

Risk factors of *Giardia* infection and pathogenicity in weaning puppies

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The prevalence of *Giardia* in dogs ranges between 5.4% and 55.2%, with a higher prevalence in puppies. However, the risk factors for *Giardia* infection around weaning have been poorly described. The aim of the study was to evaluate risk factors for *Giardia* infection in puppies during the first weeks of life and to determine an impact of this parasite on feces quality.

192 puppies from 58 litters living in a breeding kennel were followed between 4 and 9 weeks of age. Each puppy was treated with fenbendazole (Panacur®, MSD, France, 50 mg/kg, per os, q 24 h) for 3 consecutive days at 2, 4, 6 and 8 weeks of age. For each puppy, fecal consistency was evaluated using a 13-point scale. Excretion of enteropathogens was evaluated by qPCR for canine parvovirus type 2 (CPV2), qRT-PCR for canine coronavirus (CCV), coproantigens quantification for *Giardia* (ProSpecT-Giardia, Remel), and McMaster flotation technique for any eggs and oocysts. A generalized linear mixed model (proc GLIMMIX) with *Giardia* infection as a binary outcome was used to assess the following effects: breed size, age, and CPV2, CCV and *Isospora ohioensis* infections. A linear mixed model (proc MIXED) with fecal score as outcome was used to determine the following effects: breed size, age, and *Giardia*, CPV2, CCV and *I. ohioensis* infections.

A total of 277 fecal samples were collected; CPV2, *Giardia*, *I. ohioensis* and CCV were detected in respectively 13.4%, 17%, 30.3 % and 67.9% of the samples. The risk of *Giardia* infection increased with age (Odd Ratio= 1.5; 95%CI=1.1-2.1; p=0.015). Neither breed, nor CPV2, CCV and *I. ohioensis* infections influenced risk of *Giardia* infection (p=0.299; p=0.213; p=0.892; p=0.282 respectively). *Giardia* infection did not impact feces quality (p=0.11), whereas a significant influence of CPV2 (p<0.001), CCV infection (p=0.030) and breed size (p<0.001) was evidenced.

This study underlines that even with an adapted deworming program the eradication of *Giardia* is difficult to obtain in large dog packs. The higher prevalence of *Giardia* in puppies of 7 weeks and older could be linked with the immunity gap during this period. *Giardia* was not associated in our study with an increased risk of diarrhea. The lack of pathogenicity of the parasite per se could be hypothesized, but also an efficacy of the treatment for the prevention of the clinical signs or a local and systemic immunity limiting clinical signs.