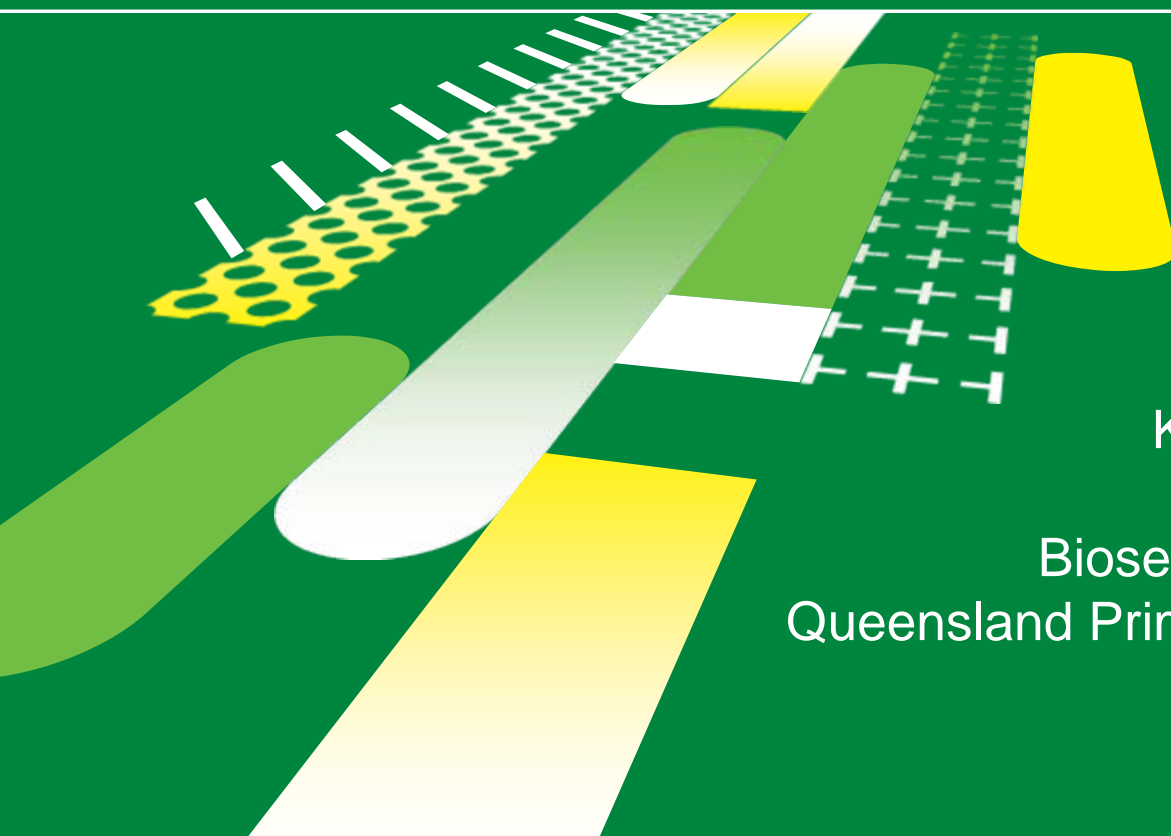


Bovine Johne's disease survey Queensland 2007-2008



Karen Skelton

Biosecurity Queensland
Queensland Primary Industries and Fisheries

Survey Aim

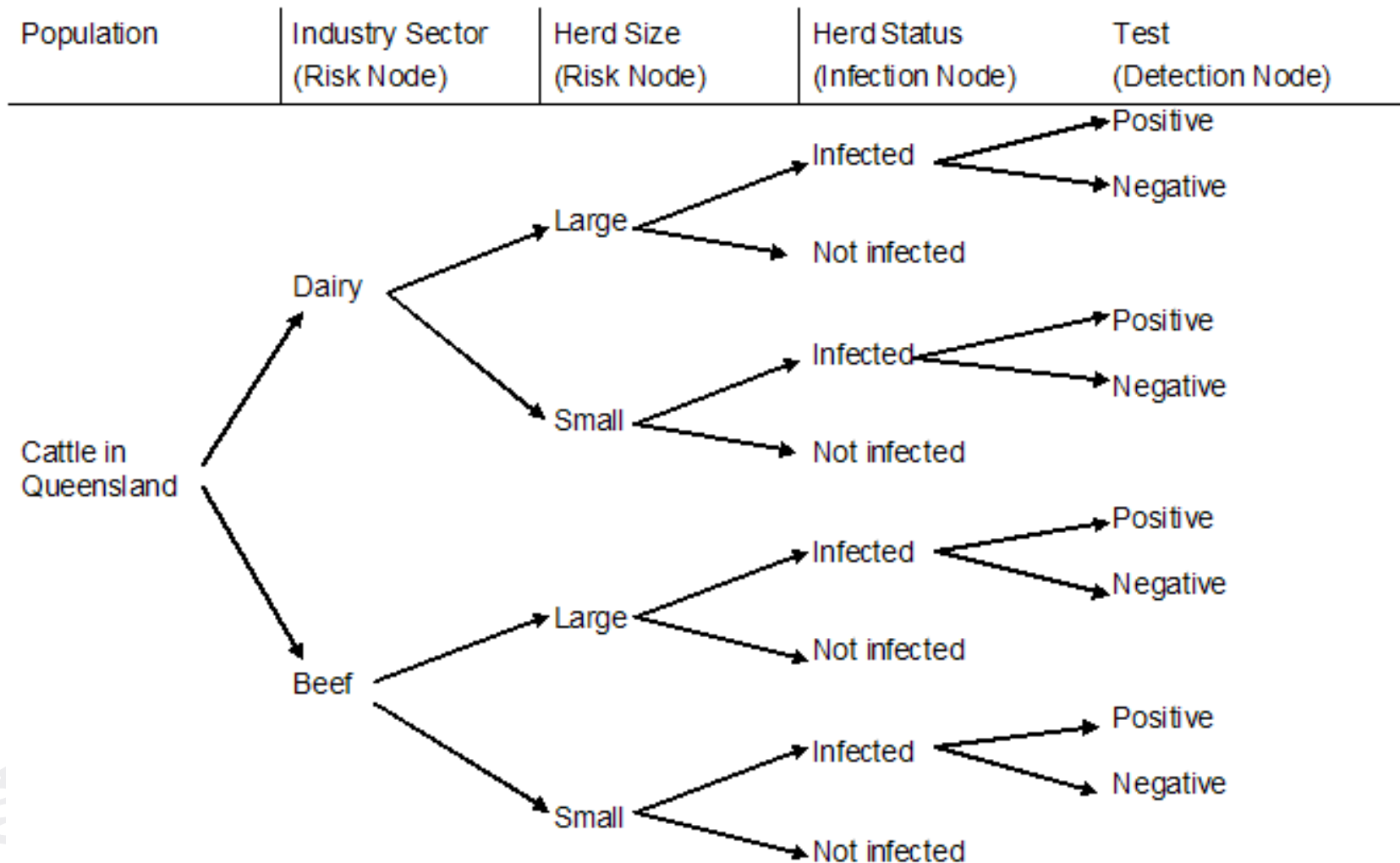
- To demonstrate that the likelihood of Queensland cattle being free of BJD (with design prevalence values of 1% of herds and 2% of cattle within herds) is greater than 95% and justify the continuation of Queensland's Protected Zone status



Scenario Tree Methodology for Proof of Freedom

- Developed by Tony Martin and Angus Cameron with input from Evan Sergeant
- AB-CRC funded project
- <http://freedom.ausvet.com.au/>
- Applicable to the whole Qld cattle population
- Enable targeting of surveillance effort
- Acknowledgement of Qld's BJD history
 - Passive and active surveillance
 - Previous test and eradication programs for BJD when detected
- Cost effective
- Used this approach to establish our survey protocol

BJD Scenario tree model outline



Relative risk: Dairy vs. Beef

In Qld, Dairy cattle at greater risk of BJD infection due to

- Geographical distribution
- Fate of introduced animals
- Management – intensive vs. extensive
- Greater opportunity for disease spread (yards, calving paddocks)
- History – over last 20 years BJD introduced into 0.83% of dairy herds vs. 0.05% of beef herds (16 times more likely)

Relative risk used in model = 10

Relative Risk: Large vs. Small herds

Large herds are more likely to be BJD infected because:

- Greater chance of disease introduction
- Greater chance of disease spread
 - Higher stocking rates
 - Longer contact time with faecal material in milking yards
 - Higher stocking pressure on calving paddocks

Relative risk = 2

Selection of sample sizes

$$\text{Test Sensitivity} = 1 - (1 - P^*u \times \text{SeU})^n$$

Where

P^*u is the design prevalence for infection in the herd

SeU is the sensitivity of the screening test

n is the number of animals sampled in the herd

The P^*u used was 0.02.

The ELISA test sensitivity is 30% or 0.3.

Selection of sample sizes cont.

Possible sampling regimes if 150 Dairy sector herds were tested and 50 were Large herds

Relative risk Dairy to Beef =		10	Probability of Freedom calculation
Relative risk Large to Small =		2	
Model criteria			
SeHL	SeHS	SSE	Prior Prob of Infection 25%
Large herd sample numbers	Small herd sample numbers	Total Herds	Proportion of Large herds sampled
75	40	150	0.33
75	30		
70	40		
70	30		
60	40		
60	30		
50	50		
50	40		
50	30		

Large herd sample numbers	SeHL	Small herd sample numbers	SeHS	SSE	Total Herds	Proportion of Large herds sampled	Prior Prob of Infection 25%
75	0.363236	40	0.213941	0.974701	150	0.33	0.991638
75	0.363236	30	0.165183	0.96523			0.988543
70	0.343784	40	0.213941	0.97134			0.990537
70	0.343784	30	0.165183	0.96066			0.987056
60	0.30308	40	0.213941	0.96281			0.987755
60	0.30308	30	0.165183	0.94897			0.983275
50	0.259851	50	0.259851	0.9636			0.988012
50	0.259851	40	0.213941	0.95097			0.983919
50	0.259851	30	0.165183	0.93277			0.978081

Sampling methodology

- 100 small herds and 50 large herds
- 30 animals sampled in small herds
- 50 animals sampled in large herds
- Sampled cattle 4 years old and older ensuring animals selected randomly covered all age groups in the herd
- Large and small herds selected randomly but stratified across the 5 DPI regions in Qld to ensure statewide coverage
- Voluntary participation

Diagnostic methodology

- Screening blood test using Institut Pourquier JD ELISA
- Confirmation by faecal culture followed by a second faecal culture after 3 months
- Positive faecal culture samples - PCR test for *Mycobacterium paratuberculosis* and culture for mycobacterin J dependency

Results

5346 animals were tested with 21 ELISA reactors (0.39%)

No positive faecal culture samples

Region	Estimated No. large dairy herds	No. large dairy herds sampled	Estimated No. small dairy herds	No. small dairy herds sampled	Total No. herds with reactors
South East (SE)	65	31	302	50	13
South (S)	17	9	204	34	4
North (N)	11	5	74	12	1
Central (C)	4	2	22	4	0
Totals	97	47	602	100	18

Issues relating to analysis of survey

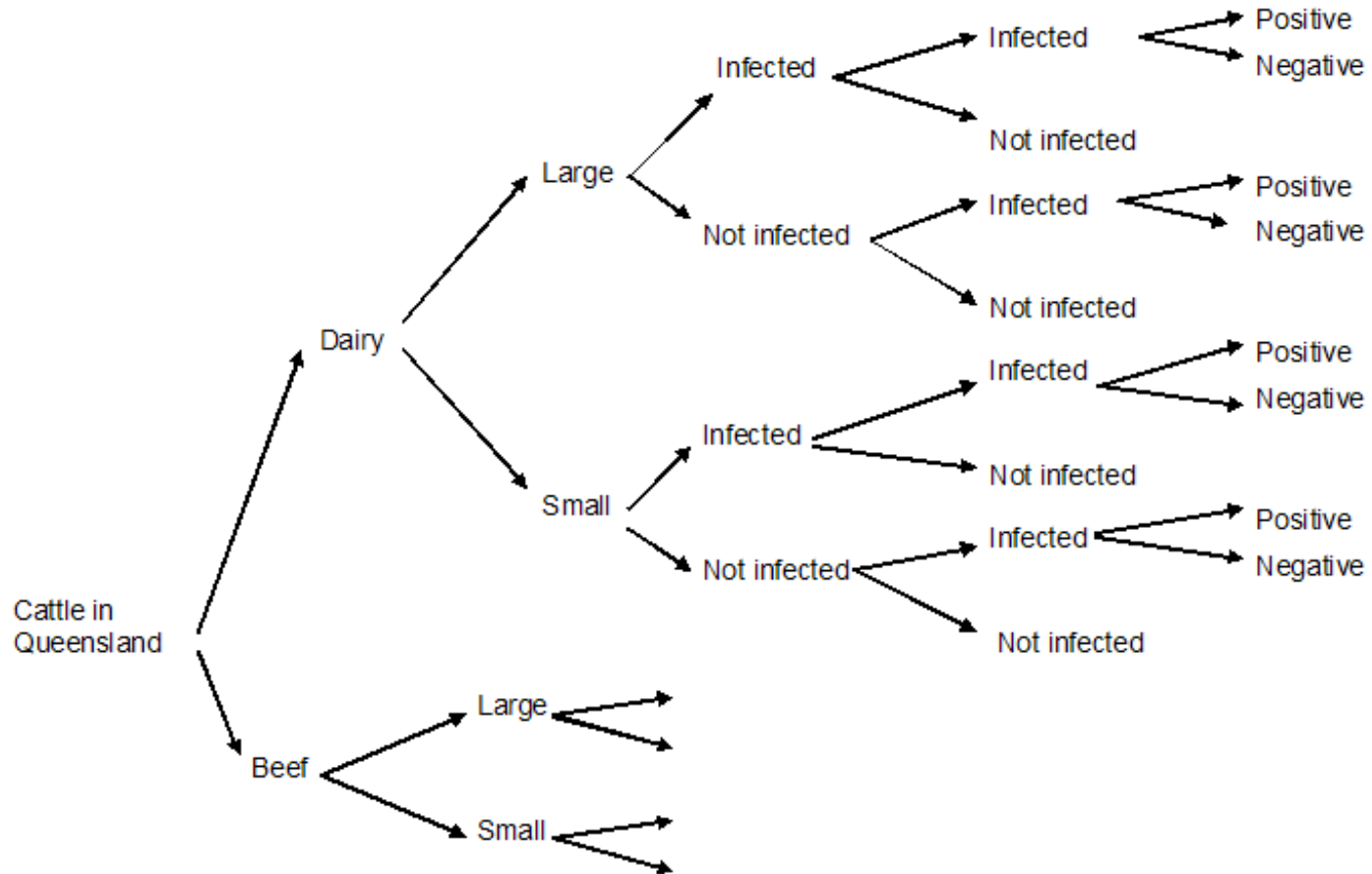
- Some dairy farms had gone out of business
- Some large dairies had downsized
- Total of 147 herds sampled - 47 large herds and 100 small herds
- 3 small herds had only 29 sample results

Options for analysis:

1. Drop herds without the full number of samples from the analysis
2. Revise the scenario tree

Revised scenario tree

Population	Industry Sector (Risk Node)	Herd Size (Risk Node)	Herd Status (Infection Node)	Animal Status (Infection Node)	Test (Detection Node)
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Surveillance system outcome

With a Prior Probability of Infection of 0.25 (25%)

Probability of freedom from BJD of the Qld cattle population

is 0.98 or 98%



Acknowledgements

- Cattle Council of Australia
- Queensland Dairyfarmers' Organisation Ltd.

