

Chapter 4 Helminth occurrence in dogs from resource-limited communities in Bloemfontein, Free State Province

4.1 **Background:** The informal settlement areas surrounding Bloemfontein in the Free State Province are similar to the study areas around Boksburg in terms of infrastructure, economic and social structures as described in Chapter 3. This study area is situated at 28°13'E; 29°07'S and consists of transitional dry *Cymbopogon - Themeda* veld (Acocks, 1975). This is characterized by mixed, grassy false Karoo vegetation, with doleritic formations and sandy soil to turf. It is flat country, with an annual rainfall of 450 - 500 mm.

The community is urban, and the dogs from which the samples were collected originated from the low-income informal settlement suburbs and older residential areas (Figs. 4.1 and 4.2).

SOUTH AFRICA

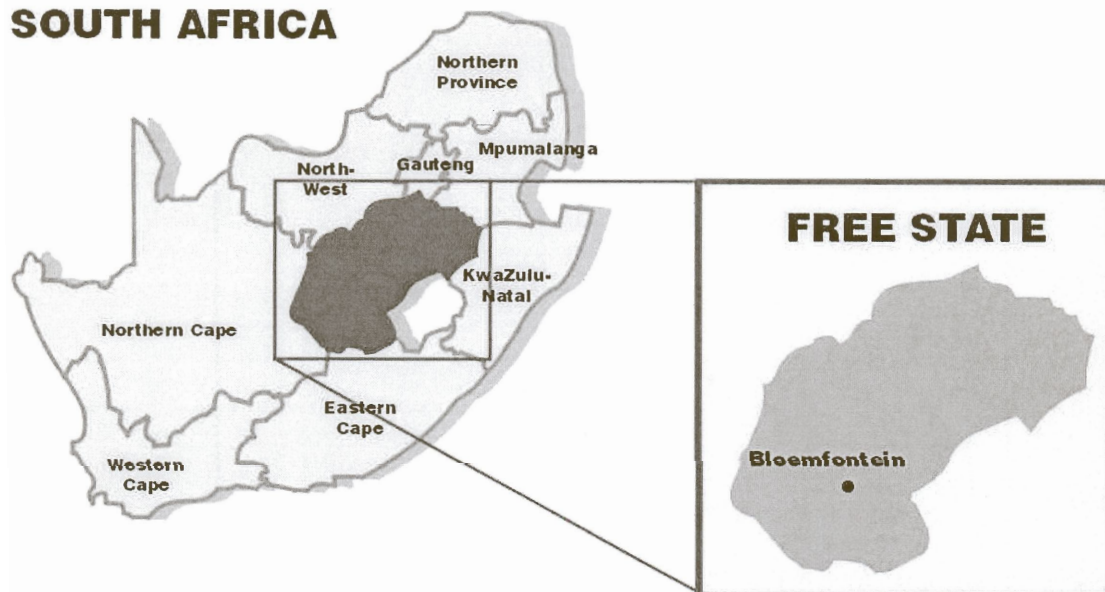


Fig. 4.1 The geographic locality of Bloemfontein in Free State Province

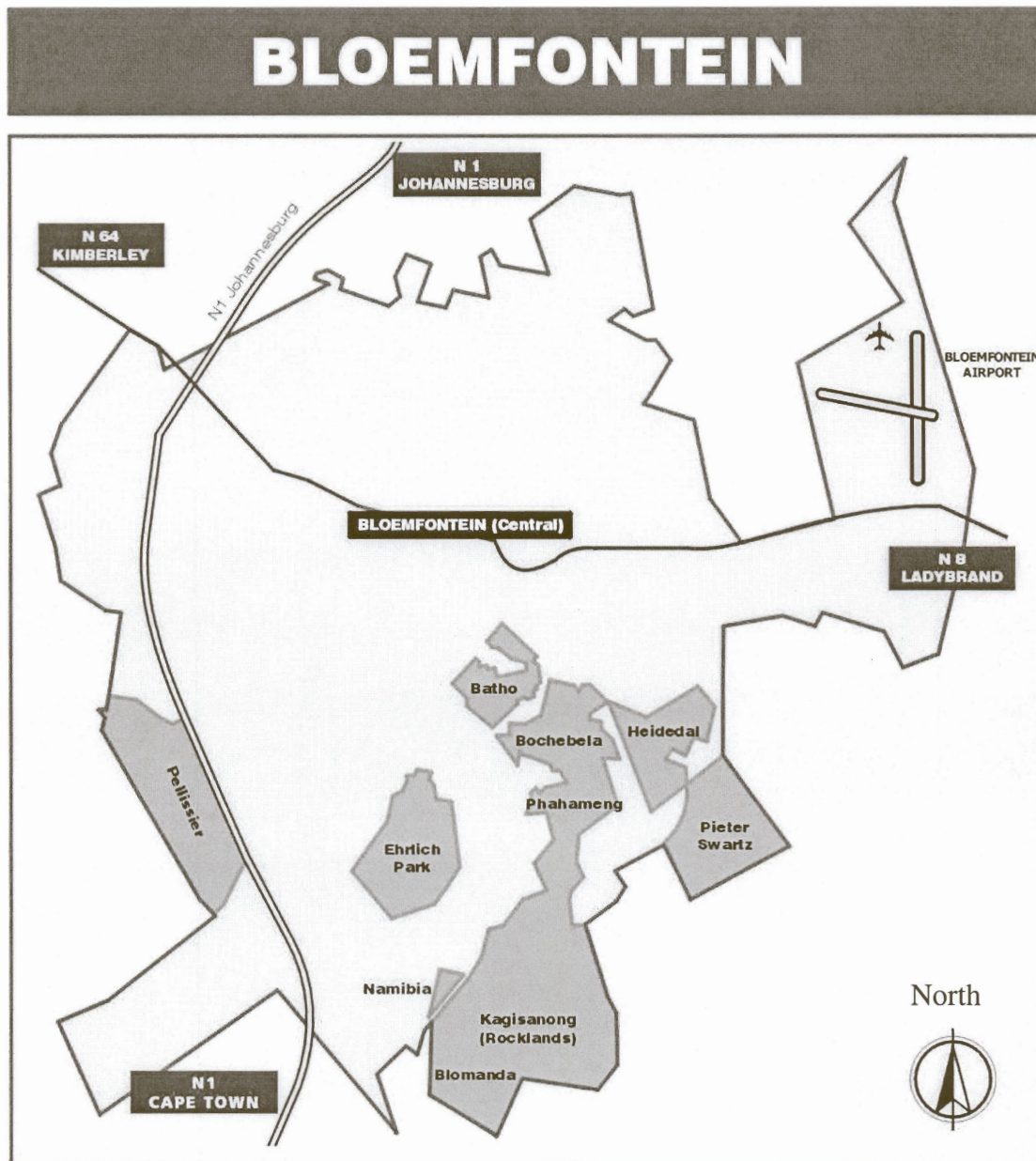


Fig. 4.2 Area map of Bloemfontein

The residents in the area are predominantly Sesotho-speaking. Many of the residents work in the city of Bloemfontein; there is a high degree of unemployment and poverty in these settlement suburbs.

The dogs impounded by the SPCA originated from the following settlement areas: Batho, Bochebela, Heidedal, Pellisier, Ehrlich Park, Phahameng, Pieter Swartz, Namibia, Kagisanong (Rocklands) and Blomanda.

4.2 Materials and methods: Necropsy samples were collected from dogs from the areas mentioned above during the period 21 May 1998 - 02 July 1999. The collection of samples in Bloemfontein was done in collaboration with the Department of Entomology and Zoology of the University of the Orange Free State. This department has a good working relationship with the Bloemfontein Branch of the Society for the SPCA and was therefore prepared to collect samples needed for this part of the project from stray and homeless dogs euthanized by the SPCA. There were no questionnaires for this study, because there were no owners involved (the dogs were homeless).



Fig. 4.3 A dog being necropsied in Bloemfontein by Mr. Eddie Williams

Cardiac blood samples were collected in EDTA tubes as described in Chapter 2, and stored in a refrigerator for processing later.

Following euthanasia, adhesive tape swabs were collected from each dog and examined as described in Chapter 2. The faecal samples were collected during the necropsy procedure and the faecal flotation tests were done in Bloemfontein (Chapter 2) on the same day.

Organ samples were collected as described in Chapter 2, and then stored in a freezer. The organs (frozen), blood samples and adhesive tape swabs were collected every four months and transported to the Department of Veterinary Tropical Diseases, Faculty of Veterinary Science, University of Pretoria, Onderstepoort, 15 km north of Pretoria, where they were processed further.

4.3 Results: The total number and species of helminths recovered from 63 dogs in Bloemfontein are given in Table 4.1. Figs. 4.4 - 4.8 include the helminth species identified in faecal flotations and numbers of nematodes and cestodes recovered from dogs that were necropsied.

The 57 blood samples were negative for haemoprotozoa and microfilariae. Of the 63 adhesive tape swabs collected, 19 were positive for taeniid eggs, and two for *D. caninum* eggs.



Few significant differences were found between the various criteria to which the statistical procedures mentioned in Chapter 2 were applied. A significant increase was found in the prevalence of infection with *A. caninum* during spring compared to summer ($P=0,0003$), winter ($P=0,0003$) and autumn ($P=0,0002$). In contrast with the findings of the Boksburg study area, sub-adult dogs tended to carry significantly higher burdens of *D. caninum* compared to adult dogs ($P=0,0316$).

Table 4.1 Helminth species recovered from 63 necropsy examinations of dogs in Bloemfontein

Date	Dog number	<i>Ancylostoma caninum</i>		<i>Ancylostoma braziliense</i>		<i>Toxocara canis</i>		<i>Toxascaris leonina</i>		<i>Spirocerca lupi</i>		<i>Trichuris vulpis</i>		<i>Dipylidium caninum</i> (scolecex)	<i>Joyeuxiella pascualei</i> (scolecex)	<i>Taenia</i> spp. (scolecex)
		♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀			
21/05/1998	1	0	0	0	0	0	0	0	0	0	0	0	0	31	0	0
20/06/1998	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20/06/1998	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20/06/1998	4	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
20/06/1998	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20/06/1998	6	0	1	0	0	0	0	2	6	0	0	0	0	3	0	0
22/06/1998	7	0	1	0	0	0	0	1	5	0	0	0	0	6	0	3
21/08/1998	10	5	10	0	0	0	0	0	0	0	0	0	0	0	0	3
21/08/1998	11	0	0	13	12	1	0	0	0	0	0	0	0	3	0	2
21/08/1998	12	0	0	1	5	7	9	0	0	0	0	0	0	19	0	3
21/08/1998	13	0	0	3	3	0	0	9	36	3	7	0	0	3	0	0
21/08/1998	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
21/08/1998	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14/09/1998	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14/09/1998	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14/09/1998	18	0	0	17	24	0	1	0	0	1	0	0	0	1	0	2
14/09/1998	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14/09/1998	20	0	1	5	3	0	0	0	2	4	8	0	0	1	0	0
14/09/1998	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14/09/1998	22	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
14/09/1998	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14/09/1998	24	0	0	0	0	1	5	0	4	0	0	0	0	0	0	0
16/09/1998	25	0	0	0	0	5	1	0	0	0	0	0	0	4	0	2
08/10/1998	26	0	0	0	0	0	0	0	2	0	0	0	0	1	0	6
08/10/1998	27	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0
08/10/1998	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/10/1998	29	0	0	0	0	0	0	0	0	0	0	0	0	106	0	0
29/10/1998	30	13	14	24	30	0	0	2	1	0	0	0	0	0	0	2
29/10/1998	31	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
29/10/1998	32	0	0	0	0	1	0	0	0	0	0	0	0	0	14	0
29/10/1998	33	21	16	4	10	0	0	0	0	0	0	0	0	4	0	0
29/10/1998	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1

Table 4.1 Helminth species recovered from 63 necropsy examinations of dogs in Bloemfontein (continued)

11/12/1998	35	0	0	0	0	2	1	0	0	0	0	0	0	0	0	2
11/12/1998	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/01/1999	37	0	0	0	0	0	0	0	0	12	11	0	0	0	0	0
10/01/1999	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/01/1999	39	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
03/03/1999	40	0	0	0	0	0	0	6	8	0	0	0	0	0	0	0
03/03/1999	41	1	2	0	0	0	0	0	0	0	1	0	0	1	0	4
03/03/1999	42	0	0	0	1	0	0	0	2	0	0	0	0	21	0	0
03/03/1999	43	6	13	0	0	0	1	0	0	0	0	0	0	0	0	2
03/03/1999	44	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03/03/1999	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18/03/1999	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18/03/1999	47	0	1	0	0	0	0	0	0	0	0	0	0	5	0	2
18/03/1999	48	0	3	8	9	0	0	2	1	2	2	0	0	1	0	0
18/03/1999	49	2	4	0	1	0	1	0	0	0	0	0	0	21	0	0
18/03/1999	50	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0
18/03/1999	51	0	0	0	0	6	13	0	0	0	0	0	0	0	0	0
22/04/1999	52	0	0	0	0	0	0	16	45	0	0	0	0	0	0	0
22/04/1999	53	0	0	0	0	0	0	2	0	1	3	0	0	0	0	3
22/04/1999	54	6	8	0	0	0	0	6	11	0	0	0	0	0	0	0
22/04/1999	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/06/1999	56	0	0	1	0	0	0	7	4	3	1	0	0	1	0	1
12/06/1999	57	0	1	0	0	1	0	0	0	0	0	0	0	22	0	1
12/06/1999	58	0	1	0	0	0	0	7	9	0	0	0	0	78	0	0
12/06/1999	59	0	2	0	0	0	0	5	13	0	0	0	0	0	0	0
02/07/1999	60	0	0	0	0	0	2	2	2	0	0	0	0	32	0	0
02/07/1999	61	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
02/07/1999	62	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3
02/07/1999	63	0	0	0	0	0	0	0	0	0	0	0	0	6	0	5
02/07/1999	64	0	0	0	0	0	0	10	20	0	0	0	0	2	0	0
02/07/1999	65	0	0	0	0	0	0	18	19	0	0	0	0	30	0	0
Total	63	55	79	77	98	28	39	97	191	26	33			458	23	60

Fig. 4.4 Helminth parasite species identified in faecal flotations of dogs (n=63) from Bloemfontein

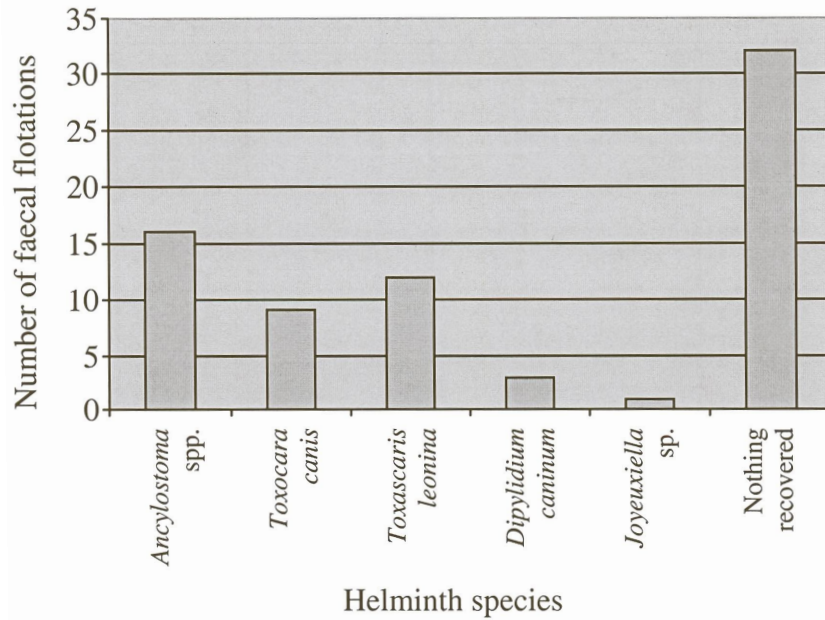


Fig. 4.5 Mean number of nematodes recovered per infected dog necropsied in Bloemfontein

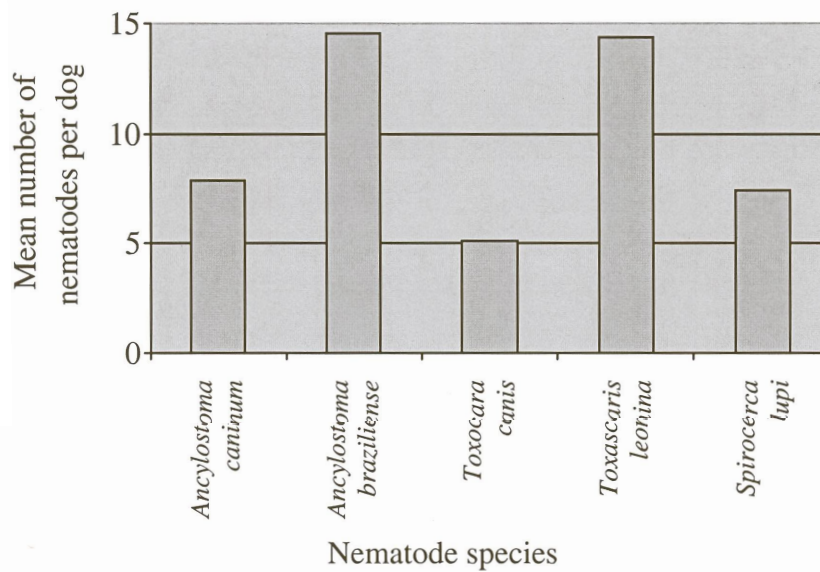


Fig. 4.6 Nematode species identified and number of dogs infected (n=63) in Bloemfontein

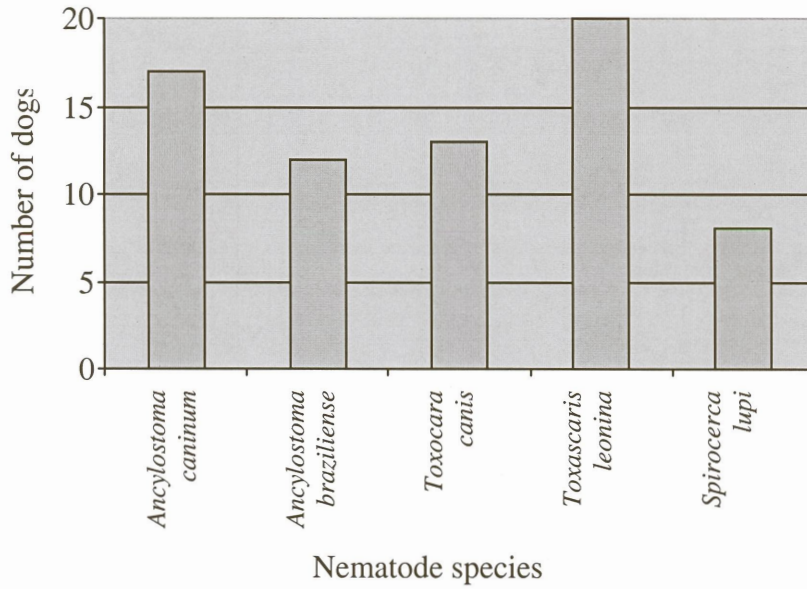


Fig. 4.7 Mean number of cestodes recovered per infected dog necropsied in Bloemfontein

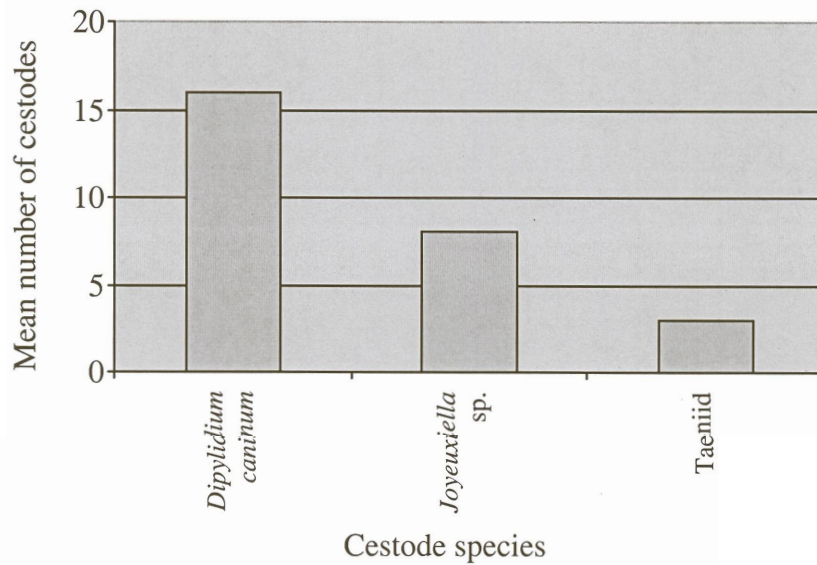
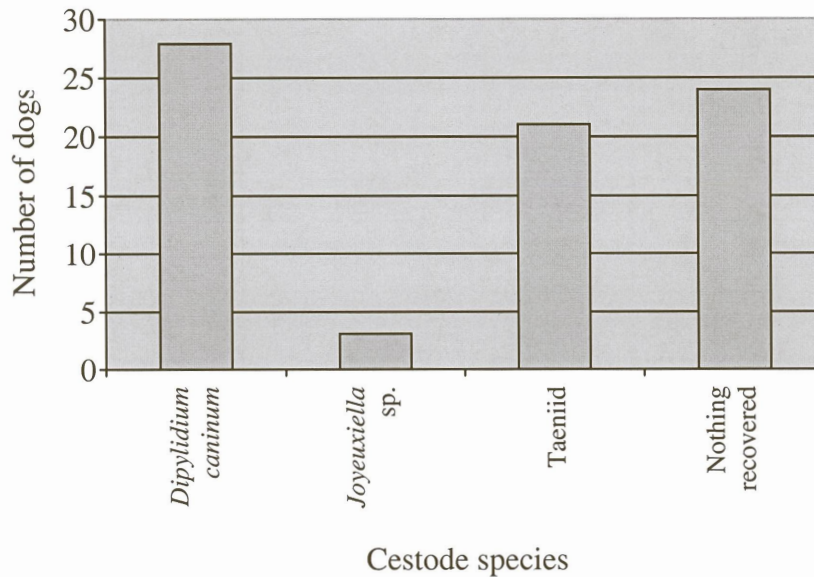


Fig. 4.8 Number of dogs from which cestodes were recovered (n=63) in Bloemfontein



4.4 Discussion:

Ancylostoma spp.: Although adult *Ancylostoma* spp. were recovered in 40% of the necropsy samples, only one-quarter of the faecal flotations were positive for eggs of *Ancylostoma* spp. The prevalence of *Ancylostoma* in dogs in Bloemfontein was low, and in some dogs there were only males present, which would explain the absence of eggs in the faeces. The incidence of *A. caninum* was much lower, and the incidence of *A. braziliense* higher in Bloemfontein than in Boksburg, although the overall numbers were still low.

T. canis: Thirteen dogs were infected. Only 10 dogs were infected with female worms; infection in nine of these dogs was detected using the faecal flotation method.

T. leonina: Thirty-two percent of the dogs necropsied were infected with *T. leonina*, but only 19% of faecal samples were positive on faecal examination. The incidence of this ascarid in dogs and cats in Bloemfontein is much higher when compared with Boksburg.

S. lupi: In this study area, 13% of the dogs were infected with *S. lupi*.

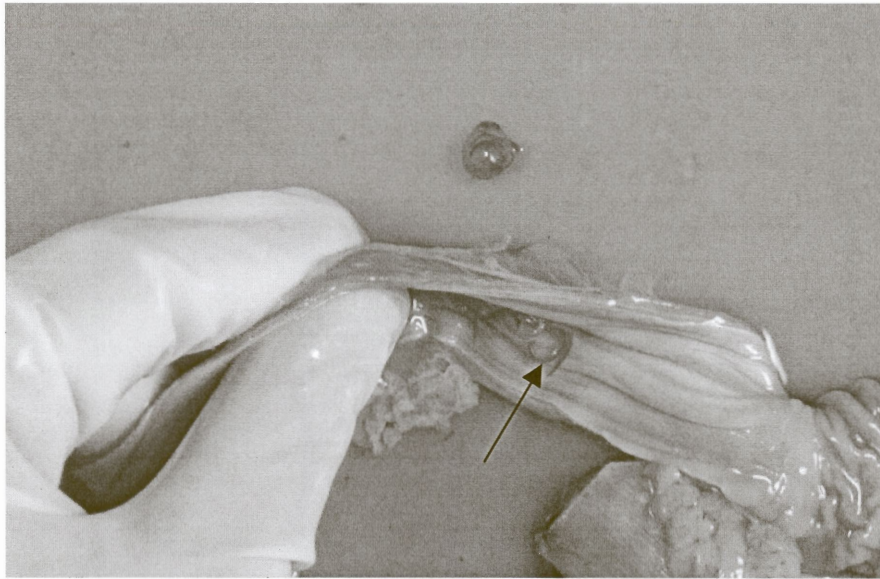


Fig. 4.9 *Spirocerca lupi* in the oesophagus of a dog from Bloemfontein (arrow)

D. caninum: Necropsy results included 28 dogs infected with *D. caninum* while faecal flotation examination revealed that only three samples and two adhesive tape swabs were positive. The results in the live animal are low underlining the difficulty of diagnosis of this cestode in the live animal.

J. pascualei: There were three infected dogs, and only one positive faecal flotation. Diagnosing *Joyeuxiella* in the live animal is more difficult, because the eggs occur singly, whereas with the related *Dipylidium* they occur in batches, making them more easily visible. Also, the eggs are thin-walled, and they blend in with the background

under the microscope, unlike taeniid eggs which tend to stand out as a result of the thick shell.

Taenia spp.: Adhesive tape swabs from all 19 dogs positive at necropsy were also positive for *Taenia* eggs. This is a 100% correlation between the two methods.

The higher prevalence of *A. caninum* during spring as compared to summer, winter and autumn was possibly the result of the dry, cold Free State winters.

Recommendations for the dog-owners of Bloemfontein:

Dog faeces should not be allowed to build up near the houses and must therefore be removed daily as it could result in reinfection of dogs and infection of children especially. Breeding and suckling bitches ought to be dewormed, and pups also from as young as three weeks. Pups may be reared in enclosed pens with concrete floors, which must be cleaned thoroughly every day. Flea control with chemicals (dips, powders, spot-on and flea collars) and regular use of a vacuum cleaner are also important in the Bloemfontein study area. For the prevention of infection with *S. lupi*, *T. canis* and *T. leonina*, dogs should not be allowed to eat lizards, frogs, mice, dung beetles or raw chicken scraps. In order to control cestodes, the dogs must be prevented from feeding on carrion, raw abattoir scraps or killing and eating other animals.

The members of the Bloemfontein community should be made aware of the dangers of visceral larva migrans, cutaneous larva migrans and other helminth zoonoses related to the findings in their dogs. They must be taught to wash hands, fruit and

vegetables before eating, and cleaning nails regularly, especially after working with soil. Dogs ought to be kept away from public parks and children's playgrounds where their faeces may contaminate the environment.

There is active involvement of both the Bloemfontein SPCA and the Department of Zoology and Entomology of the University of the Orange Free State in the surrounding communities. The opportunities exist therefore to further strengthen linkages with these communities and to educate the animal owners on parasite control. The same comments mentioned on the involvement of the SPCA in Boksburg (Chapter 3) also apply to the Bloemfontein SPCA. As the university has a strong research interest in the communities, they have the opportunity to obtain information and data in exchange for animal owner education and veterinary assistance. The State Veterinarian's office and the Provincial Veterinary Laboratory are both situated in Bloemfontein, and should be made aware of the zoonotic potential of these parasites. They may also play an important role in extension and service delivery in the resource-limited communities of Bloemfontein.