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# An epidemiological study of gastrointestinal parasites of dogs from Southern Greater Buenos Aires (Argentina): Age, gender, breed, mixed infections, and seasonal and spatial patterns

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## Abstract

A total of 2193 fecal samples from owned dogs were collected during the 2003–2004 period in Southern Greater Buenos Aires, and were evaluated for the presence of intestinal parasites by a flotation–centrifugation method. The overall prevalence was 52.4%, and the 11 species found were: *Ancylostoma caninum* (13%), *Isospora ohioensis* complex (12%), *Toxocara canis* (11%), *Trichuris vulpis* (10%), *Sarcocystis* sp. (10%), *Giardia duodenalis* (9%), *Isospora canis* (3%), *Hammondia–Neospora* complex (3%), *Dipilydium caninum* (18 cases), *Cryptosporidium* sp. (5 cases), and *Toxascaris leonina* (1 case). There was no significant difference in the overall prevalence between genders (female = 50.4%, male = 54.6%), and breeds (pure = 52.3%, mixed = 53%), but prevalence in puppies (<1 year) was higher than in adult dogs (62.7% versus 40.8%, respectively). Only the prevalence of *A. caninum* differed between genders, with higher values for males. The prevalences of six of the parasite species showed a decreasing trend with increasing host age, and an inverse pattern was found for two other species. The prevalences of three protozoa were significantly higher in pure-breed dogs, and those of two nematodes were significantly higher in mixed-breed dogs. The prevalences of *T. canis*, *A. caninum*, and *T. vulpis* were spatially heterogeneous with a clear Southwest–Northeast gradient. Only prevalences of *Sarcocystis* sp. and *G. duodenalis* showed seasonal variation. The frequency distribution of the number of species per fecal sample did not differ from a random distribution. Results obtained throughout the world were discussed.

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## 1. Introduction

In recent years, numerous surveys have been conducted around the world to investigate the prevalence of intestinal parasites among dogs; e.g., Fok et al. (2001) in Hungary, Minnaar et al. (2002) in South Africa, Ramírez-Barrios et al. (2004) in Venezuela, Asano et al. (2004) in Japan, and Eguía-Aguilar et al. (2005) in Mexico. Each of these provides baseline knowledge on parasitic infections at a local scale. The most common factors used to evaluate association with parasite prevalence in dogs have been age, gender, and breed, but some authors also included seasonal variations and diversity indexes for a more comprehensive analysis (e.g., Oliveira-Sequeira et al., 2002; Eguía-Aguilar et al., 2005). These studies reveal heterogeneous results among regions for species composition, relative prevalences, and factors involved in parasite transmission. For example, when the prevalences of *Toxocara canis* infection were compared between genders, no statistical differences were found in São Paulo (Oliveira-Sequeira et al., 2002), males showed higher prevalence in Maracaibo (Ramírez-Barrios et al., 2004), and both of these outcomes were obtained in different neighborhoods of Buenos Aires (Rubel et al., 2003). Local and updated information is essential to understand the epidemiology of gastrointestinal parasitic diseases in dogs and to design rational control strategies at local, country, or regional scales.

In Argentina, data on overall prevalences of intestinal parasites among dogs derive from fecal or soil samples taken at public places; e.g., La Plata (Minvielle et al., 1993; Córdoba et al., 2002), Mar del Plata (Andresiuk et al., 2003), and the Province of Chubut (Zunino et al., 2000; Sánchez Thevenet et al., 2003). In Greater Buenos Aires, current information on this issue is limited to a study by Rubel et al. (2003) on *T. canis* in dogs from two neighborhoods of different socioeconomic and urban status.

The aim of our study was to provide baseline knowledge about intestinal parasites of dogs in Greater Buenos Aires, the most crowded urban centre of Argentina. We evaluated parasite prevalences regarding the age, gender, and breed of the host, mixed infections, and seasonal and spatial patterns.

## 2. Materials and methods

### 2.1. Study area

Greater Buenos Aires includes the Federal District (Buenos Aires City) and the surrounding belt composed of 24 municipalities (INDEC, 2003). The population of this urban agglomeration is over 11 million people. The climate is temperate humid with a mean annual RH of 76% and a mean annual temperature of 15.8 °C (Anonymous, 1992).

The study area comprised six contiguous municipalities in Southern Greater Buenos Aires: Avellaneda (A), Quilmes (Q), Lomas de Zamora (LZ), Lanús (L), Almirante Brown (AB), and Esteban Echeverría (EE) (Fig. 1). It has 2,651,725 inhabitants within a total area of 556 km<sup>2</sup> (INDEC, 2001).

### 2.2. Methods

A total of 2193 fecal samples from owned dogs were examined for the presence of parasite elements between January 2003 and December 2004. All samples were collected by dogs' owners and submitted by veterinary practitioners to our laboratory (DIAP, Diagnóstico en Animales Pequeños) for diagnosis. Unpreserved samples were stored in closed containers at 4 °C, and processed within 48 h. Each sample was first examined macroscopically for the detection of *Dipylidium caninum* proglottids, and then processed by the centrifugation–flotation Sheather technique (saccharose solution with a density of 1.3 g/ml) (Vignau et al., 2005). All eggs, cysts, and oocysts found were identified according to morphological characteristics under light microscopy (Soulsby, 1987; Mc Allister et al., 1998; Cordero del Campillo and Rojo Vázquez, 1999). A dog was classified as positive if at least one of these elements was present in its stool sample.

Due to the morphological similarity in the oocysts of some species, we considered *Hammondia heydorni* and *Neospora caninum* as *Hammondia–Neospora* complex. Likewise, three species of the genus *Isoospora* (syn. *Cystoisospora*), namely *I. ohioensis*, *I. burrowsi*, and *I. neorivolta* were grouped as *Isoospora ohioensis* complex.

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