Surveying Prevalence of Cryptosporidium in Fecal Material of Rural and Suburban Canis latrans of Illinois

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When working with animal stool, make sure the smear is a microparasite that causes Cryptosporidium, a diarrheal infection. Largest outbreak known occurred was in Milwaukee, WI affecting 400,000 people from the municipal water supply system. This infection is caused by ingesting infected fecal material with cysts, mainly from water sources. There are approximately 29 species of Cryptosporidium, effecting both humans and animals. Coyotes use a wide diversity of habitats and food sources, thus venturing into areas with high human density. Coyotes drink from many different water sources, hence a possible host of Cryptosporidium in urban, suburban, and rural areas.

Cryptosporidium is a microparasite that infects the respiratory and gastrointestinal tract of humans and animals. This microparasite is a waterborne disease and can be in any type of water source. In natural areas, animals, such as coyotes, drink from different water sources, such as streams, ponds, and stagnant pools. These water sources tend to have an abundance of fecal material run off from the surrounding areas. Because humans are slowly taking over natural land, they are having more frequent contact with wildlife. As coyotes are very pliable in using a diversity of habitats, they are slowly roaming into areas with a high human density. That being said, coyotes, and humans alike, may be more susceptible to ingesting Cryptosporidium and thus having cryptosporidiosis, which is a diarrheal disease. Although, because humans are not coming into contact with coyotes and/or their scat as often, suburban areas may have a smaller abundance whereas the prevalence of Cryptosporidium may be higher in rural areas because that is where coyotes still reside in their home ranges.

By taking samples of coyote scat and using a modified version of Kinyoun’s Acid-Fast Staining, I was able to find positive Cryptosporidium samples in both rural and suburban areas. Contrary to my hypothesis, the count of Cryptosporidium oocysts are more prevalent within suburban areas. Maybe humans do contribute to the movement of this microparasite more than previously recognized.

Methods and Materials
- Coyote scat was collected from suburban and rural areas around the south and southwest of Chicago, IL in Cook and Will Counties.
- Scat was stored in a -80°C freezer until placed in refrigerator to thaw for subsequent analysis.
- Samples were smeared onto slides in triplicates.
- Modified Kinyoun’s Acid-Fast (cold) Staining was performed to detect cysts in fecal samples.
- Each slide was examined until an oocyst was found, once a cyst was found, searching and counting cysts lasted for one minute.
- A univariate analysis between landscape and Cryptosporidium oocystcs was used to find out whether or not Cryptosporidium changed between rural or suburban areas.

Cryptosporidium oocysts will be more abundant in Canis latrans with rural areas with less human interaction and fragmentation and less abundant in suburban areas with a higher density of humans.

Source of Error
- Scat samples should have been more than 5 miles apart due to a coyotes average home range. Samples were only approx. 1 mile apart and overlap in data may have occurred.
- More samples must have been collected, as well.
- When working with animal stool, make sure the smear is smooth with no hair, bents, etc., so working under the microscope under oil immersion is easier to view; was not able to view some slides properly because the coverslip did not lay smoothly on top.
- Increase to four regions – urban, suburban, rural, and agriculture – this having more independence between samples

Results
- Suburban areas of the south and southwest Chicago region have a higher abundance than rural of Cryptosporidium oocysts.
- SE for suburban areas is .396 and .129 for rural; mean being 1 and .222, respectively.
- The standard errors are large because of the small number of scat collected.

Discussion
- The hypothesis was not supported; the amount of Cryptosporidium oocysts were more abundant in suburban areas compared to the rural areas southwest of Chicago.
- Of the 12 samples collected, 4 of the samples were positive.
- 2 positive samples occurred in suburban areas and 2 occurred in rural area, suburban areas having more oocysts per sample, though.

Sources

Abstract
Cryptosporidium is a microparasite that infects the respiratory and gastrointestinal tract of humans and animals. This microparasite is a waterborne disease and can be in any type of water source. In natural areas, animals, such as coyotes, drink from different water sources, such as streams, ponds, and stagnant pools. These water sources tend to have an abundance of fecal material run off from the surrounding areas. Because humans are slowly taking over natural land, they are having more frequent contact with wildlife. As coyotes are very pliable in using a diversity of habitats, they are slowly roaming into areas with a high human density. That being said, coyotes, and humans alike, may be more susceptible to ingesting Cryptosporidium and thus having cryptosporidiosis, which is a diarrheal disease. Although, because humans are not coming into contact with coyotes and/or their scat as often, suburban areas may have a smaller abundance whereas the prevalence of Cryptosporidium may be higher in rural areas because that is where coyotes still reside in their home ranges.

By taking samples of coyote scat and using a modified version of Kinyoun’s Acid-Fast Staining, I was able to find positive Cryptosporidium samples in both rural and suburban areas. Contrary to my hypothesis, the count of Cryptosporidium oocysts are more prevalent within suburban areas. Maybe humans do contribute to the movement of this microparasite more than previously recognized.

Hypothesis
Cryptosporidium oocysts will be more abundant in Canis latrans within rural areas with less human interaction and fragmentation and less abundant in suburban areas with a higher density of humans.

Figure 2—Image of samples collected in rural and suburban areas south and southwest of Chicago