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Dirofilaria immitis IN RED FOXES IN ILLINOIS

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Abstract: Dirofilaria immitis was found in 8 of 225 (3.6%) red foxes *(Vulpes vulpes)* collected from fur buyers and trappers in Bond, Clinton, DeKalb, Edgar, Ford, Jasper, Moultrie, and Richland counties, Illinois. Infections ranged from 1 to 23 nematodes per fox. The finding of *D. immitis* in red foxes represents a new host record for the state.

INTRODUCTION

Survey reports indicate that the prevalence of *Dirofilaria immitis* is increasing throughout the Midwest.[13] The present distribution in this region is widespread, but uneven. Domestic canine infections have been reported from several states, including Illinois.[1,4,6,9,15,20] However, there are fewer reports of heartworm in wild canids from the Midwest and none from Illinois. *D. immitis* has been recovered from coyotes *(Canis latrans)* in Indiana,[8] Iowa,[3] and Kansas,[5] red foxes *(Vulpes vulpes)* in Indiana,[8] Michigan,[17] and Minnesota,[11] and gray foxes *(Urocyon cinereoargenteus)* in Indiana[8] and Michigan.[16] The objective of this study was to determine the prevalence of heartworm in red foxes in Illinois.

METHODS

During December, 1978 and January, 1979, red fox carcasses were secured from fur buyers in DeKalb county in north-central Illinois, Edgar and Moultrie counties in east-central Illinois, Clinton county in south-central Illinois, and Jasper and Richland counties in the southeastern part of the state. Although precise capture locations were not available for most animals, all were captured in Illinois and within 80 km of the furhouse where collected. Additional red fox hearts from specimens caught during December, 1978 in Ford County in east-central Illinois and Bond county in south-central Illinois were supplied by cooperating trappers.

Some carcasses were frozen when received and subsequently were thawed for heart removal. Hearts collected by the cooperating trappers were frozen; these too were thawed prior to inspection. Ventricles, atria, and pulmonary arteries were examined macroscopically.

RESULTS AND DISCUSSION

Specimens of *D. immitis* were recovered from the right ventricles of 8 of 225 (3.6%) red fox hearts (Table 1). Numbers varied from one nematode in three foxes to as many as 23 in one of the five remaining cases ($\bar{x} = 8$). There was no difference in the rate of infection of male foxes compared to female foxes ($p > .20$).

The above data indicate a lower prevalence of heartworm infection in red foxes from Illinois compared to other nearby states. In Indiana, 2 of 7 (28.6%) red foxes were reported positive,[8] while in Minnesota, *D. immitis* was found in 4 of 83 (4.8%).[14] However, an earlier Minnesota study failed to detect any heartworms in a sample of 120 red foxes.[2] Eleven of 39 (28.6%) red foxes collected from a highly endemic area for heartworm in dogs in Michigan had heart-

TABLE 1. Prevalence of *Dirofilaria immitis* in red foxes collected in Illinois, December, 1978-January, 1979.

County	Male	Female	Totals
Bond	0/14[a]	0/19	0/33
Clinton	1/12	0/4	1/16
DeKalb	0/38	0/42	0/80
Edgar	3/20	1/11	4/31
Ford	0/11	0/10	0/21
Jasper	0/4	0/7	0/11
Moultrie	1/14	1/11	2/25
Richland	1/2	0/6	1/8
Totals	6/115	2/110	8/225

[a]Number infected/Number examined.

worms, but the survey probably was not representative of the entire state.[17]

Previous surveys indicate that heartworm has been found in dogs in all regions of Illinois we sampled to determine if the nematode was present in red foxes.[9,11] In addition, Marquardt and Fabian[9] found that the percentage of infected domestic canines increased from north to south. Therefore, all the red foxes we examined could readily have been exposed to *D. immitis*, but the possibility may have been enhanced in the more southern collection sites.

Since heartworms are sometimes found in the pulmonary artery and its branches,[7] the prevalence of infection in red foxes may actually be higher than 3.6% because the 54 hearts obtained from trappers had only a limited portion of the large vessels. Although the right ventricle is by far the most common location, some heartworms may have undergone postmortem migration into the lungs, thus escaping detection. Also, extremely small heartworms might have been missed in the large masses of clotted blood occasionally found in the hearts.

The prevalence of *D. immitis* infection in red foxes collected from areas where canine heartworm is enzootic has ranged from zero to 50%.[14,19] This has resulted in some disagreement regarding the status of wild canids in the epizootiology of heartworm infection. Schlotthauer,[11] Otto[12,13] and Stuht *et al.*[18] considered red foxes to be accidental hosts and therefore unimportant in transmission to domestic dogs. On the other hand, Monson *et al.*[10] stated that foxes may be important reservoir hosts in spite of a low rate of infection. Overall, the role of the red fox in the epizootiology of heartworm disease remains unclear and warrants additional study. We agree with Franson *et al.*[3] and Stuht *et al.*[18] that experimental infections are necessary to determine if the red fox or other wild canids can function as a reservoir host of heartworm, especially in an area where preventive programs for domestic dogs are in effect.

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