

Workshop: Decision support tools and the management of feral pigs in an Emergency Animal Disease event

Canberra, 4-5 Nov 2003

Executive summary

The workshop successfully brought together a range of people from a variety of disciplines in an open learning environment. Participants developed a better understanding of the complexity of the issues and the need for a truly multidisciplinary approach when dealing with and managing feral animals in an emergency animal disease response. Information was also shared, to assist participants in understanding several of the disease spread models in concert with their potential application and limitations.

Relevant sections of the Ausvetplan Wild Animal Response Strategy (WARS) manual were tested within the context of two scenarios. Participants identified areas where minor improvements were possible in the manual. In general, the manual was found to be a relatively robust document that meets the need of assisting with decisions in an emergency animal disease event. A list of actions has been identified for follow-up.

Introduction

This workshop was funded by Wildlife and Exotic Disease Preparedness Program (WEDPP) and was held in Canberra on 4th and 5th November 2003. .

The workshop objectives were reviewed at the start of the workshop and were agreed to by participants. The agreed objectives were to:

1. Review key aspects of feral pig ecology and epidemiology of diseases of concern.
2. Increase the understanding of participants of current feral pig disease models including describing model assumptions and uncertainties
3. Assess the suitability of models as decision support tools.
4. Increase familiarity of workshop participants with WARS (Wild Animal Resource Strategy).
5. Identify improvements to WARS and other relevant sections of AUSVETPLAN.
6. Promote interaction between epidemiologists, wildlife/feral animal ecologists and others.
7. Define outcomes (improved contingency planning; placing likely role of feral pigs in context of other issues etc) as appropriate.

One of the desired outputs from the workshop was a brief workshop report including papers and powerpoint presentations. Due the size of some files, it has been decided to distribute the report on the CD. The CD includes the summary papers from presenters, the accompanying powerpoint presentations, and a number of specific issues discussed at the workshop. The CD contains a table of contents to assist in the navigation of this report.

List of Presentations

1.	Epidemiology of Foot-and-Mouth Disease	Graeme Garner
2.	Feral pig biology and ecology	Glen Saunders
3.	Brief introduction of model types	Peter Black
4.	Application of models with reference to FMD in UK during 2001	Annette O'Connor
5.	A spatial model to evaluate control strategies for foot-and-mouth disease under Australian conditions	Graeme Garner
6.	Modelling and exotic diseases	Jim Hone
7.	Stochastic models of foot and mouth disease in feral pigs in the Australian semi-arid rangelands	Nick Dexter
8.	Summary of Gen-Wed	Steve McLeod
9.	Inferring disease host data from survey data	Peter Caley
10.	R_0 , disease eradication and control	Hamish McCallum
11.	The Wildlife animal response strategy for an emergency animal disease	Chris Bunn
12.	FMD scenarios 1 and 2	Peter West
13.	Specific issues discussed at workshop (see below)	Group
14.	Nick Taylor	

Specific issues relating to workshop objectives

The actions and comments listed below relate to the review of the workshop objectives during the last session.

Objectives

1. Review key aspects of feral pig ecology and epidemiology of diseases of concern.
2. Increase the understanding of participants of current feral pig disease models including describing model assumptions and uncertainties.
3. Assess the suitability of models as decision support tools.
4. Increase familiarity of workshop participants with WARS (Wild Animal Resource Strategy).
5. Identify improvements to WARS and other relevant sections of AUSVETPLAN.
6. Promote interaction between epidemiologists, wildlife/feral animal ecologists and others.
7. Define outcomes (improved contingency planning; placing likely role of feral pigs in context of other issues etc) as appropriate.

Objective 1. Review key aspects of feral pig ecology and epidemiology of diseases of concern.

- It was agreed that the workshop had met this objective. However, the focus had been almost entirely on FMD with little discussion of other diseases of concern.

Objectives 2 and 3.

Increase the understanding of participants of current feral pig disease models including describing model assumptions and uncertainties

Assess the suitability of models as decision support tools

- A number of models (and modellers) are available within Australia. However, the group recognised a need for a number of models to be published in more detail (similar to the way the Pech and Hone model has been documented). This would allow others to reconstruct the models and examine their application.
- Although increasing empirical research and modelling capacity could be achieved with more resources, such work is recognised as very expensive. Currently, there is insufficient data for parameterising single host models and even less for multiple host models. There was no agreement about whether any agency would be willing to fund such work. No recommendation was recorded.
- Transmission rate issues

There is currently a major information deficit with respect to contact rates and it was generally agreed that the transmission rate issue is the critical issue for modelling spread of disease. Discussions mentioned both transmission:

- between wildlife/ferals and domesticated species; and
- within feral animal populations

Although work to estimate transmission rates directly, instead of estimating transmission rates via contact rates is desirable, there was no agreement about how this could be done.

There is also a need to better understand spatial issues with respect to disease transmission.

- Mass action models

Mass action models can be either density dependent or frequency dependent. With frequency dependent models, there is no threshold density for disease persistence.

With respect to estimating transmission coefficients, the use of point estimates as opposed to interval estimates was discussed, along with the consequences of ignoring interval estimates within disease models.

- It was noted that there are few examples where disease models have been used directly for decision support during outbreaks. A recent comprehensive report reviewing the use of models to inform disease control policy during the 2001 UK FMD epidemic concluded that the most appropriate use of models is as tools in 'peacetime' to aid retrospective analysis of real epidemics and to gain insights into epidemic behaviour, and that the use of

models in 'wartime' should be restricted to monitoring the epidemic and aiding short-term fine adjustments to strategies (see report: Review of the use of models in informing disease control policy development and adjustment, by Nick Taylor, report for DEFRA 26 May 2003).

- It is recognised that, from an epidemiological perspective, multi-host models that take into account interactions between the different hosts (e.g. domestic livestock and feral pigs in the case of FMD) are desirable. However, most of the detailed data available that are necessary to build such models has a European bias and are not considered very relevant to Australia. Single host models can still be used to increase our understanding of disease behaviour.
- With emerging diseases, we actually know very little (almost nothing!) with respect to disease transmission or rates of spread. It is important to appreciate that even when dealing with real outbreaks, we are usually recording and working from rates of detection, rather than rates of spread (eg fire ants in Brisbane).

Objective 4. Increase familiarity of workshop participants with WARS (Wild Animal Resource Strategy).

It was agreed that the workshop had met this objective.

Objective 5. Identify improvements to WARS and relevant sections of AUSVETPLAN

The workshop identified several areas where improvements could be considered.

- One issue of definition was highlighted – ie. What is the definition of presumptive diagnosis in question 2 of the WARS decision key? It was recognised as important to ensure that all personnel using the manual need to have the same understanding of terms used. Should the WARS include a list of definitions for key terms?
- With respect to the decision key, in its current form, it is possible to enter an endless loop. For example, with questions 5, 6 and 7. The possible loops were identified as shown in Figure 1.

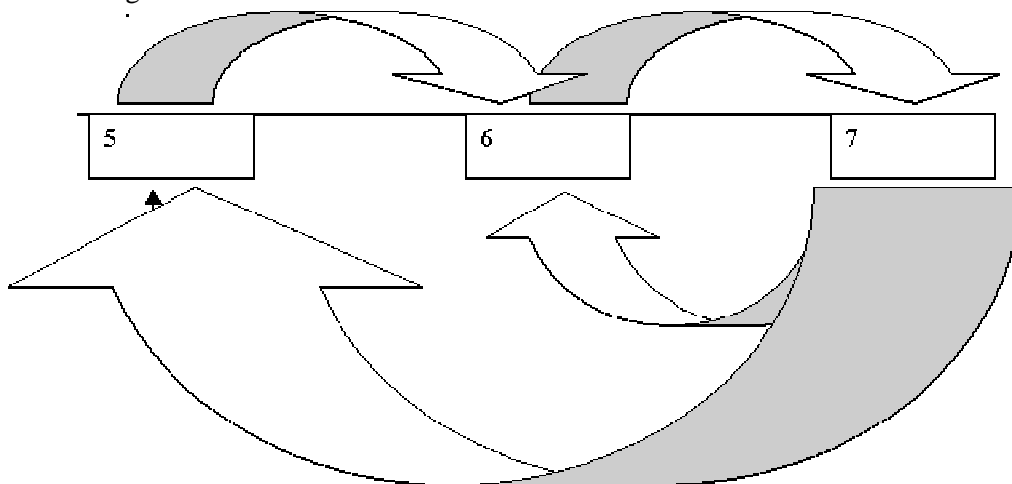


Figure 1. Possible loops between questions in the WARS decision key.

- Under Question 7, Option 1 seems to indicate that there is some dependency between control in domestic animals and spread of disease in wild animals. In some cases, this dependency does not exist. This section needs to be reworded (perhaps inserting words - where relevant).
- It is possible to progress from Question 1 to Question 2 to Question 8, and bypass Question 6, which addresses the key issue of surveillance needs. Even when a presumptive diagnosis has been made in wild animal hosts (or when disease has been confirmed), there is still the need for appropriate surveillance strategies to be considered. This potential weakness in the current WARS needs to be addressed.
- If the disease has been confirmed as in Question 2, and one progresses to Question 8, it is a legitimate option to have no targeted action against wild animals and so then progress to Question 9. Choices here are between either:
 - the concern continuing or increasing (back to Question 8) or
 - the concern decreasing (progress to Question 12)

The option of not taking targeted action, but continuing to monitor the situation is not clear. [Refer to the manual]

- Similarly, in progressing from Question 2 to Question 5, there needs to be a mention of the consideration of surveillance issues at this stage.
- Another issue that was mentioned with respect to wild animal control related to concerns over logistics, hazards and use of poisons legislation. It was suggested that all jurisdictions check the current relevance of policies and legislation in this area.

Objective 6. Promote interaction between epidemiologists, wildlife/feral animal ecologists and others.

It was agreed that the attendees had a responsibility to keep colleagues informed in general about the outcomes of this workshop. Specifically, others should be kept informed of issues raised in the workshop via other forums and via the Animal Health Committee process and other equivalent process within the pest animal arena eg. Vertebrate Pest Committee.

Objective 7. Define outcomes (improved contingency planning; placing likely role of feral pigs in context of other issues etc) as appropriate.

- The group acknowledged that there is a decreasing number of people with experience and expertise in feral animals to assist in this area. Therefore, in order to improve contingency planning, it will become increasingly important to keep colleagues informed (see previous objective). Also, there is a clear need to promote training in the use of WARS and the potential application of disease models as part of an overall integrated package. In addition, the evaluation of past experience and the 'lessons learned' from previous exercises need to be followed up more formally (this has often failed in the past). There was a need for this follow-up to progress via the relevant committee structures to ensure the learnings are captured in response plans. In most cases, this means that there needs to be a champion to progress the issue.
- It was recognised that the workshop primarily concentrated on FMD and there is the need for other diseases to be considered.

Other key points raised during workshop

- There is no such thing as a typical pig. Pigs vary depending on environment and location. From the disease perspective, the interest is more related to relative densities in intensive farming areas compared to remote extensive grazing situations. There is also the issue of pig social structures and their influence on disease transmission. Simple mathematical models assume homogenous mixing of the population and do not take into account social or spatial heterogeneities in disease transmission.
- A key question is how models should be used, and whether they would be used tactically in Australia during an epidemic? (see Review of the use of models in informing disease control policy development and adjustment, by Nick Taylor, report for DEFRA 26 May 2003).
- General discussion on use of models recognised:
 - Pre-event – useful
 - Emergency response – limited
 - Recommend use for training – but not in real time
- As far as decision support is concerned, there was general agreement amongst the modelers present that it is difficult to see how the current feral animal models would be used if we had an FMD outbreak tomorrow.
- Is disease spread density or frequency dependent?
- Homogenous mixing assumption – a factor in virtually all the feral animal models developed in Australia to date will overestimate disease spread at large scales.
- Single or multi species outbreaks. Models currently are all single species.
- Role of feral pigs in a disease outbreak – some participants suggested that jurisdictions explore the hypothesis and move forward (e.g. Identify when they may be important and develop some general risk management strategies).
- Persistence of FMDV in carcasses in the field is still not clear. This issue has been around for some time now, but is still considered worthy of follow up. There is the need to chase up the WEDPP-funded work on carcass decomposition in WA. Chris Bunn from DAFF to follow up.
- The time to detection of disease in wildlife was recognized as a highly significant issue in Australia (e.g. Australian Bat Lyssavirus and Hendra virus).
- Compartmentalisation -general issue for managing disease in wildlife that is worth following up by DAFF officers within the next one to two years as it is considered by the OIE.

Other specific outputs

At the commencement of the workshop, the objectives and a number of outputs were agreed. The outputs included this workshop report. In addition, another output was that we would have the basis of an article or articles for a scientific journal reviewing potential application of models as decision support tools. We (staff of the Office of the Chief Veterinary Officer) are still committed to this task and will be in contact with some of you in the future.

Action list

Task	By Whom	By when
Publish details of DAFF spatial FMD model	Graeme Garner	31 December 2004
WARS manual improvements	Chris Bunn and Animal Health Australia	July 2004
Keep colleagues informed of workshop outcomes Specifically <ul style="list-style-type: none">• Animal Health Committee• Vertebrate Pest Committee	All participants DAFF officers BRS officers	Continuing April 2004 April 2004
Follow – up on previous and proposed work addressing survival of FMDV in carcasses	Chris Bunn	June 2004
Keep stakeholders informed on compartmentalization issue developments in relation to OIE considerations	DAFF officers	Continuing over 2004/5
Paper for scientific journal reviewing potential application of models as decision support tools	DAFF officers and other interested parties	December 2004

Attendees List

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