

Prevalence of antibodies to *Neospora caninum* within central Queensland beef cattle

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Neospora caninum has been shown to be an important cause of abortion in cattle worldwide. Despite the considerable attention this parasite has attracted globally, and Australia's status as a major beef producer, little is known about the epidemiology of *N. caninum* in Australian beef herds. The only previous report of *N. caninum* in Australian beef cattle was from a diagnostic laboratory report of the aetiological cause of abortion in cattle in northern New South Wales, which found that 41% of all protozoal abortions diagnosed (presumably due to *N. caninum* infection) occurred in beef herds.¹ The present study aimed to define the age-specific prevalence of antibodies to *N. caninum* in central Queensland beef herds.

The study was conducted in central Queensland, which has a subtropical climate and is a major beef producing area, with over 3 million of Queensland's 11 million beef cattle and more than 10% of the national beef herd.

During 1997, blood samples were collected from 1800 beef cattle and the sera stored at -20°C as part of an animal health surveillance program conducted by the Department of Primary Industries, Queensland (QDPI). A full description of the herd selection and sampling methodology is provided by Black et al², albeit for earlier years. Briefly, each year 45 beef properties were selected as representative of the central Queensland administrative region, in 1997 40 of these herds agreed to participate in the survey. Only cattle that were bred on the property were sampled. Forty-five female cattle from each property were sampled, irrespective of herd size. Female cattle were selected because they were more likely to remain on the property and be available for follow-up testing if necessary. Fifteen heifers, 1 to 2 years of age and 30 older cows were sampled in each herd. Cow ages were recorded in years as it is common management practice in most herds for cows to be branded with a number being the last numeral of the year of birth. Fifteen samples were lost from each of eight properties, and a further seven miscellaneous samples were also missing, the total number of samples available for testing was 1673. The missing samples were not from any one particular region or group of properties.

Samples were tested at 1:200 dilution by the indirect fluorescent antibody test,³ utilising in vitro derived NC-1 tachyzoites as antigen and an anti-bovine IgG (H+L; Sigma-Aldrich, Castle Hill) as the conjugate. Only bright, complete peripheral fluorescence of the tachyzoite was scored as positive.³

Of the 1673 cattle tested, 249 (14.9%) were seropositive for *N. caninum*. The mean seroprevalence of individual properties was 14.7% (SD = 8.6%). Of the 40 properties surveyed, only two (5%) did not have a seropositive animal among those tested. Age-related seroprevalence rates are illustrated in Figure 1 and show a seroprevalence of around 10% in heifers with a trend of increasing seroprevalence with age.

This is the first seroepidemiological report of *N. caninum* in Australian beef cattle. The results suggest that *N. caninum* is endemic in beef herds across central Queensland. Seroprevalences reported for beef cattle in overseas surveys vary from 2.8% in New Zealand⁴ to 24% in northwestern USA.⁵ The reasons for the comparatively high seroprevalence in central Queensland cattle are not known, but may include the presence of a significant population of wild dogs and dingoes in this grazing region (which may act as definitive hosts for the parasite⁶), environmental factors (such as factors influencing the survival of oocysts in the environment, the degree of contact between wild canids) and less rigorous culling of cattle that fail to rear a calf every year compared with intensive beef production regions.

Age-related seroprevalence in the central Queensland herds suggests that both horizontal and vertical transmission is occurring (Figure 1). The gradually increasing age-related seroprevalence is suggestive of horizontal transmission, presumably from a definitive host. The seroprevalence of around 10% observed in the younger stock suggests that congenital transmission also plays a part in the natural history of *N. caninum* infection in beef herds. The study design meant that in every herd, one third of all samples taken were from 1- to 2-year-old cattle. The comparatively greater numbers sampled in these age groups means that confidence limits on these means are relatively narrow. The determination of the confidence limits did not take clustering within herds or age groups into consideration. However, even considering this, the data do suggest that the seroprevalence in the 1 to 2 year age group is significantly higher than 0.

This pattern of transmission offers promise for parasite control programs. If seropositive animals were removed from breeding groups, then the overall prevalence on a property would be expected to decline significantly because the rate of

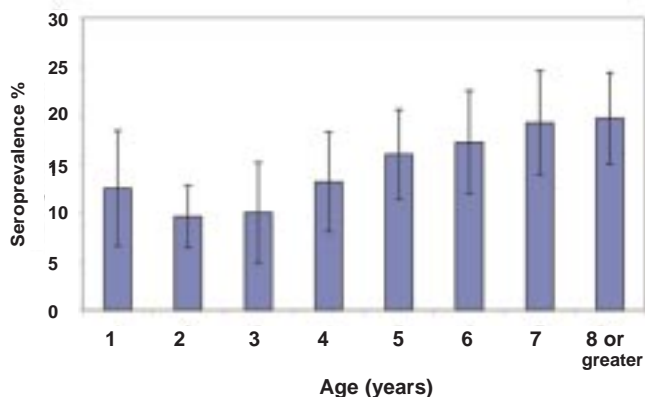


Figure 1. Mean prevalence of antibodies to *Neospora caninum* (and approximate 95% confidence limits) by age in central Queensland beef cattle.

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horizontal infection is quite low. However, a better understanding of *N caninum* epidemiology is required before optimal control programs can be developed. Aspects of parasite biology requiring further attention include its epidemiology in the canid definitive host, the role of intermediate hosts other than the cow and the influence of environmental factors such as rainfall and stocking rate on maintenance of infection in herds.

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OBITUARY

Keith McDonald Grant

Keith was born in Glen Innes in 1916 and died at his home in the Brisbane suburb of Wynnum on 19 January 2003. He matriculated from North Sydney High to enter the Sydney Veterinary School, graduating in 1937 at the age of 21 in the last year of the old four year course.

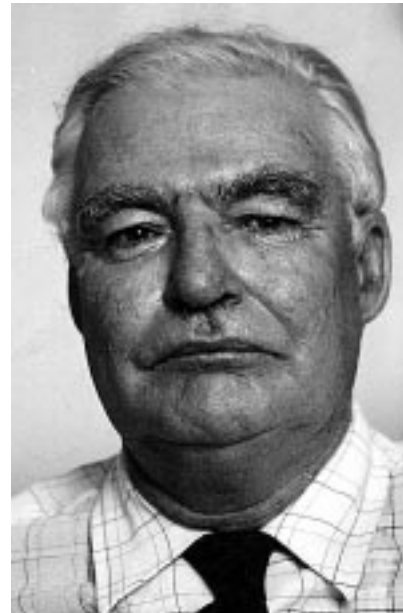
He was appointed in 1938 to the staff of the Oonoonba Animal Health Station at Townsville. Later that year he accepted a transfer to Atherton as a field Veterinary Officer. Whilst there he met and married Jean Currie, who remained his devoted wife for over 60 years until her recent death.

Soon after the onset of the war with Japan, an invasion of northern areas of Australia was regarded as a distinct possibility. Keith was given the task of planning the removal of livestock as part of a scorched earth policy. With the arrival of large numbers of American servicemen encamped in far north Queensland, Keith was co-opted to the veterinary arm of the American services devoted to ensuring that milk and meat supplied to their forces were free of tuberculosis and other zoonotic diseases. With American colleagues Keith tuberculin tested all dairy herds in the region. He made lifelong friendships with some of these colleagues, particularly with the late Dr Richard Shuman who revisited Australia and was to play host to a number of Queensland veterinarians visiting the USA in later years.

Keith was transferred to Murgon in the South Burnett region in 1944, promoted to Divisional Veterinary officer, Townsville in 1948, accepted a transfer to Maryborough in 1951, was promoted to Brisbane Head Office in 1953 and succeeded the late CR. Mulhearn as Director of Veterinary Services in 1968. As such he was in charge of a large staff of veterinarians and lay inspectors. Keith was closely involved with successful national programs for the eradication of contagious bovine pleuropneumonia, brucellosis and tuberculosis. He was for several years the Queensland representative on the NSW Cattle Tick Control Commission, served on the Queensland Agricultural Requirements Board and the Queensland Poisonous Plants Committee.

Keith had a wide range of community interests, being a member of Lions, his Masonic Lodge and for nearly 40 years a member of the Wynnum Golf Club. He was a keen angler in Moreton Bay, had a wide appreciation of music and history, read widely and was a devoted builder of replicas of famous sailing ships during his retirement.

Keith Grant had a keen intellect. His staff saw him as a good and steady leader and showed him great loyalty. He is survived by three sons and one daughter and their families.



SG Knott and BA Woolcock