

Heartworm in dogs in Canada in 1988

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Abstract

In late November 1988, 1581 small and mixed animal clinics and institutional veterinarians across Canada were sent a questionnaire in order to assess the status of *Dirofilaria immitis* in Canada in 1988, and 46% of them responded. Veterinarians reported that 181,577 dogs were blood-tested for heartworm disease and 367 dogs were found with *D. immitis* microfilariae. Another 60 dogs were amicrofilaremic but diagnosed with heartworm disease to give the total number of cases diagnosed in 1988 as 441 (0.24%).

Heartworm was reported from Alberta, Manitoba, Ontario, Quebec, Nova Scotia and New Brunswick, but most (389) of the cases were from Ontario. South-western Ontario continued to be the primary focus of the infection in Canada. There were 22 cases reported from Quebec, mostly from and around Montreal, and 24 from Manitoba, mostly from Selkirk, Winnipeg and surrounding areas. Heartworm was found most frequently in companion dogs over three years of age maintained mainly outdoors in rural areas. About 76% of the cases had a history of not having left Canada, and 24% were observed with clinical signs of heartworm disease.

Résumé

La dirofilariose chez le chien au Canada en 1988

Vers la fin de novembre 1988, 1581 questionnaires furent envoyés à des vétérinaires de milieux institutionnels, de cliniques pour petits animaux et de pratiques mixtes à travers le Canada. Ceci, afin d'évaluer la situation de la dirofilariose au Canada en 1988. Le taux de réponses a atteint 46%. Un total de 181,577 chiens ont été testés par analyse sanguine, et de ceux-ci, 367 ont donné des résultats positifs pour *Dirofilaria immitis*. À ce nombre, l'on a ajouté 60 autres cas où l'on a diagnostiqué une dirofilariose avec absence de microfilariémie pour donner un total de 441 cas en 1988 (0,24 %).

La dirofilariose a été diagnostiquée en Alberta, au Manitoba, en Ontario, au Québec, en Nouvelle-Écosse et au Nouveau-Brunswick, bien que la majorité des cas (389) se retrouvèrent en Ontario. En effet, le sud-ouest ontarien persiste à être le principal foyer d'infection au Canada. On a identifié 22 cas au Québec, la plupart provenant de la région de Montréal et 24 cas au Manitoba, provenant de Selkirk, Winnipeg et des régions environnantes. La dirofilariose fut le plus

souvent rencontrée chez des chiens de compagnie, âgés de plus de trois ans et gardés à l'extérieur dans des régions rurales. Environ 76% des cas n'avaient jamais quitté le Canada et 24% présentaient des signes cliniques compatibles avec la dirofilariose.

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Introduction

In late November 1988, 1581 questionnaires were sent to small and mixed animal clinics and institutional veterinarians in Canada to assess heartworm disease (HWD), primarily in dogs, as was done previously (1-12). There were 724 questionnaires which were completed and returned (46% response). Sixty-five questionnaires were returned uncompleted because of inappropriate addresses.

There were 441 cases of HWD reported by practitioners in Canada (589 in 1987) and these were found in Alberta, Manitoba, Ontario, Quebec, Nova Scotia and New Brunswick (Figures 1, 2 and Tables 1 and 2). This survey for HWD in Canada was started in 1976; the number of cases reported annually increased until 1984 and then declined. We have reported previously (11,12) that the decrease is probably due to the effectiveness of the preventive program in the population of dogs that routinely visit clinics and that it is likely that infection with heartworm continues to increase in the population of dogs at large.

Dr. Anthony Braithwaite, Kingsville, Ontario, provided us with some information on the prevalence of HWD in dogs in his area and on whether or not the dogs had been on a preventive program in the previous year. For dogs that had been on a preventive program, he found a prevalence of 2% in 705 dogs tested in 1987 and 0% in 907 tested in 1988. For dogs that had not been on a preventive program, he found a prevalence of 17.6% in 125 dogs tested in 1987 and 17.1% in 222 tested in 1988. These are not large numbers of dogs, but it does support our contention that heartworm infection will continue to increase in the population of dogs at large and we believe that continued surveillance for HWD is needed. In the 1988 survey, 96% of the practitioners who responded indicated that they would complete a questionnaire if it was offered again.

In 1988, there were 60 amicrofilaremic dogs with HWD (78 in 1987) and this is 13.6% of the total number of cases (13.2% in 1987). We indicated in our report last year that although the total number of HWD cases was on the decrease, the percentage of amicrofilaremic cases reported increased significantly (5.7% in 1986). We indicated also that this increase may be a reflection of the increased use of the immunodiagnostic kits. In 1986, 8% of the clinics reported using such procedures, in 1987 it was 24%

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TABLE 1
Results of a questionnaire which was sent to 1581 veterinarians or clinics in Canada in November 1988 and computed from 724 replies

1. Does your professional activity include examination of dogs, cats? If YES go to Question 2. If NO go to question 24.	YES 702 No 22
2. Which category would fit your activity best? Mixed 201, Small animal practice 501, Research 0, Diagnostic 0, Other 2	
3. What technique(s) do you use for diagnosis of HWD? % Clinical Signs 38, Radiography 24, Blood Test 96, Necropsy 12	
4. If blood tests, specify technique(s) used routinely. % Knotts 24, Filter 43, Smear 10, Microcapillary 4, Immunodiagnosis 21, Submitted to a Diagnostic Lab 27, Other 1	
5. If blood is routinely submitted to a lab for diagnosis, is this for: % Microfilariae ID 54, Immunodiagnosis 31, Unknown 30	
6. What time of year do you test (blood) most dogs for HWD? % Spring 60, Summer 31, Fall 6, Winter 3	
7. No. of dogs blood tested in 1988.	181,577
8. No. of dogs diagnosed with HWD in 1988 and microfilaremic.	367
9. No. of dogs diagnosed with HWD in 1988 and amicrofilaremic.	60
10. Total no. of dogs diagnosed with HWD in 1988.	441
11. No. of dogs diagnosed with HWD in 1988 and with clinical signs of HWD.	103 (24%)
12. Circle month(s) you diagnosed most heartworm cases in 1987: % Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec 1 2 4 16 29 24 13 4 2 4 1 0	
13. How many cases of HWD had the following histories in 1988? Six months or more prior to diagnosis was outside of Canada Six months or more prior to diagnosis was in another province Never left the province Movement Unknown	21 (4.8%) 1 (0.2%) 335 (76.0%) 84 (19.0%)
14. For dog(s) with HWD that never left their province (Q 13) identify No. of cases that never left your area No. of cases that in the summer visited endemic areas Unknown For Questions 15 through 18 give the number (or percentage) of those dogs with HWD in 1988 according to the following classifications. (The numbers were converted to frequencies where most frequent = 1.)	259 (77.3%) 42 (12.5%) 34 (10.2%)
15. Domicile of Dogs City — 2, Suburb — 3, Rural — 1, Unknown — 4	
16. Location in Domicile Primarily indoors — 2 Primarily outdoors — 1, Unknown — 3	
17. Age of Dogs Less than 1 year — 4 1-3 years — 2 Greater than 3 years — 1 Age Unknown — 3	
18. Principal activity of dogs Companion dog — 1, Show dog — 5, Hunting dog — 4, Farm dog — 2 Unknown — 3	
19. Do you recommend a preventive program for your area?	YES 436 (62%)
20. No. of cases diagnosed with <i>Dipetalonema reconditum</i> in 1988	40
21. No. of cases of <i>D. immitis</i> in cats diagnosed in 1988	2
22. No. of cases of <i>D. immitis</i> in other animals. Ferret	1
23. For which of the above questions (Q) was the information supplied based on your medical records (expressed as a % of respondents to those questions): Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20 Q21 45 57 51 50 45 67 64 62 43 67 65 67 61 44 44 44	
24. Would you be interested in the results of this questionnaire? %	YES 96 NO 2
25. Would you be interested in information on HWD? %	YES 87 NO 8
26. Would news releases on HWD be helpful to the public? %	YES 87 NO 8
27. Did you respond to the 1987 Heartworm questionnaire? %	YES 78 NO 15
28. Did you see the results of the 1987 questionnaire? %	YES 87 NO 9
29. Would you respond to the questionnaire if it was offered again? %	YES 96 NO 1
30. Any other comments: 58 respondents made comments.	
FOR RESPONDENTS WITH HWD CASES	
31. No. of dogs with HWD in 1988 and on a preventive program in 1987 On DEC 30 Ivermectin 5	
32. Give reasons, with no. of dogs for each reason, why the preventive program failed. Missed treatment 26 Inadequate dosage 2 Other 7	
33. No. of dogs with HWD in 1988 and not treated 157	
34. Give reasons, with no. of dogs for each reason, why the dogs were not treated. Advice refused or ignored 72 Treatment too expensive 6 Old age/Clinical signs 32 Euthanized 30 Other 17	

TABLE 2
Areas In Canada with two or more dogs diagnosed with heartworm disease in 1988

Area	Number of cases	
	Had been outside Canada or movement unknown	Never left Canada
Manitoba		
Anola	0	2
Oakbank	0	2
Selkirk	6	8
Steinbach	0	2
Winnipeg	0	3
Ontario		
Ancaster	0	6
Aylmer	0	4
Belle River	6	0
Blenheim	0	5
Bolton	1	1
Bracebridge	1	5
Brantford	4	10
Chatham	0	12
Clearwater	4	0
Delhi	0	5
Elmvale	0	2
Fisherville	0	2
Fonthill	0	2
Forest	3	0
Fort Erie	0	5
Glencoe	7	0
Grassie	0	3
Guelph	2	0
Kingsville	4	34
Leamington	2	0
London	2	6
Morpeth	0	13
Mount Brydges	0	6
Niagara Falls	2	1
Oldcastle	0	5
Peterborough	1	2
Port Colborne	0	8
Sarnia	0	3
Simcoe	4	16
Smithville	0	2
St. Catharines	10	2
St. Thomas	0	2
Stirling	0	2
Stoney Creek	0	3
Tilbury	3	0
Tillsonburg	0	42
Toronto	1	1
Welland	0	2
Wheatley	2	0
Windsor	15	84
Quebec		
Blainville	3	0
Buckingham	1	1
Hudson	0	2
Lachine	1	1
Montreal	2	2
Sherbrooke	0	2
St-Clet	2	0
Nova Scotia		
Brookfield	2	0

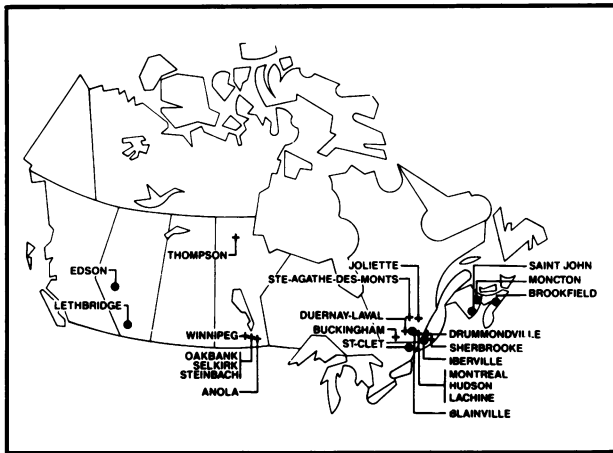


Figure 1. Areas in Canada (except Ontario) with diagnoses of heartworm disease in dogs in 1988

- Areas with dogs which had been outside of Canada and presumed infected before returning or with dogs whose movements were unknown.
- + Areas with dogs some of which had never left Canada.

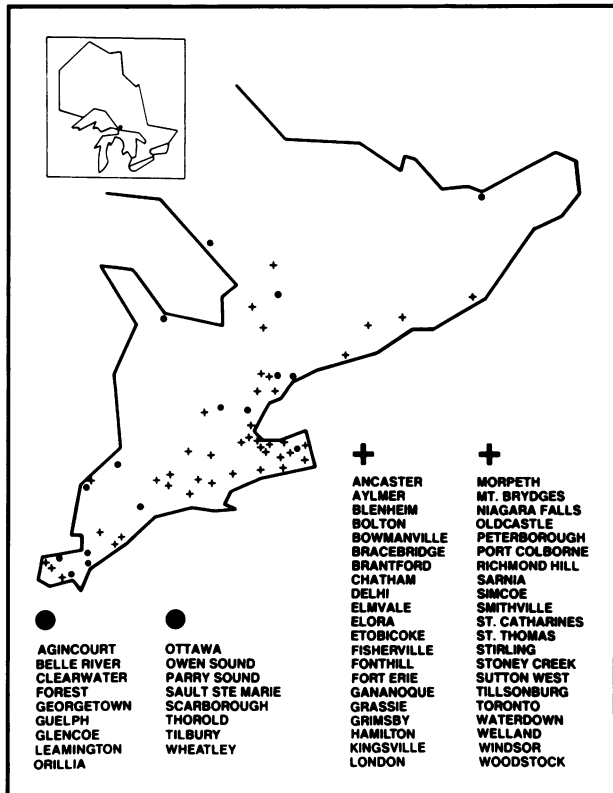


Figure 2. Areas in Ontario with diagnoses of heartworm disease in dogs in 1988.

- Areas with dogs which had been outside of Canada and presumed infected before returning or with dogs whose movements were unknown.
- + Areas with dogs some of which had never left Ontario.

and in 1988 21%. We encourage practitioners who use those tests to be fully conversant with the methodology. To increase the predictive value of the tests, practitioners should be highly selective of the cases for immunodiagnosis.

The number of dogs blood tested in Canada in 1988 was 181,577 (165,428 in 1987) and the prevalence of HWD in Canada was 0.24% (0.35% in 1987). Seven practices reported that they used the smear as the only blood test procedure. This procedure is very inefficient

TABLE 3
Number of clinics or laboratories reporting that they had blood-tested (BT) dogs and the number of dogs diagnosed with heartworm disease (HWD) in 1988 in each province

	No. of clinics	No. of dogs	
		BT	HWD
British Columbia	64	404	0
Alberta	45	368	2
Saskatchewan	12	124	0
Manitoba	30	7,258	24
Ontario	344	154,193	389
Quebec	79	17,857	22
Nova Scotia	11	145	2
New Brunswick	14	1,148	2
Prince Edward Island	4	52	0
Newfoundland	4	28	0
Total	607	181,577	441

for the recovery of microfilariae. We encourage the use of concentration techniques as part of the laboratory examination.

Heartworm disease was found most frequently in companion dogs over three years of age maintained mainly outdoors in rural areas. The percentage of dogs with HWD with a history of not having left Canada was about 76% and this was similar to that for previous years. For about 19% of dogs with HWD, the movement in and out of a province or Canada was unknown. Clinical signs of HWD were observed in about 24% of the cases reported in 1988.

The foci of infection in Canada were as reported previously with the major focus in southwestern Ontario and others in and around Montreal and Winnipeg. In Ontario, there were 389 dogs with HWD (478 in 1987). In that province, there were 78 clinics (85 in 1987) in 59 towns (63 in 1987) that reported a diagnosis of HWD. There were 154,193 dogs blood tested (139,024 in 1987) to give a prevalence of 0.25% (0.34% in 1987). Some statistics for groups of towns which are generally within a conservation area or on a watershed base are presented below. The 1987 statistics for the area are given for comparison and these may have been compiled from a group of towns that were different to those reporting for 1988.

1. Belle River, Chatham, Kingsville, Leamington, Oldcastle, Tilbury, Wheatley and Windsor had 167 cases (204 in 1987). There were 14,119 dogs tested (16,956 in 1987) to give a prevalence of 1.18% (1.20% in 1987).

2. In Clearwater, Dresden, Forest, Glencoe, Mount Brydges and Sarnia, there were 23 cases (19 in 1987). There were 4711 dogs tested (5047 in 1987) to give a prevalence of 0.49% (0.38% in 1987).

3. Along Lake Erie and including Aylmer, Blenheim, Delhi, Fisherville, Fonthill, Fort Erie, Morpeth, Niagara Falls, Port Colborne, Simcoe, Smithville, St. Thomas, Thorold, Tillsonburg and Welland there were 116 cases (151 in 1987). A little less than one half of the cases in 1988 were reported from Simcoe and Tillsonburg. There were 12,345 dogs tested (13,707 in 1987) to give a prevalence of 0.94% (1.10% in 1987).

4. In London and surrounding areas of Arva, Ingersoll, Kirkton, Lambeth, Mitchell, Stratford and Woodstock there were nine cases (11 in 1987). There were 13,420 dogs tested (9208 in 1987) to give a prevalence of 0.07% (0.12% in 1987).

5. There were 17 cases reported from Brantford, Cambridge, Elmira, Elora, Guelph, Kitchener, New Dundee, New Hamburg and Waterloo (24 in 1987). Fourteen of the 17 cases were in Brantford. There were 11,845 dogs tested (11,191 in 1987) to give a prevalence of 0.14% (0.21% in 1987).

6. Ancaster, Burlington, Grassie, Grimsby, Hamilton, Lynden, St. Catharines, Stoney Creek and Waterdown had 27 cases (20 in 1987). There were 14,304 dogs tested (12,005 in 1987) to give a prevalence of 0.19% (0.17% in 1987).

7. In Brampton, Georgetown, Milton, Mississauga, Oakville and Orangeville, there was one case (5 in 1987). There were 15,699 dogs tested (14,904 in 1987) to give a prevalence of 0.01% (0.03% in 1987).

8. In Metropolitan Toronto, including Agincourt, Don Mills, Downsview, Etobicoke, Markham, Islington, Rexdale, Richmond Hill, Scarborough, Thornhill, Unionville, Westhill, Weston, Willowdale and Woodbridge, there were six cases (16 in 1987). There were 23,371 dogs tested (15,510 in 1987) to give a prevalence of 0.03% (0.10% in 1987).

9. In the area between Metropolitan Toronto and Lake Simcoe, there were four cases (4 in 1987). In that area, questionnaires were received from Alliston, Aurora, Barrie, Beaverton, Beeton, Bolton, Caledon East, Collingwood, Mount Albert, Newmarket, Nobleton, Orillia, Shelburne, Stayner, Stouffville, Sutton West and Uxbridge. There were 12,012 dogs tested (9030 in 1987) to give a prevalence of 0.03% (0.04% in 1987).

10. One case was reported from the area including Exeter, Goderich, Kincardine, Markdale, Meaford, Mildmay, Milverton, Owen Sound, Port Elgin, Ripley, Southampton, Teeswater, Walkerton, Wiarton and Zurich (1 in 1987). There were 2301 dogs tested (1201 in 1987) to give a prevalence of 0.04% (0.08% in 1987).

11. In 1987, six cases were reported from Bracebridge, two from Midland and four from Peterborough. In 1988, there were six cases in Bracebridge, three in Peterborough and two in Sterling. Five of the dogs from Bracebridge and two from Peterborough had not left that area previous to the diagnosis of HWD. We encourage an increased level of testing in these areas and the region surrounding them.

In Quebec, there were 22 dogs reported with HWD (103 in 1986). About 55% of the dogs had never left the province, and the movements of 36% were unknown. There were 14 clinics (31 in 1987) in 12 towns (26 in 1987) that reported a diagnosis of HWD. There were 17,857 dogs tested (20,973 in 1988) to give a prevalence of 0.12% (0.39% in 1987).

In Manitoba, there were 24 dogs with HWD (23 in 1987). There were seven clinics (7 in 1987) in six towns (5 in 1987) that reported a diagnosis of HWD. Fourteen of the cases were diagnosed in Selkirk. There were 7288 dogs tested (4269 in 1987) to give a prevalence of 0.33% (0.54% in 1987).

In Canada in 1988, 157 of 441 dogs with HWD were not treated with an adulticide. The primary reason (46%) given for lack of treatment was that owners had ignored or refused the advice. Another 20% of the dogs were not treated because they were either too old or had advanced clinical signs. About 19% of the untreated dogs were euthanized.

Over the years of the annual survey for HWD, *Dipetalonema reconditum* had been reported in dogs. In 1988, there were 40 cases and this is about 8% of all dogs found with microfilariae. We encourage practitioners to differentiate the microfilariae of this almost nonpathogenic species of worm from those of *Dirofilaria immitis*.

Over the years of this annual survey for HWD, few cats have been diagnosed with HWD and for 1988 two cases were reported. Apparently, where the prevalence of HWD in dogs in the USA is high, the number of cases in cats has been on the increase.

We have attempted to provide you with information which would be useful for discussion and making decisions with your clients on whether or not to blood-test dogs for HWD and to use preventive medication. We cannot define a precise level of infection at which it becomes necessary to blood-test all dogs or to put all dogs on a preventive program. However, to gain the best estimate of the prevalence of HWD, we encourage blood testing. This is especially important for practices in Quebec around Montreal, in Manitoba around Winnipeg and Selkirk, and in Ontario south of a line drawn from the southern end of Lake Simcoe to Grand Bend. Dogs should be tested once a year in the spring, not earlier than mid-April, and regardless of whether the dogs were given preventive medication previously.

We encourage the use of preventive medication where it seems most important — in Winnipeg and

Montreal and in areas surrounding those cities, and in southwestern Ontario in the Forest-Sarnia-Chatham-Windsor areas, along the Lake Erie shoreline and in the triangular area bounded by Niagara Falls, Brantford and Aylmer. It would appear, also, that preventive medication may be useful along the Lake Ontario shoreline from Niagara Falls to Burlington and in the area between Metropolitan Toronto and Lake Simcoe. The preventive medication should be given also to all dogs entering the above areas from June through mid-September.

References

1. Slocombe JOD. Heartworm in dogs in Canada in 1977. *Can Vet J* 1978; 19: 244-247.
2. Slocombe JOD, McMillan I. The geographic distribution of heartworm in Canada. In: Morgan HC *et al.*, eds. *Proceedings of the Heartworm Symposium — 1977*. Bonner Springs, Kansas: VM Publishing Inc., 1978: 5-7.
3. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1978. *Can Vet J* 1979; 20: 284-287.
4. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1979. *Can Vet J* 1980; 21: 159-161.
5. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1980. *Can Vet J* 1981; 22: 201-203.
6. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1981. *Can Vet J* 1982; 23: 219-221.
7. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1982. *Can Vet J* 1983; 24: 227-229.
8. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1983. *Can Vet J* 1984; 25: 347-350.
9. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1984. *Can Vet J* 1985; 26: 323-327.
10. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1985. *Can Vet J* 1986; 27: 324-328.
11. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1986. *Can Vet J* 1987; 28: 491-495.
12. Slocombe JOD, McMillan I. Heartworm in dogs in Canada in 1987. *Can Vet J* 1988; 29: 641-646.