Short report: prevalence of markers of exposure to Q fever in rural central Queensland

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Despite consistently high rates of Q fever in parts of rural Queensland and inland northern New South Wales,[1,2] little is published about the prevalence of immune markers indicating prior exposure to the infection amongst rural communities.

The Central Queensland Rural Division of General Practice conducted Q fever awareness-raising campaigns amongst rural communities, culminating in several successful screening and vaccination programs during 2001.[3]

Participants were self-selected and came from a wide range of occupations. Owing to the nature of the awareness campaigns, most resided and/or worked on farming properties, or had some other field or sale yard exposure to the agricultural industry. Abattoir workers were not part of

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the program. Table 1 shows participants' age, sex, and duration of residence on farms.

A widely-used meatworks industry screening questionnaire[4] was adapted to collect data on age, sex, participant's occupation, length of residency on a farm property, risk factors for exposure, and previous history of Q fever disease or vaccination. Immune markers of exposure were assessed using both skin testing to detect cell-mediated immunity, and serology (CFT followed by confirmatory EIA in borderline cases to detect the presence of IgG antibodies against phase II antigens of *Coxiella burnetti*). Skin testing was carried out by trained practitioners, including two of the authors, in accordance with standard pre-vaccination testing procedures,[5] and results were read 7 days later.

For the purpose of this analysis, equivocal or borderline test results were regarded as negative, and persons with either a positive serology result, or a positive skin test or both were regarded as immune 'positives'.

Of 272 people presenting for screening, skin and serology results were available for 265. The remainder were excluded from analysis. Forty-nine people (18.5%) had evidence of prior exposure to Q fever, and 196 went on to receive vaccination. Epi Info version 1.1 was used to generate univariate statistics for Q fever risk factors (Table 2).

There was little difference in the mean age of positive compared with negative subjects (Table 1). Males were significantly more likely to be immune than females (odds ratio 3.39, 95% CI = 1.44 – 8.26). Adjustment for a modest but statistically significant difference between the 2 groups in the mean number of years spent on a property (38.7 years for males vs 33.1 for females) using logistic regression produced an odds ratio of 3.11 (95% CI 1.31 – 7.41). The increased risk for males reflects differences in degree of exposure through occupational and other activities.

As would be expected given the nature of rural life, most participants reported multiple risk factors in the form of

Table 1. Age, sex and duration of farm residence

	N	Age (years)			Ever resided on a farm	
		Range	Mean	Median	%	Mean no. years
Female	94	12 - 79	44.1	44.5	86.1	33.1
Male	171	14 - 78	46.3	45.0	89.5	38.7
All Persons	265	12 - 79	45.5	45.0	88.3	36.8

Table 2. Univariate analysis of risk factors for Q fever exposure

Exposure/activity	Yes		No		OR	(95 % CI)
	Positive*	Negative†	Positive*	Negative†		
Ever lived on property	44	190	5	25	1.16	(0.40 - 4.09)
Sex of respondent (M = exposed)	41	130	8	86	3.39	(1.44 - 8.26)
Feedlot work	11	40	38	176	1.27	(0.56 - 2.86)
Stock/farm work	44	187	5	29	1.36	(0.48 - 4.77)
Tannery work	0	1	49	215	Not calculable	
Dressing kangaroo carcass and/or dressing the pelt	6	17	43	199	1.63	(0.50 - 4.66)
Collecting sheep/cattle manure for the garden	24	108	25	108	0.96	(0.49 - 1.87)
Private slaughter of sheep or goats	9	46	40	170	0.83	(0.35 - 1.94)
Shearing	3	10	46	206	1.34	(0.23 - 5.49)
Animal husbandry	27	95	22	121	1.56	(0.80 - 3.05)
Livestock buying	18	69	31	147	1.24	(0.62 - 2.47)
Animal transport	28	105	21	111	1.41	(0.72 - 2.76)
Milking cows or goats	21	77	28	139	1.35	(0.69 - 2.66)
Other	12	68	37	148	0.71	(0.33 - 1.51)

* Testing positive to serology, skin or both.

† Testing negative to both serology and skin.

activities leading to contact with animals or animal products. No particular risk factor was significant on univariate analysis.

Only 15 of 47 (31.9%) skin and/or blood test-positive subjects for whom data were available, responded positively to the question, 'Do you recall having an illness, possibly lasting 7 days or more, that commenced suddenly with fever, chills, profuse sweating, muscle and joint pains, severe headache and fatigue?'. Given problems with illness recollection, the variable nature of presentations due to Q fever, and lack of specificity, this question appears to offer little assistance to community-based programs in determining who will test positive, with a positive predictive value of 0.25.

The proportion of subjects with either a positive skin or blood test, or both, are shown in Table 3 to demonstrate the importance of skin testing in the assessment of prior exposure to Q fever.[6] Seroprevalence studies that have not utilised skin testing should be interpreted with caution, as according to our data such surveys may underestimate exposure by at least 50 per cent. A range of factors (e.g. the age distribution of the sample, and the recency of exposure) would contribute to variations in the relative proportion of positive skin to serology results. It is also important to highlight the relevance of skin testing during education of the many general practitioners currently taking an interest in offering vaccination to their patients. The announcement of a National Q Fever Management Program[7] targeting high-risk groups in the meat and livestock industries, has led to increased awareness and demand for vaccination in many sectors, particularly amongst rural communities. Coupled with this has been an increase in requests for vaccination training by doctors.

In Queensland, abattoir workers and shearers may access free vaccination programs from November 2001. Very recently the Federal Government also announced that the Program will be expanded to include livestock workers, although this group will not attract the same level of subsidy.[8] This is a welcome addition given that in central west and south-west Queensland (which have the highest Q fever notification rates in Queensland),[9] it is people working on the land and those who are associated with the livestock industry who account for the majority of notifications, rather than abattoir workers.[10,11] Our finding that exposure to Q fever is quite common amongst this rural group is supported by preliminary screening results from more broadly-based campaigns in other rural communities suggesting the prevalence of exposure may be even higher in south-west Queensland than Central Queensland.[12,13]

These data provide additional support for implementation of the recommendation by Garner et al in 1997,[1] to extend Q fever vaccination programs into rural communities in geographic areas of high incidence in Australia.

Table 3. Serology and Skin Test results

Only skin +ve n (%)	Only serology +ve n (%)	Both skin and blood +ve n (%)	Total n (%)
24 (49.0)	7 (14.3)	18 (36.7)	49 (100)

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References

1. Garner MG, Longbottom HM, Cannon RM, Plant AJ. A review of Q fever in Australia 1991-1994. *Aust N Z J Public Health* 1997;21:677-80.
2. Curran M, Harvey B, Crerar S, Oliver G, D'Souza R, et al. Australia's notifiable diseases status, 1996. *Commun Dis Intell* 1997;21:281-307.
3. Central Queensland Rural Division of General Practice. Q fever report. CQRDG. 2001.
4. Meat Research Corporation. Q fever information kit for the Australian meat industry. 1997.
5. National Health and Medical Research Council. The Australian immunisation handbook 7th edition, AGPS 2000.
6. Marmion B. Appendix 1 in Q fever: Your questions answered. CSL, 1999.
7. Wooldridge M, Minister for Health and Aged Care. Federal Government provides $10 million for free Q fever vaccinations. Media release MW95/00, 26 October 2000. Http://www.health.gov.au/mediarel/yr2000/mw/wooldr2000.htm
8. Boswell R, Parliamentary Secretary to the Minister for Transport and Regional Services. $8 million boost to national Q Fever Management Program: all livestock and dairy farmers to get free Q fever vaccine. Media Release 3 October 2001. Http://www.nationalparty.org/newsroom/boswell_r-2001-10-03-1.htm
9. Notifiable conditions data collection system. Queensland Health 2001.
10. Boland PJ, Parker NR. Q fever in south west Queensland. *Med J Aust*1999;18;171(8):446.
11. Priest S. Presentation to Queensland Public Health Nurse Network Conference, 1996. (unpublished case follow-up data)
12. Smith P, Fairley M, Troy K, Faint R, Meara R, Bell M. Multi-partner, Multi-site Q fever immunisation project in a rural setting. 7th National PHAA Immunisation Conference, 2-3 August 2000, Gold Coast Australia.
13. Parker N (Darling Downs Public Health Unit). Personal communication. 8th August 2001.