

The dog health program in Aboriginal communities - a method for dog management in remote Aboriginal communities

Kathryn Wilks and P Williamson

INTRODUCTION

Urban dog management strategies have traditionally been based on the enforcement of the Dog Act. Newer strategies have included incentives for 'responsible' dog ownership such as free euthanasia of unwanted pets, use of microchipping systems for tagging of dogs, provision of public exercise areas for pets and closer liaison between animal control officers and the public. The dog health program, a canine parasite and breeding control program based around three monthly treatments, is an effective, acceptable and workable alternative to the classical urban animal management strategies in remote and rural Aboriginal communities.

DOG HEALTH IN ABORIGINAL COMMUNITIES - THE HISTORICAL CONTEXT

Dingoes are believed to have been introduced into Australia by Asian seafarers who had strong trade and sea links with Australia (Flood, 1995; Corbett, 1995). Aboriginal people quickly adopted the dingo into their lives, although domestication of the dingo was only partial (Meggitt, 1965) with very little evidence of selective breeding. The interest shown by Aboriginal people in the dingo may have been due to the difference between dingoes and any other animal in Australia. Dingoes were avid hunters and carnivores and were the only animals to give birth in a manner similar to humans (Tonkinson, 1984). For these and many other reasons, dingoes were often accepted as 'members of the family' by being given subsection (skin) names that automatically positioned dingoes into society by giving them status such as parent, grandparent and child (Kolig, 1978; Tonkinson, 1984; Ross, 1987).

Traditionally dingoes were considered useful to Aboriginal people as hunting aides, companions, protectors and spiritual 'necessities'. Some of these uses are evident today and vary according to the Aboriginal group's history. Howe (1993) found that remote Aboriginal communities of mission background were more likely to hold utilitarian perceptions of dog roles (such as companion, hunter and protector) than communities of non-mission background who considered that the dog's primary role was in detecting the supernatural.

Domestic dogs quickly replaced dingoes after the colonisation of Australia by Europeans. Dogs were easier to train, assimilated into people's living arrangements better (Kolig, 1978) and were considered a status symbol by some groups (Meggitt, 1965). Acceptance of the European dog did result in some problems that are evident today. Firstly, European dogs breed twice a year, whereas dingoes only breed once a year (Corbett, 1995). Also dingoes brought from the bush eventually returned to it (Lumholtz, 1889; Meggitt, 1965; Kolig, 1978) and very little breeding (or selection) was done in the camps. Secondly, dingoes were self sufficient and 'economical'. Whereas dogs expected to be fed and cared for by people (a trade off for domestication), dingoes would often hunt for the people, accept leftover food and complement their diet by foraging (Meggitt, 1965; Hamilton, 1972; Hayden, 1975).

Aboriginal peoples' attitudes to dog sickness and health

Historical literature relating to Aboriginal people's attitude to the welfare of their dogs varies according to region and opinion. Chewings (1936) noted that " (the dogs were) ... usually emaciated and fed more on affection than food". By contrast Lane (1928), Lumholtz (1889) and Berndt and Berndt (1942) believed dogs to be well fed. Others have observed that the amount fed to dogs varied according to the amount of food available to the owners (Nind, 1931; Buley, 1905). The apparent lack of feeding of dogs may be a remnant of the days when dingoes roamed the camps and foraged for themselves.

Howe (1993) found that attitudes toward the care of dogs varied according to the status of the dog (owner status in community, sex and age of dog and uniqueness) and the experiences of the owner. Older owners were noted to respond to the needs of their ill dogs and this was considered, in part, to be a traditional cultural imperative on the part of the dog owner. Younger people, raised in contemporary settings, did not have the perception of usefulness of dogs in a traditional sense, and Howe (1993) considers that this may reflect less attention to dog care by younger community members. Overall "for much of the post-contact period, Aboriginal people were neither encouraged nor equipped to take responsibility for the health of their dogs, their major alternatives being euthanasia or neglect" (Howe, 1993). Euthanasia, particularly by shooting, is also shunned by many groups (Meggett, 1965; Ross, 1987) but considered to be an unpleasant necessity by some (Howe, 1993).

George Wallaby was quoted as saying "Them doggers, whitefella blokes, they come here and shoot 'm in the old days, them dogs ... They say gimme money or I kill the dog. I say I got no money. So they take 'm .., so I go hide 'm out bush. That's how we save 'm. Make them doggers bloody mad! Like they wanna shoot us, too!" (Arden, 1995).

THE PRESENT HEALTH STATUS OF DOGS IN ABORIGINAL COMMUNITIES

The rapid transition of Aboriginal people from nomadic lifestyles to 'permanent' residence after colonisation is often considered a factor for the poor environmental health standards experienced by Aboriginal communities today (Gracey 1992). Concomitant is the perceived overpopulation and poor health of dogs, much of which is also a result of this transition. Population regulation, traditionally controlled by the capture of puppies from the wild without breeding within camps, became difficult after the introduction of the European dog. As a result the health of dogs suffered due to the overcrowding and difficulty in feeding large numbers of dogs.

Most accounts of the health status of dogs in Aboriginal communities relate to the zoonotic pathogens. Given the very close association of Aboriginal people and dogs and the frequent accounts of close cohabitation (Ross, 1987; Berndt and Berndt, 1992), the potential for transmission of canine disease to humans is high. Ross (1987) stated that "few people acknowledge any health hazard resulting from dogs, though beds are shared with dogs and the ground around some camps is strewn with faeces". This and similar comments has resulted in surveys of dogs in Aboriginal communities for zoonotic parasites.

THE DOG HEALTH PROGRAM IN THE KIMBERLEY REGION OF WESTERN AUSTRALIA

The 'Dog Health Program in Aboriginal Communities' project was established in 1992 as a pilot program to assess the benefits of a canine parasite and breeding control program in Aboriginal communities of the Kimberley region, Western Australia. The pilot program was introduced to 14 communities.

The objectives of the program were to:

- assess the health status of dogs in communities;
- implement a parasite control program to reduce the potential for zoonoses transmission;
- implement a breeding control program to reduce the number of dogs in communities and hence the reservoir for zoonotic disease; and
- use the control program as a vehicle for education regarding the wider environmental health concerns in communities.

Dogs from each of the pilot communities were identified using a microchip system (trovan Passive Transponder System ID-100). Signalment data, including sex, age (estimations based on dentition when necessary [Harvey, 1985]), owner name and place of residence, was collected from each newly registered dog.

Clinical examinations and dermatological assessments were done on each dog and information regarding reproductive status was recorded. Faecal samples, blood samples and skin scrapings (where applicable) were collected. Each dog (apart from collie dogs and unweaned pups) was then treated with ivermectin (ivomec antiparasitic injection for cattle MSD AgVet, 10g/L; 200 µg/kg subcutaneous). Mature female dogs (over 6 months of age) were given proligestone injections (covinan Intervet (Australia) Pty Ltd, 100mg/mL; 10-30mg/kg subcutaneous) at the request of the owner for control of oestrus. These treatments and samplings were continued every three months for the duration of the program (3.5 years). The general methodology for the study is described elsewhere (Wilks, Williamson and Robertson, 1996).

The findings from the dog health program

The data collected during the pilot program provided valuable information about the effectiveness of the control program in reducing the parasite prevalence and reproduction in female dogs as well as the dog population characteristics in communities. The most common parasites found during the pre-treatment testing of dogs were *Sarcoptes scabiei*, *Ancylostoma caninum*, *Dirofilaria immitis* and ticks (see Charts 1-3). Parasitic diseases were expected to be at a high level due to the tropical climate of the region and the lack of treatment of dogs for these diseases.

Other parasitic agents that were found included *Toxocara canis* (at levels below 5%), *Strongyloides stercoralis*, *Spirocera lupi*, *Hymenolepis nana*, *Spirometra erinaceieuropai* and *Giardia duodenalis* and are described elsewhere (Wilks, Williamson and Robertson, 1996).

The effectiveness of the parasite and breeding control program

The success of the parasite and breeding control program was reliant on the support and assistance provided by the communities in encouraging owners to co-operate and present dogs for treatment. Initially 99% of dogs were re-presented at the next visit, but this decreased over time to 81% at the end of the pilot program. With these 'capture rates' the effect of the program on some parasites was considerable.

Parasite control

Ivermectin is a potent endo- and ectoparasiticide which, when used at 200 µg/kg S/C in dogs, can kill a wide variety of parasites, except tapeworms. The program was mainly targeted at reducing the prevalence of scabies and hookworm in dogs.

Sarcoptes scabiei. *Sarcoptes scabiei* is a skin burrowing mite capable of causing intense pruritus and resultant skin damage and alopecia in many host mammals. The species is subdivided into variants (Fain, 1978) which are mostly host specific, although if close contact is maintained between host species (such as between humans and dogs), some cross transmission of mites can occur (Emde, 1961; Beck, 1965; Newton and Gerrie, 1966; Sauer and Koch, 1967; Smith and Claypoole, 1967; Thomsett 1968; Elgart and Higdon, 1972; Charlesworth and Johnson, 1974; Agbede, 1978; Scott and Horn, 1987; Burton, 1997). Chronically and severely affected dogs may become anorexic, depressed and develop weight loss and secondary bacterial pyoderma (Scott and Horn, 1987). Sarcoptic mange is also considered a major cause of mortality amongst natural red wolf (Philips and Scheck, 1991) and coyote populations (Pence, Windburg, Pence and Sprowls, 1983).

Repeated skin appraisals of dogs every three months revealed a consistent reduction in scabies prevalence and severity across all of the communities of the pilot program. (Figure 1). Ivermectin is very effective at resolving *Sarcoptes scabiei* infections in dogs when given at 200µg/kg twice at a 10-14 day interval (Thimmappa Rai & Yathira, 1988). Despite the treatments in the present study only being given every three months, there was an eventual reduction in prevalence of scabies from 14 to 52% to a level below 10% at all communities.

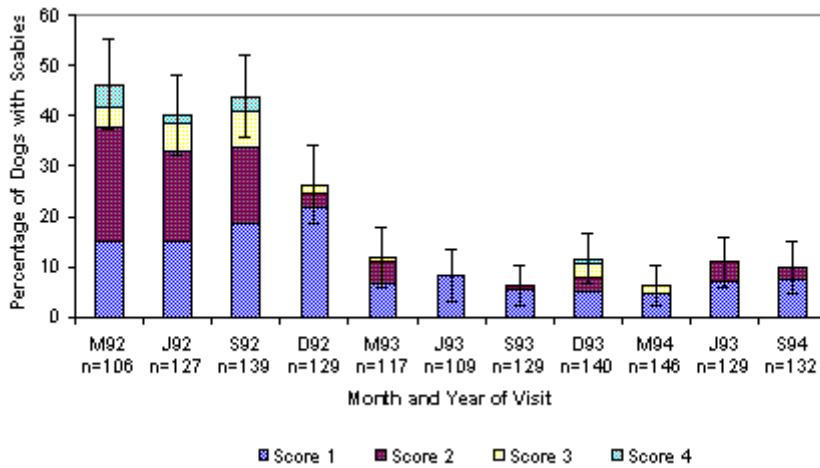


Figure 1: Sarcoptes scabiei prevalence in dogs from a representative Kimberley Aboriginal community

Hookworm. Hookworm disease can be a severe anaemic disease for young puppies and dogs on a low plane of nutrition due to the blood sucking activities of the worm (Bowman, 1992). *Ancylostoma caninum* and *Ancylostoma braziliense* are also responsible for cutaneous larva migrans in humans who come in contact with the infective larvae (L3) in the ground (Robinson, Thompson and Lindo, 1989). The result is an intensely pruritic skin lesion due to the immunological response of the host. In Queensland *Ancylostoma caninum* has also been found to be the etiological agent for eosinophilic enteritis (Prociv and Croese, 1990) which may cause severe abdominal cramps prompting surgical intervention (Croese, Loukas, Opdebeek and Prociv, 1994). Neither of these human manifestations of the disease have been reported in Aboriginal communities.

The reduction in prevalence of hookworm followed a seasonal pattern throughout the pilot study (Figure 2) which varied according to the region within the Kimberley. Being a typical geohelminth, hookworm is reliant on environmental factors such as humidity and temperature for survival. Prevalence was lowest during the dry seasons but increased during the wet season. It is likely that although small reductions in prevalence were noted there would have been even more rapid reductions in the intensity of infection (number of worms per host) in the dogs. By reducing the intensity of infection the likelihood of hookworm disease in the dogs would have also decreased and contributed to the overall improvement in condition.

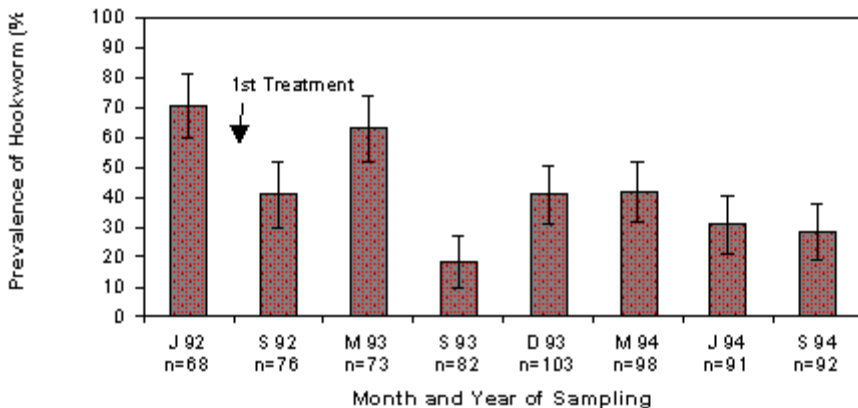


Figure 2: Hookworm prevalence in dogs from a representative Kimberley Aboriginal community

Other parasites. In one community weekly samplings were conducted to determine the immediate effects of treatment on parasite levels. During the samplings the prevalence and number of ticks on dogs had reduced by 70% within one week of treatment. The prevalence of ticks had returned to the pre-treatment level by 5 weeks after the treatment due to the availability of larval ticks from the dogs' environment.

Dirofilaria immitis infection in dogs in tropical climates is very common and of considerable clinical significance for infected dogs (Dunsmore and Shaw, 1990). Heartworm larval stages (L3 and L4) are extremely sensitive to ivermectin and this forms the basis of monthly prophylactic treatments for heartworm. During the 'Dog Health Program' ivermectin was given at three monthly intervals which was considered to be too sparse to ensure that the larvae did not mature. Ivermectin, though, is potent against circulating microfilariae at doses higher than 50 µg/kg (Campbell & Benz, 1984), which explained a reduction in the prevalence of microfilariae positive dogs after several treatments. The overall effect of the program may be a reduction in the reservoir of microfilariaemic dogs and hence a reduction in heartworm prevalence over time.

Breeding Control

Proligestone (covinan) is recommended to be given three months after the first treatment, then four months later and then continued every five months thereafter for permanent control of oestrus in dogs. During the 'Dog Health Program' treatments were given every three months to ensure that any bitches that missed one treatment were only one month overdue for their treatment, rather than several months. The treatment regime did not result in any adverse side effects.

The compliance rate for proligestone treatments was high (over 60%) and the breeding control program was effective. The conception rates during the period of treatment (between March 1992 and September 1994, below 10%) were well below the conception rates before and after the treatment period (greater than 15%). The reproductive rate for bitches during the program was between approximately 40% and 80% less than Perth and the Kimberley urban centres respectively.

Although some bitches did breed during the program, this was not due to ineffective contraception treatments, as 51% of these bitches had not been treated with proligestone before their pregnancy. The pregnancies throughout the program were either due to bitches entering the communities already pregnant or because they missed the treatments.

Despite the effectiveness of the contraceptive treatments, the average rate of change in population for every three months was 0.99. This extrapolates to an annual rate of change in population of 0.94 indicating a very low decline in population numbers, due primarily to acquisition of dogs from outside the communities.

This overall annual rate of change of population (excluding June to September 1993) was similar to those found in Kansas (0.975) and Las Vegas (0.96) (Nassar and Mosier, 1980; Nassar, Mosier and Williams, 1984) where there are higher reproductive rates (17 and 13%) but much lower rates of acquisition of dogs from outside the community. The dynamics of dog populations in these communities is different to those found in the present study, as they are more stable with fewer inward migrating dogs. For adequate canine population control in the Kimberley communities breeding control must therefore be coupled with reductions in importation of new dogs from other areas. This will bring the dynamics more in accord with centres where population control of dogs is considered to be more adequate.

Some of the Dog Population Characteristics in Communities

Overall, the population of dogs in the Kimberley Aboriginal communities was young (estimated average age 2 years old). A young dog population has implications for zoonoses control as many of the zoonotic parasites (such as *Toxocara canis* and *Ancylostoma caninum*) were often found in younger animals. The sex distribution was skewed towards male dogs (59% males and 41% females).

One possible reason the bias toward male dogs in the Kimberley is the selective killing of female newborn puppies to help control dog population numbers (personal observation; Howe, 1993). It is also often commented that males are more favourable than females for protection and hunting. Sterilisation of dogs by surgery was rare for the dogs of the Kimberley communities, possibly due to the lack of availability of veterinary services, low disposable income and lack of awareness of veterinary services and population control measures apart from culling.

The distribution of dogs within the communities (number of dogs per owner, dogs per household) varied across the Kimberley. Some areas had rates of dog ownership similar to other non-Aboriginal studies (Robertson, Edwards, Shaw and Clark, 1990), whereas some communities (particularly of the desert areas) had much higher rates of ownership. The number of dogs per owner for some areas was much lower than the number of dogs per household suggesting that there were several dog-owners living at the same household. In most non-Aboriginal communities, the number of dogs per owner and dogs per household are much the same, as only one person per house takes the role of owner. In the Kimberley communities, many owners may live at the same house due to the crowded living conditions (the average number of aboriginal people per private community dwelling in 1991 was 7.7 compared with 2.6 per dwelling for non-Aboriginal people [Anon, 1993]). This has implications for animal management programs, as workers requiring owner o-operation must ensure they address all owners at each household.

Overall the ratio of people to dogs was found to be an average of 4.9 to 1 which is within the range found in many other studies in non-Aboriginal societies (range of 3.9: 1 to 7.3:1) (Franti and Kraus, 1974; Schneider and Vaida, 1975; Griffiths and Brenner, 1976; Nassar and Mosier, 1980; Nassar, Mosier and Williams, 1984; Nassar and Mosier, 1984; Robertson, Edwards, Shaw and Clark, 1990; Ticman and Carlos, 1992; Odendaal, 1994; Leslie, Meek, Kawah and McKeon, 1994; Patronek, Beck and Glickman, 1997). Since the number of dogs per household and owner was high, but the number of dogs per person was not, this indicates that the perceived dog overpopulation may not be due to too many dogs, but not enough houses. The same number of people, owners and dogs located in another community with more houses could result in figures similar for non-aboriginal communities of other studies. There also was a disproportionately high number of dogs per owner for older age groups of the human population although 31% of the Aboriginal population was under the age of 15 at the 1991 census (Anon, 1993).

One year after the start of the program 47% of the original dogs had died or gone missing during that year. Consequently, over 50% of dog-owning-households had lost a dog in the same period, which was four times the rate of similar households in the urban communities of the Kimberley region. Only 9.2% of the dog deaths were of a known cause when voluntary euthanasia was excluded. The causes of death ranged from drowning to snake envenomation. Many of the reported deaths were season related as six (33.3% of deaths of known cause) were due to drowning. The voluntary euthanasia rates during the wet seasons were higher than normal (20% of deaths) due to the poor condition of some dogs after widespread flooding across the region. Other reasons for voluntary euthanasia included overpopulation, aggressive behaviour and disease.

Although some of the dog population characteristics from some of the Kimberley Aboriginal communities were similar to those found in other studies, the rate of ownership per household, and per owner were higher in Aboriginal communities. Mortality rates and rates of introduction of animals into the communities were also much higher than non-Aboriginal centres. The ownership patterns indicate that older people are more likely to own large numbers of dogs and communities with more 'traditional' customs are more likely to have higher numbers of dogs per capita than those with more contemporary experiences with dogs.

The future of dog health programs in Western Australia

The pilot program has expanded from 14 communities to over 50 communities in the Kimberley and Pilbara regions of Western Australia. Programs in communities are now managed and operated by the community people and supervisors from Public Health Units of the Health Department of WA and local shires of the two regions.

The transition from pilot program to control by staff from the regions was carried out over a one-year period in 1995. The people providing the treatments are required to satisfactorily complete a course certified by the Pharmaceutical Services Branch of the Health Department in the correct usage and storage of the drugs used in the program.

HOW CAN THE DOG HEALTH PROGRAM SUCCEED WHERE CLASSICAL URBAN ANIMAL MANAGEMENT STRATEGIES HAVE FAILED?

Howe (1993) considers that the modern-day attitudes of Aboriginal people toward dogs and 'dog control' are a reflection of the 'post-invasion' history of officially sanctioned antagonism toward the Aboriginal person-dog relationship. The Western Australian Dog Act of 1902-1965 placed firm restrictions on the ownership of dogs by Aboriginal people in the remote areas of the state. Some of the restrictions included:

- only one dog allowed for each owner;
- dogs owned by Aboriginal people had to be male;
- dogs had to be free from disease and registered; and
- the keeping of dingoes was unlawful (from 1919).

Any member of the police force or officer of a local authority could also destroy unregistered dogs. For 62 years an Aboriginal person could be deprived of all his or her dogs unless one chosen dog was taken to the nearest authority (often hundreds of kilometres away) for registration (Howe, 1993). Despite the restrictions placed on Aboriginal people by the Dog Act most Aboriginal people believed that a community without dogs was unthinkable (Howe, 1993).

After the demise of section 29 of the Dog Act in 1965 local authorities were still called upon to carry out culling programs. This is still perceived as the primary function of local shire animal management officers in some areas of the Kimberley Region today.

The dog health program offers many advantages and alternatives to classical Urban Management strategies, particularly those closely adhering to the Dog Act:

- dogs are 'registered' with the dog health program. Data gathered by the workers can be accessed by shires for information on dog ownership patterns;
- dog health programs offer a positive service to the community that complements 'community development' and gives communities the power to choose services (self-determination);
- staff involved with dog health programs (including shire personnel) can be introduced to communities in a positive light that facilitates further interaction;
- dog health programs address the concerns of zoonotic disease as well as offer acceptable population control measures. Although registration by most shires works on a differential payment scheme for sterilised dogs, this is unlikely to work in communities without access to veterinary services. Permanent sterilisation of dogs in remote communities is not cost effective due to the high turnover (mortality) rate. Dog health programs also address animal welfare concerns by improving the health status;
- the use of contraceptive treatments rather than dog culling is more acceptable to community members. After the program has been established for some time people are more willing to accept (humane) culling of animals. Given that many 'owners' of dogs (and families) can be living at a single dwelling, enforcing the 'two dogs per household' clause of the Dog Act is not practical in the initial stages. Continual dog population control and education may result in this in the future;
- dog health programs can be operated on a user-pay system;
- collaboration between health workers and the shire is facilitated which gives the potential for education programs to be established.

CONCLUSION

The status of dog health in Aboriginal communities is dependent on the attitudes of community members to dogs and this in turn is dependent on the history of the community. Attitudes to dogs vary from community to community and this reflects the dog ownership patterns and willingness to control dog populations. The main diseases affecting dog health are likely to be infectious due to the lack of access to veterinary services prophylactic treatments. Some of these diseases are zoonotic (especially parasites).

The dog health program, based on three monthly treatments of dogs for parasites using ivermectin and contraceptive treatments for bitches, is an acceptable and effective way to control canine parasites and breeding in Aboriginal communities. The dog health program also has advantages over traditional 'urban animal management' strategies by providing a positive service to communities and improving animal welfare. The effectiveness of dog health programs is dependent on community, shire and health department support.

ACKNOWLEDGEMENTS

We wish to thank the Health Promotion Foundation of Western Australia for providing the funding for the Kimberley dog health program. We are also grateful for the financial assistance provided by Kimberley Health and in particular the advice and 'hands-on' help volunteered by Bill Ellis, Iris Prouse, Mae Torres and the Environmental Health Worker Supervisors: Philip Wallaby, Flora Ah Choo, Buddy Morrison, Faye Nelson and Julius Barker. Last and certainly not least, we wish to thank the community members and environmental health workers with whom we have had many memorable and exciting times catching dogs.

REFERENCES

- Anon. 1993. *Kimberley Population and Settlement*, Technical Paper, Kimberley Development Commission, Derby.
- Agbede, R.I.S. 1978. *Sarcoptes mites on a puppy in Northern Nigeria*, *Veterinary Record* 103: 145.
- Arden, H. 1995. *Dreamkeepers*, Harper Collins, Mossvale p81.
- Beck, A.L. 1965. *Animal scabies affecting man*, *Archives of Dermatology* 91: 54-55.
- Berndt, R.M., Berndt, C.H. 1992. *A preliminary report of field work in the Ooldea Region, Western South Australia*, *Oceania* 13:144-168.
- Berndt, R.M., Berndt, C.H. 1992. *The World of the First Australians*, Aboriginal Studies Press, Canberra.
- Bowman, D.D. 1992. *Hookworm parasites of dogs and cats*, *Compendium on Continuing Education for the Practicing Veterinarian* 14: 585-595.
- Buley, E.C. 1905. *Australian Life in Town and Country*, G.P. Putnam's Sons, New York.
- Burton, G. 1997. *Sarcoptic mange and iatrogenic hyperadrenocorticism in a dog undergoing hyposensitisation for atopy based on RAST testing*, *Australian Veterinary Practitioner*, 27: 27-33.
- Campbell, W.C., Benz G.W. 1984. *Ivermectin: A review of efficacy and safety*, *Journal of Veterinary Pharmacology and Therapeutics* 7: 1-16.
- Charlesworth, E.N., Johnson J.L. 1974. *An epidemic of canine scabies in man*, *Archives of Dermatology* 110: 572-574.
- Chewings, C. 1936. *Back in the Stone Age*, Angus and Robertson, Sydney.
- Corbett, L. 1995. *The Dingo in Australia and Asia*, University of New South Wales Press, Sydney.
- Croese, J., Loukas A., Opdebeeck, Prociv P. 1994. *Occult enteric infection by Ancylostoma caninum: a previously unrecognised zoonosis*, *Gastroenterology* 106: 3-12.
- Currie, B.J., Maguire G.P., Wood Y.K. 1995. *Ivermectin and crusted (Norwegian) scabies*, *The Medical Journal of Australia* 163: 559-560.

- Dunsmore, J.D., Shaw, S.E. 1990. *Clinical Parasitology of Dogs*, University of Sydney Post Graduate Foundation in Veterinary Science, Sydney, pp 12-21, 38, 59-63, 73-75, 79-80, 118, 123-127, 142.
- Elgart, M.L., Higdon, R.S. 1972. *Canine scabies: Report of a family outbreak*, Southern Medical Journal 65: 375-376.
- Emde, R.N. 1961. *Sarcoptic mange in the human*, Archives of Dermatology 84: 149-152.
- Fain, A. 1978. *Epidemiological problems of scabies*, International Journal of Dermatology 17: 20-30.
- Flood, J. 1995. *Archaeology of the Dreamtime*, Angus and Robertson, Sydney.
- Franti, C.E., Kraus, J.F. 1974. *Aspects of pet ownership in Yolo County, California*, Journal of the American Veterinary Medical Association 164: 166-171.
- Gracey, M. 1992. *Diarrhoea in Australian Aborigines*, Australian Journal of Public Health 16: 216-225.
- Griffiths, A.O. and Brenner, A. 1977. *Survey of cat and dog ownership in Champaign County, Illinois, 1976*, Journal of the American Veterinary Medical Association 170: 1333-1340.
- Hamilton, A. 1972. *Aboriginal man's best friend?* Mankind 8: 287-295.
- Harvey, C.E. 1985. *Veterinary Dentistry*, W.B. Saunders Co., Philadelphia.
- Hayden, B. 1975. *Dingoes: Pets or producers?* Mankind 10: 11-15.
- Hopkins, R.M., Meloni, B.P., Groth, D.M., Wetherall, J.D., Reynoldson, J.A., Thompson R.C.A. 1997. *Ribosomal RNA sequencing reveals differences between the genotypes of Giardia isolates recovered from humans and dogs living in the same locality*, Journal of Parasitology 83: 44-51.
- Howe, M. 1993. *The Biosociological relationship between Western Australian Aborigines and their dogs*, Ph.D. Thesis, Murdoch University, Perth.
- Kolig, E. 1978. *Aboriginal dogmatics: Canines in theory, myth and dogma*, Bijdragen tot de Taal-, Land- en Volkenkunde 34: 84-115.
- Lane, C. 1928. *Adventures in the Big Bush in the Haunts of the Aboriginal*, Hutchinson and Co. Ltd., London.
- Leslie, B.E., Meek, A.H., Kawah, G.F., McKeon, D.B. 1994. *An epidemiological investigation of pet ownership in Ontario*, Canadian Veterinary Journal 35: 218-222.
- Lumholtz, C. 1889. *Among Cannibals*, John Murray, London.
- Meggitt, M.J. 1965 *The association between Australian Aborigines and dingoes*, In Leeds A. and Vayada A. (Eds.) Man, Culture and Animals: The Role of Animals in Human Ecological Adjustments, American Association for the Advancement of Science, Washington pp. 7-26.
- Nassar, R. and Mosier, J.E. 1980. *Canine population dynamics: A study of the Manhattan, Kansas, canine population*, American Journal of Veterinary Research 41: 1798-1803.
- Nassar, R., Mosier, J.E. 1984. *Canine and Feline Population Studies in Salina, Kansas*, Report prepared for American Veterinary Medical Association.
- Nassar, R., Moiser, J.E., Williams, L.W. 1984. *Study of the feline and canine populations in the greater Las Vegas area*, American Journal of Veterinary Research 45: 282-287.

- Newton, D.K., Gerrie, W. 1966. *Sarcoptic scabies in a dog (with human involvement)*, Canadian Veterinary Journal 7: 43.
- Nind, S. 1831. *Description of the natives of King George's Sound (Swan River Colony) and adjoining country*, The Journal of the Royal Geographical Society of London 1: 21-51.
- Odendaal, J.S.J. 1994. *Demographics of companion animals in South Africa*, Journal of the South African Veterinary Association 65: 67-72.
- Patronek, G.J., Beck, A.M., Glickman, L.T. 1997. *Dynamics of dog and cat populations in a community*, Journal of the American Veterinary Association 210: 637-642.
- Pence, B.D., Windberg, L.A., Pence, B.C., Sprowls, R. 1983. *The epizootology and pathology of sarcoptic mange in coyotes, Canis latrans, from south Texas*, The Journal of Parasitology 69: 1100-1115.
- Philips, M.K. and Scheck, J. 1991. *Parasitism in captive and reintroduced red wolves*, Journal of Wildlife diseases 27: 498-501.
- Prociv P., Croese, J. 1990. *Human eosinophilic enteritis caused by dog hookworm Ancylostoma caninum*, The Lancet 335: 1299-1302.
- Robertson, I.D., Edwards, J.R., Shaw, S.E. Clark, W.T. 1990. *A survey of pet ownership in Perth.*, Australian Veterinary Practitioner 20: 210-213.
- Robinson, R.D., Thompson, D.L., Lindo, F. 1989. *A survey of intestinal helminths of well-cared-for dogs in Jamaica, and their potential public health significance*, Journal of Helminthology 63: 32-38.
- Ross, H. 1987. *Halls Creek Aboriginal culture*, Just for Living, Aboriginal Perceptions of Housing in North West Australia, Aboriginal Studies Press, Canberra.
- Sauer, R.M., Koch, S.A. 1967. *Clinico-pathologic conference*, Journal of the American Veterinary Medical Association 150: 217-223.
- Schneider, R., Vaida, M.L. 1975. *Survey of canine and feline populations: Alameda and Contra Costa Counties, California, 1970*, Journal of the American Veterinary Medical Association 166: 481-486.
- Scott, D.W., Horn, R.T. 1987. *Zoonotic dermatoses of dogs and cats*, The Veterinary Clinics of North America, W.B. Saunders and Co., Philadelphia.
- Smith, M.E.B., Claypoole, T.F. 1967. *Canine scabies in dogs and humans*, The Journal of the American Medical Association 199: 1967.
- Thimmappa Rai, R.M., Yathira, S. 1988. *Clinical evaluation of ivermectin for treatment of scabies in canines*, Indian Veterinary Journal 65: 626-628.
- Thomsett, L.R. 1968. *Mite infestations of man contracted from dogs and cats*, British Medical Journal 3: 93-95.
- Ticman, M.E., Carlos, E.T. 1992. *Dog population survey in six barangays of Makati Metro Manila*, 8th Congress of the Federation of Asian Veterinary Associations, Federation of Asian Veterinary Associations, Manila.
- Tonkinson, R. 1984. *Semen versus spirit-child in a Western Desert culture*, In Charlesworth M., Morphy H., Bell D., Maddock K. (Eds) Religion in Aboriginal Australia, University of Queensland Press, St Lucia.

Wilks, K.M., Williamson, P., Robertson, I.D. 1996. *Assessing and improving the health status of dogs in Aboriginal communities in the Kimberley Region, Western Australia*, In Dog Health in Indigenous Communities, Shield J. (Ed.), Queensland Department of Primary Industries, Cairns.

ABOUT THE AUTHOR

Kathryn Wilks

Lecturer in Veterinary Public Health

Murdoch University

MURDOCH WA 6150

Ph: 08 9360 2224

Fx: 08 9310 7495

Kathryn Wilks is a Murdoch University Veterinary Science graduate. For four years she co-ordinated and conducted the 'Dog Health Program in Aboriginal communities' program as part of her PhD studies. The program continued very successfully and ultimately won the Excellence in health Promotion Award from the WA Health Promotion foundation. Three years ago Kathryn commenced a lectureship in Veterinary Public Health and Parasitology at Murdoch University.

[UAM 98 Index Page](#)