

Gastrointestinal Parasite Study of Dogs in Kuujjuaq

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Abstract: *As part of a month-long internship with the “Veterinary Public Health and Animal Health Support Project in Nunavik” of the Groupe international vétérinaire of the University of Montreal, a study of the variety and prevalence of gastrointestinal parasites affecting dogs in Kuujjuaq was conducted in mid-May, 2010. Feces from 28 dogs were examined, belonging to a total of 13 different owners. Analysis was performed by quantitative fecal flotation using a modified double centrifuge technique. Toxascaris leonina was found in 43% of dogs tested, with high variation in the level of fecal shedding. Trematode eggs (species unknown) were found in 11% of dogs, while Diphyllbothrium spp. and Uncinaria stenocephala were each found in 4% of dogs. No association was found between feeding practices and the presence or absence of gastrointestinal parasites.*

Abstract: *Une étude sur la variété et la prévalence des parasites gastrointestinales des chiens à Kuujjuaq a été menée en mai, 2010 dans le cadre d’un internat d’un mois avec le “Projet d’appui en santé publique vétérinaire et en santé animale au Nunavik” du Groupe international vétérinaire de l’Université de Montréal. Des matières fécales provenant de 28 chiens appartenant à 13 propriétaires différentes ont été examinées. L’analyse a été effectuée par flottaison fécale quantitative utilisant une technique de double centrifugation modifiée. Toxascaris leonina a été trouvé chez 43% des chiens testés, avec une grande variabilité dans le taux d’excrétion fécale. Des œufs de trématode (espèce inconnue) ont été trouvés chez 11% des chiens, tandis que Diphyllbothrium spp. et Uncinaria stenocephala étaient présents chacun chez 4% des chiens. Aucune corrélation entre les tendances d’alimentation et la présence ou l’absence des parasites gastrointestinales n’a été trouvée.*

Introduction

Kuujjuaq is a community of approximately 2300 people situated 50km south of Ungava Bay on the Koksoak River. This is the largest of fourteen Inuit communities in the Nunavik region, which occupies approximately the northern third of the province of Quebec. Little is known about the health of the dog population in Nunavik. It has been estimated that there are approximately 900 dogs in the entire region, although this remains a very rough estimate that likely fluctuates significantly. Stray dogs are generally recognized as being a public health threat due to dog bites and attacks. In terms of animal health, dog fights are a common occurrence, often resulting in injury. The municipality of Kuujjuaq has implemented a dog control program in recent years, which stipulates that dog owners keep their dogs indoors or attached outside the home. Owners with 3 dogs or more must keep their dogs outside of town, which is the case for dogs used for sled racing. Although the majority of dog owners respect this new rule, stray and wild dogs remain a problem.

There is no permanent veterinary service in Nunavik. Since 1983, the Ministry of Agriculture, Fisheries and Food (MAPAQ) has offered annual vaccination including rabies and base vaccines to the communities of Nunavik that request this service. In 2008, the *Group internationale vétérinaire* (GIV) of the University of Montreal initiated the “Veterinary Public Health and Animal Health Support Project in Nunavik,” an inter-institutional project that includes local governmental and non-governmental agencies, MAPAQ, the Canadian Food Inspection Agency (CFIA), academic research groups, and other non-governmental agencies concerned with animal and public health. The GIV project aims to increase the level of veterinary service available through a free long-distance consultation service, onsite clinics, and by providing first-aid training to interested individuals. Understanding the health issues of the dog population in Nunavik is another project objective.

The goal of the current study was to determine what species of parasites are most commonly found in Kuujuaq, and what this means in terms of future recommendations and interventions taken in the context of the GIV project.

Methods

Fecal samples were collected from a total of 28 owned dogs throughout the village and outskirts of Kuujuaq over a 4-day period. These dogs belonged to 13 different owners. All owners were asked permission to participate in the study, and the name of the owner, the age and sex of the dog, past deworming history and feeding practices were recorded for each dog. When possible, fecal samples were collected just after defecation. However, this was rarely feasible, and in most cases fecal samples were collected nearby the attached animal, choosing only samples that appeared fresh within the day. Samples were collected using individual whirl-pack plastic bags and kept refrigerated until analysis, which was performed within 5 days of collection for all samples.

Quantitative Fecal Flotation, modified Wisconsin Double Centrifuge Technique

1. Using wooden tongue-depressors, 5g (+/- 0.1g) of fecal material was weighed from each sample into individually labeled plastic disposable cups (cup 1). Approximately 12mL of tap water was added to each cup and left to soften the stool sample for the time it took to prepare all the samples.
2. The contents of each cup were mixed well using the individual tongue-depressors until the contents were as homogeneous as possible. The contents of each cup were transferred into a second set of individually labeled cups (cup 2) through a double layer of medical gauze. Approximately 3mL of tap water was used to perform a wash of the remaining contents of cup 1, which was again poured through the gauze. The gauze was squeezed around the tongue-depressor into cup 2 to remove remaining liquid.
3. The filtrate in cup 2 was poured into individually labeled 15mL plastic tubes with twist-on caps. A second wash with approximately 3mL of tap water was performed on each cup 2 and added

- directly to the 15mL tubes. If needed, additional tap water was added to the tube to fill it to just below full. *At this point due to time constraints, tubes were refrigerated overnight.*
4. The capped 15mL tubes were centrifuged for 10 minutes at 1500 rpm.
 5. After centrifugation, the liquid was removed from each tube with individual disposable pipettes, taking care not to disturb the sediment at the bottom of the tube.
 6. 4-5 mL of previously prepared Sheather's solution, prepared according to instructions¹ (specific gravity 1.26) was added to the sediment of each tube, and mixed well using the same disposable pipette used to remove the liquid of that tube. The test tube was then filled with additional Sheather's solution until 1-2mm from the top. *Tubes were refrigerated again at this point and removed in batches for analysis.*
 7. Tubes were centrifuged a second time with lids on (10 minutes at 1500 rpm), in batches of a few tubes at a time. One tube at a time, Sheather's solution was added to form a meniscus, and a slide cover placed on the top of the tube for 10 minutes.
 8. Cover slips were removed and placed on a slide for examination under 200x magnification.

Results

23 of the 28 dogs tested were huskies. The other breeds included in the study were two Labrador retrievers, one golden retriever, and two mixed breed dogs. Of the huskies, 19 were kept outside of town and served as sled dogs. The other 9 dogs were kept tied up near their houses in town. The sex distribution of the dogs was 11 females and 17 males. Three of the dogs were under one year of age, the rest were adult.

Twelve of the 28 dogs tested were found to have eggs of *Toxascaris leonina* in their feces (43%). Four of these dogs had a high level of infection (>40 eggs per 5g feces), the other eight had between 2-13 eggs per 5g feces.



Toxascaris egg, 400x

Larvated *Toxascaris* eggs,
400x

Dog with high level of
Toxascaris infestation, 200x

Three dogs were found to have trematode eggs in their feces (11%). Identification of the specific trematode species is not possible by microscopy. Dogs with these eggs had between 14 and 35 eggs per 5g feces.



Trematode eggs, 400x

The only other parasite eggs recovered were a single *Diphyllobothrium* spp egg, and a single *Uncinaria stenocephala* egg.



Diphyllobothrium spp, 400x



Uncinaria stenocephala (right) shown next to *Toxascaris leonina* (left), 400x

Feeding practices were variable, and included “country food” which varies year-round according to availability (often including fish, caribou and other game, seal, tarmigan, etc), leftover food from human consumption, and store-purchased commercial dog food. There did not seem to be an association between the type of diet and the presence of parasite infestation.

Diet	# dogs	# with parasites
Mostly country food, some commercial dog food	8	5
Mostly country food, some leftovers	1	1
Mostly leftovers, some country food	2	1
Mostly leftovers, some commercial dog food	1	1
Mostly commercial dog food, some country food	12	4
Mostly commercial dog food, some leftovers, some country food	2	2
Mostly commercial dog food, some leftovers	1	1

Exact histories for parasite treatment were difficult to establish with precision. 7 dogs received treatments twice a year, although owners did not specify when their most recent treatment was, 8 dogs were last treated 4 months ago, 1 dog was treated “recently”, and 2 others had been treated at some point, although not recently. The remaining 10 dogs had never received parasite treatment. High levels of *Toxascaris* infection were associated with no treatment or no recent treatment (4/4). Age did not seem to be a factor in the level of parasite excretion.

Discussion

Toxascaris leonina was found to be the most prevalent parasite among the dogs tested. *Toxascaris* is a roundworm about 3-10cm long that can be found in the small intestine of dogs, cats, foxes and other wild canine or feline species (such as wolves). Dogs can become infected with this worm by eating feces that contain parasite eggs, or by eating another host species such as mice. Although larva cannot develop below 6°C, they can survive at -15°C (for example beneath snow cover). These larvae can reach their infective stage in less than 3 days. Roundworms are of greater concern in puppies due to their smaller digestive tract. In adults, they may cause vomiting, occasional diarrhea, weight loss, and in severe cases abdominal distension and discomfort. This infection is therefore undesirable, but rarely life threatening. *Toxascaris* is not thought to be zoonotic.

Trematodes were found in a limited number of dogs. These leaf-shaped flatworms are usually less than 5cm long. They can be acquired by eating prey, although it is unknown if there are specific prey species that are more likely to be carriers. There is no risk for humans. There is no evidence that trematodes cause any health problems to dogs when in their intestinal tract, and therefore treatment is not necessary.

Diphyllobothrium is a cestode with two intermediate hosts: aquatic microorganisms and fish. Fish-eating mammals including cats, dogs and humans most often become infected by eating infected fish that is either raw or undercooked. This parasite is thought to be of low pathogenic consequence to dogs. Although humans can become infected by the same route as dogs, infected dogs cannot pass this parasite to humans. Infection can be prevented by checking fish for white cysts in their muscle or for tapeworms in the abdominal cavity: these fish should not be given to dogs or should be cooked.

Uncinaria stenocephala, or the Northern hookworm, can be found in the small intestine of dogs, cats and foxes. The most common route of infection is oral. Clinical signs in animals include diarrhea and protein loss. This parasite is of low zoonotic potential.

A study on the occurrence of gastrointestinal parasites was conducted in Kuujuaq in August and October of 1983 on a total of 80 dogs². This study found a high prevalence of *Diphyllobothrium dendriticum* (45%), *Taenia spp.* (40%) and *Toxascaris leonina* (44%), with low levels of *Uncinaria stenocephala* (10%) and *Plagiorchis elegans* (9%). The level of *Toxascaris* found in this study is in

agreement with this previous study. It is interesting to observe the lack of *Taenia* and low levels of *Diphyllobothrium* found in this study. Possible reasons for these differences could include the technique used (the previous study employed a zinc sulfate flotation technique and formalin-ether sedimentation), the time of year, or the fact that most samples collected in this study were not freshly voided scats.

No association was found between feeding practices and *Toxascaris* infection. This suggests that consumption of food contaminated by fecal material is more likely to be the primary source of infection rather than the “country food” fed to the dogs.

All owners were contacted initially by phone or email to inform them of the results. The opportunity was taken to inform the owners of dogs positive for *Toxascaris* of the vaccination clinic offered by MAPAQ on June 7th 2010 in Kuujjuaq, where dewormer would be available free of charge to a limited number of owners. Owners with dogs positive for parasites were also sent a formal letter describing the type of parasite found and the treatment options available.

Toxascaris can be treated with an over the counter medication available in human pharmacies (including the pharmacy in Kuujjuaq) called Combantrin® (Pyrantel). It is available in the form of a 125mg pill. The appropriate dose per treatment is 5mg/kg. An initial treatment should be given, a second treatment given 2 weeks afterwards, and then 2 or 3 further treatments at 2-month intervals. The treatment works by paralyzing the worm, so live worms may be seen in the feces after treatment. Pyrantel is also effective in treating *Uncinaria stenocephala*.

Trematodes can be eliminated using praziquantel at 5-10 mg/kg. This medication requires a prescription for purchase. Owners with dogs positive for trematodes were informed that although treatment was not of urgent necessity, a prescription could be obtained upon request by contacting the University of Montreal’s long-distance consultation service at nunavik-giv@medvet.umontreal.ca, or (450) 773-8521 ext 0065. Praziquantel is also effective in the treatment of *diphyllobothrium*.

Conclusions

In contrast to a previous study of two northern Canadian communities, no parasites of important zoonotic potential were found³. *Toxascaris leonina* was found to be the most common parasite infecting dogs in Kuujjuaq in this study. Effective treatment (Pyrantel) is available in Kuujjuaq without a prescription; however, efforts should be made to ensure that owners can have ready access without depleting human medical stores. Educational information in the form of handouts, articles in Makivik Magazine, radio information capsules, and school programs could improve public awareness of the importance of preventive treatment, particularly in puppies.

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