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# Intestinal Parasites in Pet Store Puppies in Atlanta

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**Abstract:** We examined 143 pups from 14 Atlanta area pet stores for intestinal parasites and reviewed deworming practices and information given to customers. Seventy-four (52 per cent) of the pups had at least one parasite including *Giardia* sp. (34 per cent), *Toxocara canis* (12 per cent), and *Isospora* sp. (9 per cent). Eighty-eight per cent received some form of anthelminthic treatment while at the store. Only six (43 per cent) of the stores routinely informed clients of the need to continue deworming procedures once the pup left the store. (*Am J Public Health* 1987; 77:345–346.)

*Introduction*

Many parasites which naturally infect dogs can also infect humans, including *Toxocara canis, Echinococcus granulosus, E. multilocularis, Ancylostoma caninum, Dipylidium caninum,* and *Strongyloides* sp. Although some of these infections are asymptomatic in humans, some lead to serious and potentially life-threatening illnesses.[1–3] Efforts need to be made to prevent transmission of these canine parasites to humans through appropriate treatment of dogs to eliminate parasites and by educating the public, particularly pet owners, of the zoonotic potential of these parasites, so that they may take precautionary measures to minimize the risks leading to infection.

Pet shops can play a role in these efforts. They supply a large number of pups annually in the United States and have countless other interactions with the public through the sale of pet supplies. Pet stores can initiate health care of pups in their facilities (including vaccinations and dewormings) and can inform new owners and other customers of appropriate pet health care. To evaluate the role played by pet shops in the prevention of zoonoses associated with pets, we surveyed 14 Atlanta area pet stores for deworming procedures and information given to customers on pet care. We also examined pups from these sources for signs of disease and intestinal parasites.

*Methods*

Using the Greater Atlanta Area commercial telephone directory (December 1984–85), 19 of the 71 establishments listed under "Pet Shops" were identified as routinely selling pups. Owners and/or managers of all establishments were contacted and asked to participate in the study. Those who agreed to participate were visited and asked to complete a questionnaire regarding deworming procedures and health care information distributed to clientele. Pups present in the store were visually examined by one of the authors for signs of abdominal distention, diarrhea, cough, and depression. An overnight stool sample was collected from the bottom of each pup's cage, preserved in 5 per cent buffered formalin and examined within 48 hours. Prior to microscopic examination, stool specimens were concentrated using a formalin-ethyl acetate concentration procedure.[4]

*Results*

Thirteen (68 per cent) of the designated pet shops and one not listed in the telephone directory, but identified by another owner, agreed to participate in the study. Three stores were part of a nationwide chain. Puppy sales in these establishments ranged from less than 50 to more than 400 pups annually. Most pups spent three to eight weeks in the store before being sold.

All pups at the stores were ready-to-sell except for three considered "to be sick" by the store manager. Of the 143 pups on whom stool specimens were collected, 74 (52 per cent) were found to have at least one intestinal parasite (Table 1). Nine had mixed infections. *Giardia* sp. was the most prevalent intestinal parasite and was present in pups from 11 of the 14 establishments, with 25 to 100 per cent of the pups being infected.

One hundred and twenty pups were caged individually, allowing for correlation of age, sex, clinical signs, source of pup, and anthelminthic treatment with stool examination results. Pups ranged in age from six to 28 weeks, with a mean of 11.8 weeks. Seventy-four (62 per cent) of the pups were male and 45 (38 per cent) were female; the sex of one pup was not recorded. Distribution of intestinal parasites by age, sex, and source of the pup did not differ. Observable clinical signs suggestive of infection were not predictive for the presence of parasites in the stool. No parasites were found in the stools of the three clinically ill pups.

Deworming practices at the stores varied: eight establishments (57 per cent) routinely dewormed the pups; the others dewormed the pups only if microscopic examination of the stool indicated the presence of worms. Of the 118 pups for which in-store deworming records were available, 14 (12 per cent) received no anthelminthic treatment, 65 (55 per cent) received one treatment, 17 (14 per cent) received two treatments, and 22 (19 per cent) received three or more treatments. Histories of dewormings prior to arrival at the pet store were also known for 84 pups. Combining prearrival and in-store dewormings, those receiving a total of two or more anthelminthic treatments had a lower prevalence of *Toxocara* infection (1/54 [2 per cent]) compared to those receiving no or only one treatment (5/30 [17 per cent]) (odds ratio 0.09, 95% confidence interval 0.01, 0.81).

Five (36 per cent) of the owners/managers from the 14 establishments were unaware of the zoonotic potential of canine parasites. Only six (43 per cent) routinely counseled

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**TABLE 1—Prevalence of Infection with Intestinal Parasites in 143 Pups from 14 Pet Stores within the Metropolitan Atlanta Area, 1985**

| Parasite | Number of Pups Positive* (%) |
|---|---|
| *Giardia* sp. | 49 (34) |
| *Toxocara canis* | 17 (12) |
| *Isospora* sp. | 13 (9) |
| *Ancylostoma caninum* | 3 (2) |
| *Strongyloides* sp. | 2 (1) |
| *Dipylidium caninum* | 1 (1) |
| No parasites found | 69 (48) |

*Nine pups had more than one parasite.

the new pet owner on continued puppy care including the need to continue deworming practices. All but one establishment advised the customer to have the puppy examined by a veterinarian and provided a record of the pup's health history.

*Discussion*

We do not feel the pups sampled here are representative of all pups received in US homes, most of which come from neighborhood pet owners. However, they are probably similar to pups sold in other pet stores since many of the larger stores have similar sources of pups, and deworming practices tend to be similar among stores belonging to a nationwide chain.

*Giardia* sp., found in 34 per cent of the pups studied, is shed irregularly from the host's intestine;[5] the true prevalence probably exceeds that estimated, based on only one stool examination per pup. The high rate of *Giardia* sp. seen within stores suggests that caging of pups together and perhaps overcrowding may facilitate dog-to-dog transmission. No direct evidence is available to support the transmission of *Giardia* from dogs to humans. However, strains of *Giardia* causing disease in humans have been used to infect dogs and other animals experimentally[5,6] and humans and dogs have been experimentally infected with strains of *Giardia* found in beavers and mule deers.[6] This cross-species compatibility suggests that transmission of *Giardia* from dogs to humans could occur. Until further controlled experiments are performed, it seems prudent to treat puppies infected with *Giardia*, not only for the health of the pup but also to prevent potential spread to humans.

Although all the parasites detected in this study are potentially pathogenic for dogs, they can occur in dogs that appear to be completely healthy. In our study, readily observable clinical signs were not predictive of the presence of any intestinal parasite and are not a good indicator of the need for treatment. Since virtually all pups are infected with *Toxocara canis* through transplacental and transmammary migration of larva from the bitch,[7] we recommend routine prophylactic deworming of pups rather than treating in response to positive laboratory results as seen in six of the establishments interviewed. Repeated treatments (performed in only 33 per cent of the pups) are necessary because additional patent infections can develop from transmission of infective larvae in the bitch's milk during lactation and from infective eggs in the environment.[8] In addition, we would recommend routine fecal examinations for the detection of other parasites, such as *Giardia*, which are not covered by the prophylactic anthelminthics.

The establishments studied here did not appear to be reliable sources of education for new pet owners concerning puppy health care or the risk of dog-borne zoonoses. Perhaps it is naive to think that pet stores would alert potential customers of zoonotic health hazards. But they can provide proper prophylactic deworming of pups while in the store and require that pups be examined by a veterinarian within 10 days of their purchase in order for any health guarantee from the store to be valid. The veterinarian would then be responsible for pet owner education. Unfortunately, this route of education cannot be fully relied upon since only 54 per cent of veterinarians routinely advise clients of the risk of zoonoses.[9] Perhaps legislation regarding prophylactic deworming of pups or public health education through local health departments need to be undertaken.

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