

Heartworm in Dogs in Canada in 1984

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ABSTRACT

In late December 1984, 1853 institutional veterinarians and small and mixed animal clinics across Canada were sent a questionnaire in order to assess the status of *Dirofilaria immitis* in Canada in 1984 and 35% of them responded. Veterinarians reported that 97,794 dogs were blood-tested to check for microfilariae and 1417 dogs (1.45% of those tested) were found with heartworm. Another 34 dogs were amicrofilaremic, but were diagnosed as having heartworm disease, to give the total number diagnosed in 1984 as 1451 (1.48%). Heartworm was reported from all provinces except Prince Edward Island and Newfoundland but most (1310) of the cases were in Ontario. In Quebec, 126 cases were reported mostly from west of Montreal.

Heartworm was found most frequently in companion dogs over three years of age maintained mainly outdoors in rural areas. About 27% of the cases were observed with clinical signs of heartworm disease and 72% had a history of not having left Canada. Southwestern Ontario continued to be the primary focus of the infection.

Key words: *Dirofilaria immitis*, heartworm, dogs, prevalence, Canada.

RÉSUMÉ

Dirofilariose canine au Canada en 1984

Vers la fin de décembre 1984, les auteurs adressèrent un questionnaire à 1853 vétérinaires des diverses provinces du Canada, qui oeuvrent dans des laboratoires, des cliniques de petits animaux ou des pratiques mixtes. Ils voulaient ainsi connaître la situation de la dirofilariose au pays, pour l'année

1984; 35% des vétérinaires visés répondirent au questionnaire. Le relevé démontra que 97 194 chiens avaient subi l'épreuve sanguine destinée à déceler la dirofilariose et que 1417, ou 1,45% d'entre eux, étaient parasités par *Dirofilaria immitis*. On considéra aussi 34 autres chiens comme atteints de la maladie, même si leur sang ne recelait pas de microfilaries. Ceci donna un résultat global de 1451 cas de dirofilariose, impliquant 1,48% des chiens éprouvés dans le cadre du relevé. La maladie sévit dans toutes les provinces, à l'exception de l'Île-du-Prince-Édouard et de Terre-Neuve. La plupart des cas, c'est-à-dire 1310, provenaient de l'Ontario. Les 126 cas diagnostiqués au Québec intéressaient surtout des chiens de l'ouest de Montréal.

La maladie affectait surtout des chiens âgés de plus de trois ans et laissés libres, à l'extérieur, en campagne. Environ 27% des chiens parasités manifestaient les signes cliniques de la maladie et l'anamnèse de 72% révéla qu'ils n'avaient jamais quitté le Canada. Le sud-ouest de l'Ontario représente toujours le principal foyer d'infection.

Mots clés: *Dirofilaria immitis*, dirofilariose, chiens, prévalence, Canada.

In late December 1984, 1853 questionnaires were sent to institutional veterinarians and small and mixed animal clinics throughout Canada to assess heartworm disease (HWD), primarily in dogs in Canada, in 1984 as was done previously (1-8). The number returned was 653 (35% response). A few additional questionnaires were returned because of inappropriate addresses. The findings are

presented in two figures and three tables and a few brief comments about these should be made.

1. The percentage response for 1984 was higher than 1983 (26% response) and this occurred because we were able to be more selective in sending out the questionnaires which were sent to clinics rather than practitioners, as previously. Hopefully, all clinics attending to dogs and cats received a questionnaire. Of those clinics that responded, 88% indicated an interest in information on HWD and 92% stated that they would complete a questionnaire if offered again.

2. In 1984, 38,290 more dogs were checked for microfilariae than in 1983. The increase in testing was primarily in Quebec and Ontario. We have commented previously that the smear procedure is very inefficient for recovering microfilariae. In 1984, only four practices reported that they used the smear as the only blood test procedure. We would encourage those practices to incorporate a concentration technique.

3. In 1984, 1451 dogs (1.48% of dogs tested) were found with HWD compared with 771 (1.30%) in 1983. There were 34 amicrofilaremic dogs that were diagnosed with HWD. Heartworm disease was diagnosed in all provinces except Prince Edward Island and Newfoundland, but as seen previously, nearly all of the cases were in Ontario. Heartworm disease was found most frequently in companion dogs over three years of age maintained mainly outdoors in rural areas. Clinical signs of HWD were observed in 27% of the cases.

4. The percentage of dogs with HWD with a history of not having left Canada was about 72%. This was sim-

TABLE I
RESULTS OF A QUESTIONNAIRE WHICH WAS SENT TO 1853 VETERINARIANS IN CANADA IN DECEMBER
1984 AND COMPUTED FROM REPLIES

HEARTWORM IN CANADA 1984

Name: _____ Address: _____

1. Does your professional activity include examination of dogs, cats? If YES go to question 2. If NO go to question 24.	YES 595	NO 58					
2. Which category would fit your activity best? Mixed practice 201 Small animal practice 380 Research 2 Diagnostic 12 Other 0							
3. What technique(s) do you use for diagnosis of HWD? %							
Clinical Signs 47 Radiography 29 Blood Test 90 Necropsy 18							
4. If blood tests, specify technique(s) used routinely. %							
Knotts 26 Filter 49 Smear 17 Microcapillary 9 Submitted to a Diagnostic Lab 34 Immunodiagnosis -- Dirotect 2							
5. If blood is routinely submitted to a lab for diagnosis, is this for: Microfilariae ID 88% Immunodiagnosis 19%.							
6. What time of year do you test (blood) most dogs for HWD? %							
Spring 49 Summer 35 Fall 11, Winter 5							
7. No. of dogs blood tested in 1984.		97,794					
8. No. of dogs diagnosed with HWD in 1984 and microfilaremic.		1,417					
9. No. of dogs diagnosed with HWD in 1984 and amicrofilaremic.		34					
10. Total no. of dogs diagnosed with HWD in 1984.		1,451					
11. No. of dogs diagnosed with HWD in 1984 and with clinical signs of HWD.	373	(27%)					
12. Circle month(s) you diagnosed most heartworm cases in 1984: %							
Jan 1 Feb 1 Mar 3 Apr 9 May 17 June 20 July 23 Aug 17 Sept 4 Oct 2 Nov 1 Dec 2							
13. How many cases of HWD had the following histories in 1984? 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		70 (4.8%) 17 (1.2%) 1,033 (71.2%) 331 (22.8%)					
14. For dog(s) with HWD that never left Ontario identify No. of cases that never left your area No. of cases that in the summer visited endemic areas in Ontario (eg. Windsor, Lake Erie, etc.) Unknown		722 (77.4%) 130 (13.9%) 82 (8.7%)					
For Questions 15 through 18 give the number (or percentage) of those dogs with HWD in 1984 according to the following classifications. (The numbers were converted to frequencies where most frequent = 1).							
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. Principle activity of dogs	Companion dog -- 1, Show dog -- 5 Hunting dog -- 3, Farm dog -- 2, Unknown -- 4						
19. Do you recommend a preventive program for your area?	YES 203	(65%)					
20. No. of cases diagnosed with <i>Dipetalonema reconditum</i> in 1984?		34					
21. No. of cases of <i>D. immitis</i> in cats diagnosed in 1984?		5					
22. No. of cases of <i>D. immitis</i> in other animals.		3					
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
54.2	49.9	48.0	45.2	43.8	78.7	78.5	65.5
Q14	Q15	Q16	Q17	Q18	Q20	Q21	Q22
81.1	67.1	60.0	71.4	63.6	37.7	36.9	36.0

ilar to that for previous years except in 1982 when it was 43%. For about 23% of dogs with HWD the movement in and out of the province or Canada was unknown. Southwestern Ontario continued to be the focus of the infection in Canada. Another focus of infection appeared to lie in Hudson west of Montreal, Quebec where more than 100 dogs were found with HWD. One case in each of Delta and Richmond, British Columbia, one in Saskatoon, Saskatchewan and one in Moncton, New Brunswick were reported to have been in another province six months or more prior to diagnosis. One case in Halifax, Nova Scotia was reported not to have left that province previously.

5. In Ontario, the number of dogs with HWD in 1984 was 1310 (733 in 1983). There were 118 clinics (68 in 1983) and 81 towns (66 in 1983) reporting a diagnosis of HWD in 1984 and these towns were more widely distributed than previously found. However, if the increases in number of cases for the several areas are calculated and compared with the total increase (577 cases) for Ontario, about 65% of the increase occurred in areas previously described as endemic and 19% in Brantford. About 8% of the increase occurred in the area between Metropolitan Toronto and Lake Simcoe. There appears also to be a focus of infection in the Waterdown-Campbellville-Mississauga area.

In Amherstburg, Charing Cross, Chatham, Essex, Leamington, Oldcastle, Wheatley, Windsor there were 609 cases (358 in 1983). There were 14,648 dogs tested (12,170 in 1983) to give a prevalence of 4.2% (2.94% in 1983).

In Dresden, Forest, Glencoe, Petrolia, Sarnia, Strathroy, Wallaceburg and Watford there were 82 cases (47 in 1983). There were 3445 dogs tested (3206 in 1983) to give a prevalence of 2.38% (1.47% in 1983).

Along Lake Erie and including Aylmer, Caledonia, Delhi, Dunnville, Fonthill, Fort Erie, Fisherville, Mt. Hope, Niagara Falls, Port Colborne, Simcoe, Smithville, St. Thomas, Thorold, Tillsonburg and Welland there were 337 cases (230 in that general area in 1983). As in previous years most of the cases were in Simcoe and Tillsonburg. There were 11,967 dogs tested (9573 in that general area in 1983) to

24. Would you be interested in the results of this questionnaire? %	YES 93	NO 5
25. Would you be interested in information on HWD? %	YES 88	NO 7
26. Would news releases on HWD be helpful to the public? %	YES 82	NO 8
27. Did you respond to the 1983 Heartworm questionnaire? %	YES 75	NO 16
28. Did you see the results of the 1983 questionnaire? %	YES 74	NO 21
29. Would you respond to the questionnaire if it was offered again %	YES 95	NO 2
30. Any other comments: 151 respondents made comments.		

give a prevalence of 2.81% (2.40% in 1983).

In London and the surrounding areas of Ingersoll, Kirkton, Lambeth, Mt. Brydges, Stratford, Tavistock and Woodstock there were 25 cases (15 in that general area in 1983). There were 8867 dogs tested (8427 in that general area in 1983) to give a prevalence of 0.28% (0.18% in 1983).

With the cooperation of the practitioners in Brantford and surrounding areas, we blood-tested dogs in the Six Nations Reserve near Brantford. In that survey 117 dogs of 300 tested were found with *Dirofilaria immitis* microfilariae. We referred these dogs for treatment to practitioners of the clients' choice and 18 dogs from that survey are listed as in Caledonia where they were treated. The other dogs are listed under Brantford. The number of cases listed for Brantford, Cambridge, Elmira, Fergus, Guelph, Kitchener, Lynden, New Dundee, New Hamburg, Paris and Waterloo is 119 (29 in 1983). There were 9995 dogs tested (5643 in 1983) to give a prevalence of 1.19% (0.51% in 1983).

In Ancaster, Burlington, Grassie, Grimsby, Hamilton, St. Catharines, Stoney Creek and Waterdown there were six cases (five in 1983). There were 9123 dogs tested in that general area (6517 in 1983) to give a prevalence of 0.07% (0.08% in 1983).

In Acton, Bramalea, Brampton, Campbellville, Georgetown, Inglewood, Mississauga, Oakville and Orangeville there were 27 cases (six in 1983). There were 15 cases diagnosed in Oakville and the dogs were from one kennel near Waterdown. There were 8109 dogs tested (2086 in 1983), to give a prevalence of 0.33% (0.29% in 1983).

In Metropolitan Toronto including Agincourt, Downsview, Islington, North York, Rexdale, Scarborough, Weston and Willowdale there were 14 cases (15 in 1983). There were 8479 dogs tested (3243 in 1983) to give a prevalence of 0.16% (0.46% in 1983).

In the area between Metropolitan Toronto and Lake Simcoe there were 56 cases (seven in 1983) with 29 of those cases in Newmarket. That area includes also Aurora, Gormley, Keswick, King City, Maple, Markham, Nobleton, Queensville, Richmond Hill, Schomberg, Thornhill, Tottenham, Uxbridge and Woodbridge.

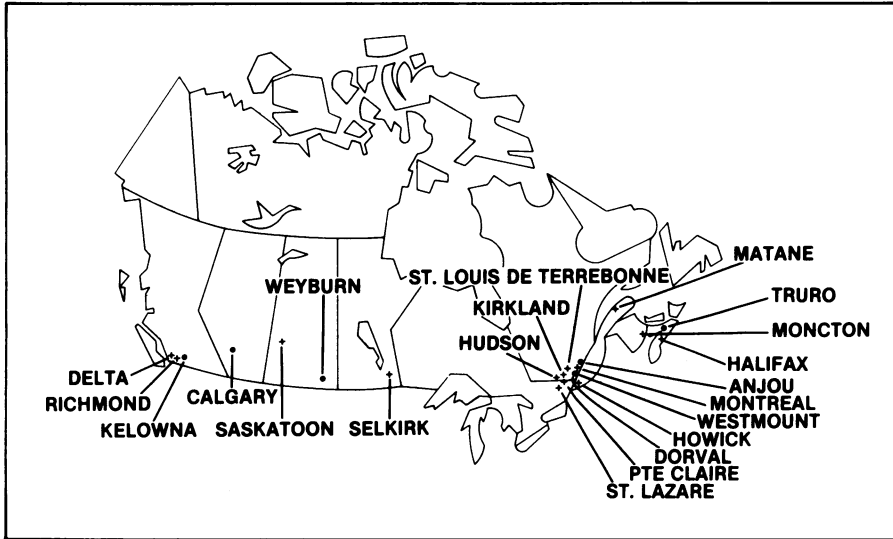


FIGURE 1. Areas in Canada with diagnoses of heartworm disease in dogs in 1984.

- 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.

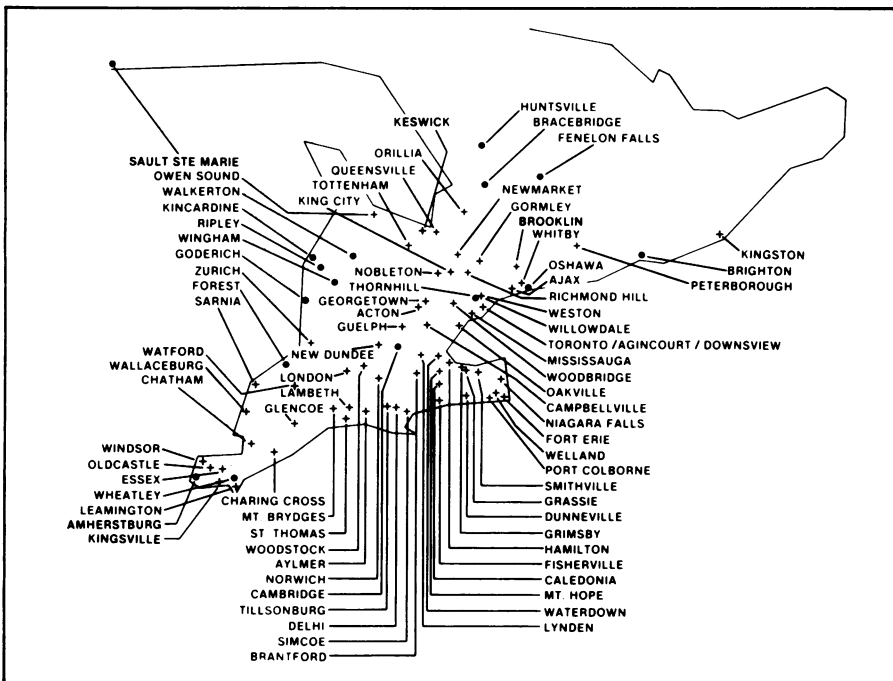


FIGURE 2. Areas in Ontario with diagnoses of heartworm disease in dogs in 1984.

- 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.

TABLE II
AREAS IN CANADA WITH TWO OR MORE DOGS DIAGNOSED WITH HEARTWORM DISEASE IN 1984

Area	Number of Cases	
	Had Been Outside Canada or Movement Unknown	Never Left Canada
Saskatoon, Saskatchewan	3	1
Amherstburgh, Ontario	25	0
Aylmer, Ontario	0	9
Brantford, Ontario	17	93
Caledonia, Ontario	6	14
Cambridge, Ontario	2	0
Campbellville, Ontario	2	2
Charing Cross, Ontario	1	3
Chatham, Ontario	0	61
Delhi, Ontario	0	27
Dunnville, Ontario	0	5
Essex, Ontario	0	64
Exeter, Ontario	2	0
Fisherville, Ontario	0	2
Forest, Ontario	5	0
Fort Erie, Ontario	1	17
Glencoe, Ontario	1	4
Guelph, Ontario	1	4
Hamilton, Ontario	1	2
Keswick, Ontario	0	6
Kincardine, Ontario	2	0
King City, Ontario	2	2
Kingsville, Ontario	0	30
Lambeth, Ontario	1	1
Leamington, Ontario	0	32
London, Ontario	2	7
Mississauga, Ontario	2	4
Mt. Brydges, Ontario	0	12
Mt. Hope, Ontario	1	1
Newmarket, Ontario	6	23
Niagara Falls, Ontario	1	3
Nobleton, Ontario	0	2
Oakville, Ontario	0	15
Oldcastle, Ontario	7	78
Orillia, Ontario	0	2
Oshawa, Ontario	2	0
Owen Sound, Ontario	1	2
Peterborough, Ontario	1	7
Port Colbourne, Ontario	0	2
Queensville, Ontario	0	8
Richmond Hill, Ontario	0	2
Sarnia, Ontario	5	8
Simcoe, Ontario	0	136
St. Thomas, Ontario	0	10
Tillsonburg, Ontario	0	95
Toronto, Ontario	2	6
Tottenham, Ontario	0	2
Wallaceburg, Ontario	0	56
Watford, Ontario	0	3
Welland, Ontario	2	3
Wheatley, Ontario	68	0
Whitby, Ontario	1	3
Willowdale, Ontario	0	3
Windsor, Ontario	195	45
Woodstock, Ontario	0	2
Dorval, Quebec	0	2
Hudson, Quebec	15	90
Kirkland, Quebec	0	4
Montreal, Quebec	1	5
Pointe Claire, Quebec	0	2
St. Lazare, Quebec	0	2
Moncton, New Brunswick	1	2

There were 6745 dogs tested (1031 in that general area in 1983) to give a prevalence of 0.83% (0.68% in 1983).

In Blyth, Chesley, Exeter, Goderich, Harriston, Kincardine, Lucan, Markdale, Mildmay, Parkhill, Port Elgin, Ripley, Walkerton, Wingham and Zurich areas there were seven cases (five in 1983). There were 651 dogs tested (320 in 1983) to give a prevalence of 1.08% (1.56% in 1983).

6. There were 34 cases of *Dipetalonema reconditum* reported in 1984 (87 in 1983). Most of the cases (32) were in Ontario. There were three cases of HWD in cats in Ontario, and one each in Manitoba and Nova Scotia. Three foxes were found with HWD in Ontario.

7. We have attempted in this report to provide you with information which would be useful for discussion and making decisions with your clients on whether to blood test for HWD or not and whether to use the preventive medication or not. We can define no precise level of infection when it becomes necessary to blood test all dogs or to put all dogs on a preventive program. Our advice is that in order to gain the best estimate of the prevalence of HWD, we should encourage as much blood testing as the traffic will bear. This is especially important for practices south of a line drawn from the southern end of Lake Simcoe to Grand Bend and around Montreal. We encourage blood testing of dogs once a year in the spring not earlier than mid-April and preferably in May. We have also encouraged the use of preventive medication where it seems most important 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 and for all dogs entering those areas from June through September. It would appear also that preventive medication may be useful in Ontario in the area between Toronto and Lake Simcoe, particularly around Newmarket to Lake Simcoe, in the area bounded by Waterdown, Campbellville and Mississauga, and in Quebec near Montreal.

8. Your comments and advice were appreciated.

9. We acknowledge and are grateful for the support of Norden Laborato-

TABLE III

NUMBER OF CLINICS OR LABORATORIES REPORTING THAT THEY HAD BLOOD-TESTED (BT) DOGS AND THE NUMBER OF DOGS DIAGNOSED WITH HEARTWORM DISEASE (HWD) IN 1984 IN THE PROVINCES

	No. of Practitioners	No. of Dogs	
		BT	HWD
British Columbia	66	124	3
Alberta	51	154	1
Saskatchewan	20	151	5
Manitoba	22	1,074	1
Ontario	305	93,867	1,310
Quebec	54	2,262	126
Nova Scotia	13	101	2
New Brunswick	7	30	3
Prince Edward Island	5	26	0
Newfoundland	1	0	0
Total	544	97,794	1,451

ries, Inc., in making this survey possible. We will solicit your cooperation with another survey when there is a source of financial support.

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BOOK REVIEW

Parasitology for Veterinarians. Fourth Edition. J. R. Georgi with a chapter by V. J. Theodorides and a chapter by M. E. Georgi. Published by W. B. Saunders Co. Ltd., Toronto, 1985. 330 pages. Price \$49.95.

Parasitology for Veterinarians is, as its title implies, a book written specifically for veterinarians and veterinary students. The material in the book is oriented towards the clinical diagnoses, treatments and control of parasitism in domestic livestock and pet animals. The book appears to have been written with the assumption that veterinarians and others who would use it have had some previous training in veterinary parasitology.

The book is divided into three parts. The first six chapters comprise part one and deal with identifications, life histories and pathogenesis of insects, arachnids, protozoans, trematodes, cestodes and nematodes in that order. The next five chapters are included in part two and deal with the control of

clinical parasitisms in dogs and cats, ruminants, horses and swine. Also included is a chapter on antiparasitic drugs. The final three chapters in the book comprise part three and deal with antemortem, postmortem and histopathological diagnoses.

A most useful and welcome addition to this fourth edition of *Parasitology for Veterinarians* is the chapter on antiparasitic drugs by Dr. Vassilios Theodorides, a distinguished veterinary parasitologist with long experience in the pharmaceutical industry. This contribution by Dr. Theodorides should solve a dilemma frequently expressed by busy practitioners — "Where do I readily obtain information on the basic characteristics, usages and contraindications of the many antiparasitic drugs that are on the market today?" Included in this chapter are the botanical, carbamate, organophosphate and chlorinated hydrocarbon insecticides, formamidine acaricides, pheromones, repellents, growth regulators, synergists, antiprotozoals and anthelmintics.

Part three of the book should prove very useful to veterinarians, particularly the chapters on antemortem and postmortem examinations. Basic antemortem techniques are adequately described with excellent photographs of various eggs, larvae and oocysts likely to be found in various domestic and pet animals. The parasites likely to be found in the various organs and tissues of dogs, cats, ruminants, horses, swine and laboratory animals (including rabbits, rats, mice, guinea pigs, monkeys and apes) upon postmortem examination are also given. This type of information should be invaluable to the busy practitioner who does not have ready access to the services of a diagnostic laboratory. On the other hand, diagnostic laboratories will find the chapter on histopathological diagnoses of parasites a most useful reference, particularly its many photographs and photomicrographs of various parasites seen on histological examinations.

Cont'd on page 332