



# FREEDOM FORUM

Evaluation of Surveillance for Livestock  
Disease Detection: Current & Future Needs

FINAL REPORT

Canberra, May 26 2009

**Forum Steering Committee Chair:**

Tony Martin, Project Leader, DAFWA, AB-CRC

**Forum Steering Committee:**

Angus Cameron, Partner, AusVet Animal Health Services

Deb Cousins, Director Application & Linkage, AB-CRC

Jenny Hutchison, Partner, AusVet Animal Health Services

Evan Sergeant, Director, AusVet Animal Health Services

**Acknowledgements:**

The Steering Committee is grateful for the in-kind contributions from AB-CRC staff, particularly Erin Rummer who provided significant administrative support.

Report prepared by Tony Martin, July 2009

© 2009 Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease

## Contents

Furthering Freedom in Australia .....	4
Background .....	4
Introduction .....	5
Freedom Forum .....	6
Conclusion .....	7
Recommendations .....	7
Wish list and methodological gaps .....	8
Subsequently added comments: .....	10
Perceived strengths of Freedom Methodology .....	10
Potential topics for application of the Freedom Methodology in Australian animal health .....	11
Bovine Tuberculosis “case study” .....	11
Conditions and opportunities .....	11
Abbreviations & Acronyms .....	12
Delegate List .....	13

## Furthering Freedom in Australia

A workshop considering the potential for application of *Scenario tree modelling of surveillance for disease detection* in animal biosecurity in Australia, held in Canberra, May 26 2009.

### Background

Over the last few years, a team supported by the Australian Biosecurity CRC for Emerging Infectious Disease (AB-CRC) has compiled a set of methods for evaluating the efficacy of surveillance systems and their component activities aimed at disease detection. This *Freedom Methodology* is the stochastic scenario tree modelling approach to assessing the efficacy of surveillance activities for disease detection; allowing incorporation of all types of surveillance information (including general and targeted, active and passive) into such assessments and making possible the use of information collected in a non-random or biased way. Its main potential thrusts are in the areas of surveillance design (optimising the use of limited resources) and estimating certainty in our claims to freedom from diseases for international trade purposes. Various reports and publications are available [<http://freedom.ausvet.com.au>].

A series of training workshops have been run by the AB-CRC across Australia to familiarise potential users with the methods and the tools available. The AB-CRC is now keen to assess the attitudes of potential users to the *Freedom Methodology*, its perceived usefulness, and the obstacles to - and opportunities for - application in animal health in Australia.

The Freedom Forum is being held to determine what, if any, further work needs to be done to facilitate application of the *Freedom Methodology* in Australia.

The purpose of the forum is to:

- Discover the attitudes of potential end-users to the scenario tree modelling approach to evaluation of surveillance for detection of diseases of livestock (the *Freedom Methodology*).
- Elicit topics for case studies for the *Freedom Methodology* which will demonstrate, evaluate and develop its utility for animal disease surveillance in Australia.

The forum will be facilitated by the project team and will cover:

- What do end-users want and need to be able to do in the context of analysis of surveillance for disease detection?
  - needs
  - perceived obstacles
  -

- Usefulness of the *Freedom Methodology*
  - potential uses
  - potential benefits
  - perceived obstacles, difficulties, costs
- Validity of the *Freedom Methodology*
  - conceptual validity
  - mathematical validity
  - validity for different applications
  - missing components or attributes
  - necessary future developments
  - changes or alterations that are perceived to be necessary
- Potential applications for the *Freedom Methodology*
  - general areas of application
  - specific examples
  - potential case studies
  - obstacles

## Introduction

The purpose of this project was to improve accessibility and uptake within Australia of methodology developed in AB-CRC project 3.010R for evaluation of surveillance for disease detection (*Freedom Methodology*<sup>1</sup>).

An *end-user forum* was held which brought together potential end-users of the *Freedom Methodology* from the Commonwealth Government (those responsible for documenting Australia's disease status in communication and negotiation with trading partners) and each State government (those responsible for inter-state "trade", documenting state-level disease status, and conducting both national and state-level surveillance for disease detection). In addition the forum was attended by representatives from the CSIRO's Australian Animal Health Laboratory (CSIRO-AAHL) and Animal Health Australia (AHA). The group included David Wilson (AHA), who used to work for the World Organization for Animal Health (OIE), the organisation responsible for developing international standards in the areas of disease status, risk analysis and disease surveillance. A [list of attendees](#) is appended to this report.

---

<sup>1</sup> See <http://freedom.ausvet.com.au> for overview and details

The forum was held in the Majura Room at the Waldorf Apartment Hotel, Canberra, from 8.30am to 4.30pm. The project team comprised Angus Cameron, Jenny Hutchison and Evan Sergeant (all from AusVet Animal Health Services), Tony Martin (Department of Agriculture and Food, Western Australia) and Deb Cousins (Director of Application & Linkage, AB-CRC).

Facilitated discussions were used to canvas the attendees' attitudes, ideas and suggestions, under the following session headings:

- What do we need?
  - *Wish list* for assessment of surveillance for disease detection/freedom
- *Freedom Methodology*
  - Overview
  - Applications to date
  - Perceived usefulness
- Gaps and opportunities
- Suitable topics for case studies
  - Potential applications to demonstrate and develop methodology
    - Requirements
    - Topics

Following introductions, and before presenting anything on the existing *Freedom Methodology*, the delegates were asked to list their needs for analysis of mixed surveillance information. The project team then outlined the methodology under consideration, its current capacity and components, and its current uses. Forum participants were then asked to compare and assess these 'achievements' against the 'wish list' developed earlier, leading to a list of gaps in the methodology, and opportunities for its further development (see section 3). At this stage there was clearly enthusiasm for the use, application and further development of the methodology, and in the final session potential topics for its application at the national level were discussed.

The objectives of the forum were to determine Australian end-users' current attitudes to adoption of the *Freedom Methodology* and, if positive, to determine appropriate topics for Australian applications of the methodology. The forum led to a clear sense of the importance and relevance of this methodology or one with closely related objectives as the only means of approaching the inevitable requirement for transparent, science-based justification of Australia's claims to disease-free status. Initial applications of the methodology at the national level should address diseases for which there is a high level of confidence in the result of the analysis (i.e. in both our free status and in the surveillance to be assessed), and which are of high importance to international trade. The two leading contenders identified at the forum were bovine tuberculosis and avian influenza.

## Conclusion

The *Freedom Forum* took place as planned, was attended by the anticipated end-users, and it identified the necessary agreement and enthusiasm to push forward with further applications, as well as a list of desired methodological features and potential topics for national applications. This information provides a sound framework for pursuing such applications over the coming months.

## Recommendations

For both of these diseases the need for a quantitative assessment of our surveillance activities has been established through stakeholder fora, and Freedom Forum participants with personal interests in developing the applications were readily identified at the meeting. These starting points will be pursued by the project team, with a view to establishing appropriate collaborative and funding arrangements for carrying out the work, as well as clear statements from national government and industry bodies that the assessments are high priority, and are needed and wanted.

The project team will endeavour to build into any applications which arise out of this process the desired features identified during the Forum. These are laid out in the [Wish List and Methodological Gaps](#) and may be summarised as follows:

- A brief, two or three page layman's summary of the methodology, its uses and interpretation of its outputs
- A structured spreadsheet to facilitate implementation of new scenario tree models
- Incorporation of cost into surveillance models allowing selection of a cost effective surveillance strategy
- A technique for dealing with non-independence of observations from sequential surveillance time periods
- A technique for dealing with proximity-based dependence of surveillance units with regard to probability of infection.
- Dealing explicitly with selection of an appropriate mix of components in a surveillance system to achieve desired sensitivity and coverage of the population
- Presentation of the model and its results in a straightforward manner which is readily comprehensible and highlights the key features, assumptions and implications of the analysis
- Potential for incorporation of consequence-based weightings for surveillance activities, possibly as a utility function in a Bayes net implementation

In addition to these application-based desired features of the *Freedom Methodology*, the project team will pursue:

- Possible approaches to incorporation of relevant key principles into the OIE's surveillance manual

- Completion and publication of a comprehensive and readily comprehensible guide to the methodology in the form of a book being funded by a Food & Agriculture Organization of the United Nations (FAO) project
- Publication of other completed and current applications of the methodology which illustrate features identified in the table *Wish List and Methodological Gaps*
- A set of guidelines for setting design prevalences

## Wish list and methodological gaps

Attribute sought	Assessment against actual capacity and <i>Perceived strengths</i>
1. Expand time	Outside scope of methodology
2. Easier and comprehensible process <ul style="list-style-type: none"> <li>• 2 - 3 page layman's guide</li> </ul>	<ul style="list-style-type: none"> <li>• Book in simple language is in process (FAO project)</li> <li>• Accessible brief description is needed</li> <li>• More accessible spreadsheet structure is needed</li> </ul>
3. Combine surveillance components	Existing methodology achieves this
4. Combine data into overall assessment <ul style="list-style-type: none"> <li>• different activities</li> <li>• data gathered over time</li> </ul>	Existing methodology achieves this
5. Deal with dependence among surveillance components <ul style="list-style-type: none"> <li>• maths</li> <li>• concepts</li> </ul>	Existing methodology allows for this, although it has not been looked at over sequential time periods
6. Guidance for selecting design prevalence	Guidelines exist, and a set of guidelines can be produced
7. Quantitative analysis	Existing methodology achieves this
8. Compare and highlight contributions of components <ul style="list-style-type: none"> <li>• passive vs. targeted</li> </ul>	Existing methodology achieves this
9. Select most effective mix of surveillance	Existing methodology can achieve this, although there is currently no worked example in print
10. Assessments in accordance with international guidelines <ul style="list-style-type: none"> <li>• defensible internationally</li> <li>• domestic applications <ul style="list-style-type: none"> <li>- accepted by all jurisdictions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• OIE is not, and will not be, prescriptive in this area, but produces "guidelines".</li> <li>• There is an OIE working group which will produce a surveillance manual in 2011. Contact them to ensure we have input into the group's work.</li> <li>• States and territories are guided by international guidelines</li> <li>• States and territories are likely to follow a national lead</li> </ul>

Attribute sought	Assessment against actual capacity and <i>Perceived strengths</i>
11. Deal with diseases where <ul style="list-style-type: none"> <li>• there is poor sensitivity and/or</li> <li>• there are poor diagnostic criteria and/or</li> <li>• there is no clear case definition or diseases are hard to differentiate - e.g. PMWS; enzootic abortion of ewes</li> <li>• risk factors are hard to define and quantify</li> </ul>	<ul style="list-style-type: none"> <li>• Existing methodology can deal with variable and low detection sensitivity</li> <li>• Existing methodology is no better nor worse than any other for problems of poorly defined diseases and risk factors</li> </ul>
12. Address needs of compartmentalisation and zoning	<ul style="list-style-type: none"> <li>• Existing methodology can deal with any defined reference population (e.g. country, zone or compartment)</li> <li>• A small reference population has specific analytical issues</li> </ul>
13. Identify gaps in sensitivity and in coverage of population	Existing methodology can achieve this if the right questions are asked (i.e. surveillance sensitivity is assessed for the appropriate subsections of the population)
14. Surveillance in wild populations	If the surveillance can be done, the existing methodology can be used to evaluate it. The problem is doing the surveillance
15. Balance of comprehensiveness/complexity on the one hand, and comprehensibility, communication and transparency on the other	Work is needed in this area on communication and general presentation of the methodology and results of its application
16. Access to privately held data	Outside scope of methodology
17. Assess cost efficiency of surveillance	<ul style="list-style-type: none"> <li>• Straightforward in principle; needs to be worked through in a specific application</li> <li>• No worked examples published yet</li> </ul>
18. Minimise data requirements by maximising use of available data <ul style="list-style-type: none"> <li>• risk factors and targetting</li> <li>• weighting; how to do it and justify it</li> </ul>	Existing methodology achieves this
19. Communication of results <ul style="list-style-type: none"> <li>• clear statements of disease-free status</li> <li>• need for international standards</li> <li>• credibility of claim</li> </ul>	<ul style="list-style-type: none"> <li>• Existing methodology can achieve this</li> <li>• Need for layman's interpretive guide</li> <li>• OIE standards are needed for design prevalences and certainty / confidence levels in particular</li> <li>• Methodology can only be covered by OIE <i>guidelines</i> (see 10 above)</li> </ul>
20. Consequence-based surveillance <ul style="list-style-type: none"> <li>• benefits of different surveillance activities</li> <li>• blending in economic model</li> </ul>	<ul style="list-style-type: none"> <li>• Of interest - a different approach to targetting</li> <li>• Might be incorporated, together with surveillance costs, as a utility in a Bayes net approach to analysis.</li> </ul>

### Subsequently added comments:

- The *Freedom Methodology* is not the only, or necessarily the best, solution for propagating uncertainty in models dealing with variable or uncertain sensitivities of diagnostic processes
- Scenario trees encourage strong discretisation of the reference population, which necessarily introduces artefacts
- In 'optimising' cost-effectiveness of a planned surveillance program, or doing similarly with the mix of surveillance components to achieve the desired sensitivity and coverage of the population, approaches to consider include
  - evaluation of different discrete sets of options
  - mathematical optimisation of the model's 'solutions'

### Perceived strengths of *Freedom Methodology*

- Allows justification of resource allocation and targetting
- Transparent evaluation of surveillance analysis
  - requires outline of structure
- Has been tested
- Allows consideration of the whole surveillance system
  - multiple components
  - but no requirement to include the whole system
- Ability to use historical surveillance data
  - efficient in terms of cost
  - allows 'top up as needed' approach to planning
  - allows use of passive surveillance
- Identification of surveillance gaps
- Design of future surveillance
- Detailed documentation of methodology
  - continuing development
- On-line software facilitating accessibility
- Free, and there's help on the end of the phone
- Deals with lack of independence among surveillance units

## Potential topics for application of the *Freedom Methodology* in Australian animal health

1. Avian influenza in domestic poultry
2. Bovine tuberculosis
  - see *Bovine tuberculosis “case study”*
3. Viral diseases of farmed salmon

### Bovine Tuberculosis “case study”

#### **Purpose**

- Synopsis of current surveillance
  - likelihood of biological freedom
  - likelihood of satisfying OIE freedom requirements
  - likelihood of detection over time - by state / region
- What surveillance needs to be done to be sure we are free?
- What ongoing surveillance is needed for maintaining confidence in freedom?

### Conditions and opportunities

- Must be done by end of 2009
- Opportunity to highlight methodology and its potential to Animal Health Committee (AHC)
  - This is a current AHC topic

## Abbreviations & Acronyms

A&L	Application & Linkage
AB-CRC	Australian Biosecurity CRC for Emerging Infectious Disease
AHA	Animal Health Australia
AHC	Animal Health Committee
BRS	Bureau of Rural Sciences
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSIRO-AAHL	CSIRO's Australian Animal Health Laboratory
DAFF	Department of Agriculture, Fisheries & Forestry
DAFWA	Department of Agriculture & Food, Western Australia
DPI	Department of Primary Industries
DPIF	Department of Primary Industries and Fisheries
DPIW	Department of Primary Industries, Parks, Water and Environment
DRDPIFR	Department of Regional Development, Primary Industry, Fisheries and Resources
FAO	Food & Agriculture Organization of the United Nations
OCVO	Office of the Chief Veterinary Officer
OIE	World Organization for Animal Health (Office International des Epizooties)
PIRSA	Department of Primary Industries and Resources of South Australia

## Delegate List

Name	Section	Organisation	Jurisdiction
<b><i>Project team</i></b>			
Angus Cameron		AusVet	France
Debby Cousins	Director, A&L	AB-CRC	
Jenny Hutchison		AusVet	Canberra
Evan Sergeant		AusVet	New South Wales
Tony Martin	Project leader	DAFWA	Western Australia
<b><i>Delegates</i></b>			
Malcolm Anderson	PIRSA Animal Health	PIRSA	South Australia
Rob Cannon	AQIS	DAFF	Commonwealth
Mary Carr		PIRSA	South Australia
Andrew Cupit	Biosecurity Australia	DAFF	Commonwealth
Leanna Dries		DPI	Victoria
Peter Durr	AAHL	CSIRO	Victoria
Kevin Ellard		DPIW	Tasmania
Susanne Fitzpatrick		DRDPIFR	Northern Territory
Kathy Gibson	OCVO	DAFF	Commonwealth
Jonathan Happold	OCVO	DAFF	Commonwealth
Greg Hood	BRS	DAFF	Commonwealth
Ian Langstaff		AHA	Canberra
Barbara Moloney		DPI	New South Wales
Leigh Nind	OCVO	DAFF	Commonwealth
Karen Skelton	Biosecurity Queensland	DPIF	Queensland
Fiona Sunderman	Animal Biosecurity	DAFWA	Western Australia
David Wilson		AHA	Canberra
Therese Wright		DPI	New South Wales