Chapter 5

A survey of *Toxocara* infections in cat breeding colonies in the Netherlands

P.A.M. Overgaauw\(^1\) and J.H. Boersema\(^2\)

\(^1\) Virbac Nederland B.V, P.O. Box 313, 3770 AH Barneveld, the Netherlands
\(^2\) Dept of Parasitology and Tropical Veterinary Medicine, Institute of Infectious Diseases and Immunology, Faculty of Veterinary Medicine, P.O Box 80.165, 3508 TD Utrecht, the Netherlands

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Abstract

Faecal samples from 225 adult cats and 112 kittens and dust and soil samples from 25 catteries in the Netherlands were examined for *Toxocara* eggs. The results of this survey showed a low nematode infection rate in the investigated Dutch catteries since only four adult cats (2%) from two catteries (8%) were found to shed *Toxocara cati* eggs. No other helminth eggs were seen in the faecal samples. Nematode eggs were not present in the environmental dust and soil samples from houses and kennels; only *Dipylidium caninum* eggs were found in only two samples of household dust.

Introduction

The intestinal helminths described in cats in the Netherlands include *Dipylidium caninum*, *Toxocara cati*, and *Toxascaris leonina* (3). *Toxocara* spp. infections have, because of their zoonotic significance, important public health consequences. Factors that have been shown to play a role in the epidemiology of *Toxocara* infections in humans in the Netherlands (2) include soil contamination (6), and infection of companion dogs and cats, stray cats (8), and dogs in breeding kennels (9). The present study was designed to determine the prevalence and potential risk factors of gastrointestinal nematodes, in particular *T. cati*, in catteries. The management practices of cat breeders were also investigated.

Material and methods

Sampling

Cat breeders were recruited via advertisements in cat breeding magazines. Twenty-five catteries, situated throughout the country, responded and were visited between March 1995 and October 1996. Faecal samples from 225 adult cats and 112 kittens were collected (cats younger than 6 months were considered as kittens). The cats were of 12 different breeds. In 24 of the 25 catteries the cats had access outdoors to gardens (8x) or to fenced kennels with concrete surfaces (16). Soil was sampled in seven catteries at three random locations using a garden trowel (± 500 g to a depth of 5 cm). Dust samples were taken from the floor, carpets, baskets, and cat sleeping places in 11 breeders homes (± 3 g) and from four kennels (± 31 g), using a hand-held vacuum cleaner. These samples were collected in 14 of the 25 catteries. Faecal, soil, and dust samples were stored at -20º C until examined. Data were gathered about
the animals, housing and nutrition, cleaning and disinfection procedures and the use of anthelmintics.

Techniques
Faecal examination was performed with a sedimentation-flotation technique, using a ZnSO₄ solution with a specific gravity of 1.3 g/cm³. The sensitivity of this test is 10 eggs per gram (8). Although this faecal flotation test is reliable for detection of eggs of helminths in general, the goal of our study was primarily to look for nematode eggs. Soil and dust samples were examined as described by Overgaauw and Boersema (9). *Toxocara* eggs in soil and dust samples were differentiated by the finer pitting of the protein layer of *T. cati* eggs as compared to that of *T. canis* eggs.

General description of the catteries
The average number of cats per cattery was 9 (range 2-20) with an average age of 4 years (range 2-8). In 72% (18/25) of the catteries, kittens (mean 8, range 1-14) with an average age of 11 weeks (range 3-26 weeks) were present. The mean number of litters per year was 4 (range 0.5 - 12). Eleven breeders (44%) claimed to maintain a closed colony; the others regularly introduced new cats. The floor of the indoor living areas or cat rooms/catteries included flagstones, wood surfaces, and linoleum. In four catteries there were also one or more carpets. All animals were kept in groups and, with one exception, the cats had access outdoors to fenced gardens (8x) or to concrete pens. Breeders cleaned the indoor living areas daily with a detergent. In addition, 40% (10/25) of the breeders used disinfectants on schedules ranging from once a week to once every 3 months. One breeder used a chlorine product, whereas the others used milder disinfectants. Two breeders (8%) confined their parturient queens in a fenced enclosure, and 11 (44%) confined them in the living room. The remaining 12 (48%) breeders confined parturient cats in their own bedroom for an average of 13 days after queening. All cats were fed on commercial dry or canned food. Seventeen breeders alternated this commercial food with cooked meat or fish. Adult cats were dewormed by 21 breeders (84%) 1.7 times (range 0 - 6) per year on average. Nine breeders (36%) gave an anthelmintic against nematodes to queens during oestrus or pregnancy and 11 (44%) also treated the queens post partum. Kittens were dewormed by 24 breeders (96%) 1.9 times (range 0 - 4) on average during the first 12 weeks of life. Three breeders (12%) complied with the recommended Netherlands deworming schedule by treating kittens at 4, 6, and 8 weeks of age (1). The average age of first kitten deworming was 7 weeks but in 35% (8/23) of kittens
deworming occurred at 8 weeks or later. The following active ingredients were used for
deworming adult cats and kittens respectively: flubendazole (1x/2x), mebendazole (1x/0x),
oxibendazole (6x/13x), piperazin (0x/1x), pyrantel (0x/1x), and pyrantel/febantel combination
(13x/6x).

Results

Faecal samples
The results of the faecal examinations are given in Table 1. *T. cati* eggs were detected in
samples from 4 of 225 adult cats (2%). These cats were in 2 of the 25 catteries (8%). In these
catteries there were 6 and 11 adults cats and these cats were dewormed properly (3 to 6 times
per year). One of these catteries had 1.5 litters per year and, when surveyed, there were 13
kittens, with an average age of 10 weeks. The other cattery had 6 kittens with an average age
of 9 weeks. This cattery had the highest average number of litters (12 per year). All faecal
samples (from 112 kittens) tested negative (e.p.g. <10). The mean age of the infected cats was
1.9 years (range 1 - 11) and all were female. Eggs of other nematodes were not detected.

<table>
<thead>
<tr>
<th>parasite</th>
<th>animals</th>
<th>samples positive (%)</th>
<th>catteries positive (n=25) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Toxocara cati</em></td>
<td>adult cats (n=225)</td>
<td>4 (2%)</td>
<td>2 (8%)</td>
</tr>
<tr>
<td></td>
<td>kittens (n=112)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

*Table 1. Prevalence of* Toxocara cati *eggs in cat faeces and in cat breeding colonies*

Soil and dust samples
None of the soil samples were positive for *Toxocara* eggs. *Dipylidum caninum* eggs were
present in two household dust samples.

Risk factors
In view of the low prevalence of nematode infection, no significant correlation could be
established between *T. cati* infection and epizootiological risk factors, such as number of adult
cats or kittens, age of the kittens, litters per year, infected soil or dust, anthelmintic treatment
schedules or active ingredients, disinfection procedures, or the feeding of uncooked meat.
Discussion

The role of *Toxocara cati* as a zoonotic parasite is not always recognized and the zoonotic risk for *T. cati* is considered to be less than that for *T. canis* (4, 5). This assumption was based on a survey in Iceland, where, to control hydatid disease, dogs have been banned since the Forties. While there is a large population of cats on Iceland, none of the 307 tested adult Icelanders were positive for *Toxocara* serum antibodies (13). Nothing was mentioned however about the cat population density, prevalence of *T. cati* in cats, the rate of environmental contamination, the expected survival rate of eggs in Icelandic soil and the assumed risk of soil contact by Icelanders. *T. cati* infection of various potential paratenic hosts, including chickens, mice, dogs and lambs, has been demonstrated (12) and man can also be considered as a potential host. Recently, it was suggested that *T. cati* can play an important role in human ocular larva migrans (11).

Cats may be infected with *T. cati* by transmammary infection, by eating paratenic hosts containing larvae, or by ingestion of infective eggs. There is no transplacental transfer of *T. cati*, unlike *T. canis* in the dog. Patent infections in kittens can first be seen at 6 weeks of age (10). Most domestic cats in the Netherlands go outdoors (8) and are likely therefore to be exposed to helminth eggs, particularly in areas with a high density of domestic or stray cats. Places used for defaecation are often shared by several cats. This may lead to contamination of cats' paws with infective eggs as they bury their faeces. Some cats hunt and eat birds and small mammals that can act as paratenic hosts for helminth parasites like *T. cati*. These risks were virtually absent for the breeding cats in this survey, since all outdoor areas were fenced and the soil in the gardens seemed not to be contaminated with helminth eggs. *T. cati* eggs were also not found in dust samples. Transmammary *Toxocara* infection seemed to be low in these breeding cats. As a consequence of the (irregular) deworming programmes and the limited access to outdoor environments and to wildlife, *Toxocara* did not seem to flourish in these cat breeding colonies. Nevertheless, the deworming schedules could be improved.

The prevalence of patent *T. cati* infections was low in the Dutch cat breeding colonies in this study. It should be considered that the experimental population in which the survey was conducted was a convenience sample of the reference population of Dutch cat breeders, because the breeders volunteered. This may also gave rise to biased results. Nevertheless,
different types of breeders and breeds from all over the country were included in the study. In the two catteries where adult cats were infected with *T. cati*, the presence of many older kittens, as well as the high breeding rate of one of the catteries, may be considered as contributing risk factors. Other reports in the literature of studies of cat breeding colonies were not found. Nichol et al. (7) reported on the prevalence of intestinal parasites in cats, using faecal samples obtained from veterinary surgeries and catteries, but did not distinguish between these two groups. They found *T. cati* (11.5%) and *T. leonina* (0.2%), with the highest incidence of *Toxocara* infections (up to 31%) occurring in animals younger than 6 months. The prevalence of 4.7% patent *T. cati* infections in cats from households and 21% in stray cats (8) and up to 15% *T. canis* in breeding dogs (9) in the Netherlands is considerably higher than that in the catteries in this study.

For animal and human health reasons it is necessary to prevent such infections and the consequent contamination of the environment. Prevention includes deworming with effective anthelmintics and using treatment schemes with emphasis on kittens. All faecal samples from kittens in this study were negative for *T. cati* eggs. This is surprising since only 44% (11/25) of these breeders dewormed their queens after parturition and not more than 12% of the breeders (3/25) applied the recommended deworming schedule. Moreover, 53% of breeders (8/15) applied the first anthelmintic treatment when kittens were older than 8 weeks and the first patent infections in kittens can be expected before this age. From these results, it can be concluded that *T. cati* infections are nearly absent in the investigated catteries and/or that the present measures are satisfactory despite deviations from the advised anthelmintic treatment schedule. Cat breeders should be provided with better information on these topics.

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**References**


