered poison CSSP. Ian Bucknell says CSSP, which stands for "Beware wild bore poison" in Latin, is the only registered, take home pig poison, that is relatively safe and target specific. Ian Bucknell: Dirrinbandi

QLD Country Hour Summary

Tuesday 27/05/2003

Feral pig management - Richard Hudson

A thousand veterinarians from all over over Australia are in Cairns this week for their annual conference and one of the main topics of discussion will be feral pigs. It's estimated there are between 13 and 23 million feral pigs in Australia. Vets are concerned for a number of reasons, for example if a disease like Foot and Mouth ever entered Australia it could easily be spread by pigs.

Senior Vet Bob Rheinberger says they're hoping to establish a co-ordinated approach to the feral pig problem right across Australia and he would like to see more research into safe effective baiting. The vets conference runs all this week and then the feral pig workshop is on next Monday and Tuesday.

Bob Rheinberger: Director Australian Veterinarians Association.



QLD Country Hour Summary

Wednesday 04/06/2003

Feral pig workshop - Richard Hudson - Cairns

It seems Australia's feral pig problem is finally being taken seriously. The country's largest ever feral pig workshop has just finished in Cairns with delegates seeking support from all levels of Government for a national and co-ordinated eradication program. Estimates of feral pig numbers in Australia vary from 13 to 23 million depending on droughts and feed availability. They are considered a serious pest because of the damage they cause to native flora and fauna as well as livestock and crops. The Cairns workshop brought together representatives from Government, private enterprise, farming and researchers who are trying to find appropriate control methods. One of those researchers, Glenn Saunders from NSW, says aerial shooting from choppers can be very effective, for example a recent three day shoot in the Cape York Peninsula culled 4000 pigs in three days. The workshop was organised by 3 Commonwealth funded Cooperative Research Centres, the Australian Veterinary Association and Meat and Livestock Australia.

Steven Lapidge, from the Pest Animal Control CRC. Glen Saunders, Principal Research Scientist NSW Agriculture Linton Staples, Animal Control Technologies. Jim Mitchell, Researcher Old Department of Natural Resources and Mines.



Bush Telegraph Summary

Thursday 05/06/2003

Feral pigs -

It's estimated there are between 13 to 23 million feral pigs in the wild; numbers vary depending on the availability of feed and droughts. Cape York Peninsula is feral pig heaven, with a recent 3 day shoot in the Cape York Peninsula culled 4000 in just 3 days. Not only do the pigs damage our native flora and fauna, they play havoc with livestock and crops. The problem is now being adressed at the largest ever feral pig workshop in Cairns. Glenn Saunders and Steven Lapidge: Glenn Saunders is a feral pig researcher from New South Wales. Steven Lapidge is one of the coordinators of that feral pig workshop in Cairns this week.

SA Country Hour Summary

Monday 09/06/2003

Feral pig eradication plan - Sarina Locke

With an estimated 23 million feral pigs digging up the Australian environment - researchers are calling for a coordinated eradication and management plan. At a meeting just concluded in far North Queensland - industry leaders, vets and researchers decided to ask the Federal Government to provide \$10 million for the plan. At a groundbreaking workshop, in Cairns, industry leaders, vets and researchers agreed to a coordinated approach to feral pigs. Associate Professor Steve Turton, from the Rainforests CRC says they're particularly worried about the human and livestock diseases they carry. "This amazing unanimous agreement that we have to do something about feral pigs and that in itself is a landmark because there hasn't always been agreement among those groups. I guess the agreement is eventual eradication however long that takes but in the meantime coming up with ways of controlling pigs with a regional focus."

Steve Turton: Associate Professor, Cooperative Research Centre for Rainforests



Posted: Thu, 7 Aug 2003 8:44 AEST

Feral pig bait efforts move ahead

A researcher involved in the campaign for a nationally coordinated feral pig control program believes a commercial and consistent bait could be available within two years.

Pest Animal Control Cooperative Research Centre Project Manager Steve Lapidge says since a national control conference in Cairns, considerable support for the development of a national control strategy has occurred.

Dr Lapidge says a major weakness in past baiting campaigns has been inconsistency in the dose of toxin ingested by pigs.

He says because the bait project is based on an already registered toxin, researchers are hoping for an early result.

"We'll be using sodium monofloracetate, which is already a registered toxin, so there should not be the hold up there - its the actual bait medium we are playing with at the moment, or the presentation of the toxin, so we would like to think we could get something out in about two years," he said.

Steven Lapidge, from the Pest Animal Control CRC.



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APPENDIX C: Parliamentary letters resulting from the Feral Pig Action Agenda Drafted by Dr Graham Alexander, Australian Veterinary Association

The Hon John Howard MP Prime Minister Parliament House Canberra ACT 2600

Dear Prime Minister

We are writing to you to express our concerns about the economic and environmental impact of feral pigs in Australia. We believe that there is a real possibility that if the feral pig population became infected with Foot and Mouth Disease, either by accident or by design such as in a bio-terrorism campaign, our animal export industries would be brought to their knees and the effect on tourism could be as disastrous as that experienced in the United Kingdom.

These concerns were discussed at the 'Feral Pig Action Agenda' workshop convened in Cairns (2-4 June 2003) by the Australian Veterinary Association, the Rainforest CRC, the Pest Animal Control CRC and the Cattle Council of Australia. Participants included veterinarians, livestock producers, researchers and pest animal control specialists from throughout Australia, who were seeking a resolution to the escalating feral pig problem. Emphasis was on the economic impact of feral pigs on a range of agricultural industries including livestock, grains, horticulture and sugar, damage to countless fragile environments and native animals, plus public and animal health issues. Feral pigs are an agent for the spread of leptospirosis to cattle and humans. They are also a potential danger in transmitting a number of exotic diseases such as Foot and Mouth Disease, Japanese Encephalitis and Classical Swine Fever. Alarming figures were produced indicating there are almost as many feral pigs in Australia as cattle (23 million) particularly concentrated across northern Australia and the eastern States.

We are proud of the efforts made in creating our national parks but these are fast becoming sanctuaries from which feral pigs ravage surrounding farmlands, while also devastating the environment within the national parks. In Far North Queensland, where tourism is currently more important to the economy than any other industry, feral pigs are becoming a serious impediment to the tourism industry, ruining the pristine nature of the rainforest and placing many of our native species under threat of possible extinction in the world heritage rainforest areas.

The workshop recognised that current control measures have proved ineffective in reducing the feral pig menace. Most control measures were orchestrated on a local and regional level, with little coordination between regions and within regions. This leads to frustration amongst landholders who are at the forefront of the measures and whose livelihoods are affected by the outcomes. As regions are cleared, pigs from adjacent regions move in to occupy the cleared areas. This is further exacerbated by frequent translocation of pigs into areas previously free from pigs.

These difficulties point out the need for a different approach to attacking the problem of the feral pig. The consensus view from the Workshop was that we should aim at the

ultimate eradication of the pest using a nationally coordinated program. It is accepted that landholders have the primary responsibility for pest animal control and that the States have the legislative lead, but national coordination and leadership is required. Such a national program should involve landholders, local, state and federal authorities so that there is collaborative stakeholder commitment to reaching the desired outcome. In addition, any research into feral pigs should have as its overriding objective the achievement of this goal.

This letter is being forwarded in advance of the publication of the proceedings of the Workshop because of the urgency of the problem and to alert you to the very serious concerns expressed by participants. We consider that the Commonwealth Government should take the initiative and convene a meeting of Commonwealth, State, regional and industry authorities to address the problem, accepting the concept of ultimate eradication. Such a meeting should lead to a national strategy to achieve this objective.

We have directed this letter to you because we recognise that the determination of responsibility from the Commonwealth perspective must rest initially with the Prime Minister. The issues central to your consideration of the threat of feral pigs are their relationship to exotic disease and bio-terrorism, environmental degradation, primary production and impact on tourism in our national parks. We are also directing letters to the Deputy Prime Minister, Minister for Transport and Regional Services, the Minister for Agriculture, Fisheries and Forestry, the Minister for the Environment and Heritage, the Minister for Education, Science and Training and the Minister for Science.

Yours sincerely

Dr Jo Sillence President Australian Veterinary Association Keith Adams President Cattle Council of Australia

Dr Tony Peacock Chief Executive Officer Pest Animal Control CRC Professor Nigel Stork Chief Executive Officer Rainforest CRC

APPENDIX D: Ministerial responses from the Hon. Ministers Kemp and Truss

2 1 AUG 2003 The Hon. Dr David Kemp MP Minister for the Environment and Heritage Mr Keith Adams President Cattle Council of Australia PO Box E10 KINGSTON ACT 2604 1 9 AUG 2003 Dear Mr Adams Thank you for your letter of 23 June 2003 concerning the economic and environmental impact of feral pigs in Australia. The Australian Government shares your concern about the impact of feral pigs in Australia. In July 2001, feral pigs were listed as a key threatening process under the Environment Protection and Biodiversity Conservation Act 1999 recognising the impact that they have on Australia's threatened species and ecological communities. At that time, a decision was made to develop a threat abatement plan to support the national management of their impact. I am pleased to advise you that the Department of the Environment and Heritage has been drafting the Plan in consultation with representatives from state, territory and local government agencies, and groups with animal welfare, industry and indigenous interests. A draft threat abatement plan for the 'Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs' will be soon released for public comment. The Plan will provide an overarching strategy that details the impacts of feral pigs on native species, and identifies appropriate abatement objectives, management tools and actions required to reduce the threat. The Plan can also be used to set priorities for funding of projects under the Natural Heritage Trust that aim to manage the impacts of feral pigs on nationally listed threatened species. Funding has already been provided to address their impact in northern Australia. Thank you for your interest and concern in this important issue. Yours sincerely DAVID KEMP Parliament House, Canberra ACT 2600 Australia Tel: (02) 6277 7640
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APPENDIX E: Update - Cattle Council lobbying activities re. Feral Pigs

From: hartmann@cattlecoundl.com.au Sent: Tuesday, 19 August 2003 13:12 To: 3John Stewart (E-mail); Bill Gee (E-mail); Eric Davis (E-mail); Graham Alexander (E-mail); Kevin Doyle (E-mail); Nigel Stork (E-mail); Peter Rolfe (E-mail); Steve Lapidge (E-mail); Tony Peacock (E-mail) Subject: Update - Cattle Council lobbying activities re Feral Pigs

Dear All,

I felt it was about time I provided you with an update regarding Cattle Council's activities in lobbying Federal politicians re the Feral Pig issue.

Over the last 10 days we have had meetings with a number of relevant Senators and Members as well as staff at Minister Truss' office. All politicians were supportive of our position - that being that Australia requires a nationally coordinated approach to feral pig control. That is certainly encouraging. Some have even offered to make "noise" in parliament re this issue. We will be working dosely with them to that end.

Our next ambition is to have a resolution tabled at the next PIMC meeting supporting a nationally coordinated

approach. It is important to stress that at this point we are not lobbying for new money, but rather better application of existing funds into coordinated programs involving all stakeholders.

Interestingly, it has also been brought to my attention that the Senate is holding an inquiry into invasive species, with feral pigs induded in the terms of reference. Cattle Council will certainly be making a submission to this inquiry. For your information, the terms of reference of that inquiry are found at the following website. <u>http://www.aph.gov.au/senate/committee/ecita_ctte/invasive_species/index.htm</u>

Come Saturday I am off to the US for 3 weeks, however in the meantime feel free to contact me if you have any queries.

Regards

Michael

SENT BY: Michael Hartmann Deputy Director Cattle Council of Australia PO Box E10 KINGSTON ACT 2604 Ph 02 62733 688 / Fax 02 6273 2397 / Mob 0438 081968 Email: hartmann@cattlecouncil.com.au <<u>mailto:hartmann@cattlecouncil.com.au</u>> Web: www.cattlecouncil.com.au

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