Canine Heartworms in Coyotes in Illinois

I. Introduction

Thomas Nelson, David Gregory and Jeffrey Laursen co-authored “Canine Heartworms in Coyotes in Illinois,” an article published in the Journal of Wildlife Disease in 2003 that focuses on health effects of infected coyotes with heartworm disease. The article’s study aims to determine if there is a correlation between the disease and the prevalence of infected coyotes specifically in Illinois, coyotes’ physical condition and the fertility of females. Moreover, the study is gathering data from a large sample size to determine accurate impacts. Former studies have been performed, but due to their small sample sizes their experiments are limited and the effects of heartworms remain unclear.

Canine heartworms are a serious disease affecting both domestic and wild canines. The disease is transmitted to canid hosts by mosquitoes and has detrimental effects on the cardiovascular system, causing the obstruction of heart chambers, valves and vessels; pulmonary hypertension; and heart failure. The disease can potentially have a great impact on the reproduction and survival rate of coyotes and consequently have an ecological impact. In addition, coyotes are potentially transmitting the disease to domestic dogs according to the study.

Nelson, Gregory and Laursen’s objectives of the study include the following:

- Survey the pervasiveness and intensity of heart worms in Coyotes in Illinois.
- Determine if there is a correlation between infected Coyotes with heartworms and their physical condition, specifically body weight and winter fat levels.
- Determine if there is a correlation between infected Coyotes and fertility in females

II. Materials and Methods
Researchers gathered a variety of data from a sample size of 920 coyote carcasses using observational methods. The following information was gathered from each coyote sample (if possible depending on the condition of the carcass):

- Date and county of harvest
- Skinned body weight
- Length
- Subcutaneous (under the skin) fat
- Quality of fur
- Heart
- Lungs
- Reproductive tracts
- Lower canine teeth
- Kidney and kidney fat
- Bone marrow

Using the information from above, researchers carried out a series of different methods to obtain body weight, heartworms in heart and lungs, age, nutritional condition and reproductive performance. To start with, body weight was calculated by using the skinned weight and body length recorded.

Some methods were more extensive, for example, examination of both the heart and lungs were done to determine if coyotes had heartworms. The four chambers of the heart were inspected for heartworms by gross examination and the lungs were flushed out, “Lungs were inspected for parasite by inserting a small tube into the pulmonary artery and flushing with tap water for a minimum of 3 min. During flushing, lungs were massaged to extrude any parasites. After flushing pulmonary arteries were dissected and inspected for heartworms” (Thomas A. Nelson, 2003).
Age was determined by radiographing lower canine teeth to conclude if the coyote was young or an adult. If lower canines indicated an adult coyote, the canines were sent for further studies to determine the precise age.

Nutritional condition required a range of variables that indicated the general health of the coyote samples: skinned body weight, standardized weight, kidney fat index and percent marrow fat. Kidney fat index was determined by using perirenal fat divided by the kidney weight and percent marrow fat was determined by extracted lipids from femur marrow dried out at 60°C constant temperature.

Lastly, reproductive performance was determined by counted placental scars in females indicating they were breeders. If females lacked placental scars, they were considered non-breeders.

III. Results

Regarding the first objective to survey the pervasiveness and intensity of heart worms in Coyotes in Illinois, the data indicated that 16% of coyotes out of the 920 sample size were infected with adult heartworms. The results differed with the increase in age; heartworms were low in juvenile coyotes with only 8.7% of infected young compared to 40.4% of infected adults. In comparison to sex, 17.7% of males were infected in contrast to 14.1% females in all ages. Additionally, results differed regionally in Illinois; a higher percentage of coyote samples were infected in the southeast regions boarding the Wabash River compared to the northeast region. Overall, heartworm intensities did not differ in age, sex and regionally.

As for the second objective to determine if there is a correlation between heartworm infected coyotes and their physical condition, data showed that there was no difference in skinned body weight from infected and uninfected coyotes. Furthermore, kidney fat index used to determine the nutritional condition of coyotes showed no difference between infected and uninfected coyotes. As a result, body weight and winter fat levels have no correlation with infected coyotes. The only difference in physical characteristics was fur quality. Fur quality was rated on a scale ranging from poor to excellent quality; 57% of
uninfected coyotes were rated excellent or good and only 40% of infected coyotes were rated excellent or good.

Results from the third objective to determine if there is a correlation between infected Coyotes and fertility in females indicated that infected females had less placental scars versus uninfected females. The percentage of infected females considered non-breeders was 4.1% due to the lack of placental scars.

The data collected showed two surprising results in comparison to previous studies. First was the lack of connection between infected coyotes and bodyweight and winter fat level. Previous studies indicated that bodyweight was lower in infected coyotes and researchers expected to find the same results given that coyotes are active animals and the stress of the heartworms can lower stamina and essentially put a nutritional stress on infected coyotes. Results, however, disproved former studies that a correlation exists. Second, results showed that males had a higher probability of getting heartworms. Former studies did not see a difference in sex in the prevalence of heartworms. Both findings are likely due to the larger sample size used and trends to accurately form.

IV. Discussion

Results for the first objective proved that there is a trend in the pervasiveness of infected coyotes in Illinois. Researchers concluded that the increase of infected coyotes in the Southeast region of Illinois results from the increase exposure of mosquitos. Mosquitos are attracted to the environment in the south (bottomland forest, swamps and forested wetlands), therefore further exposing coyotes to the disease. Moreover, the higher prevalence of heartworms in older coyotes is due to increased exposure of mosquitoes for a longer period of time and the prevalence of heartworms in males is due to more movement and therefore more exposure to mosquitoes; females are less active during the summer when taking care of their young.
Results from the second objective proved that there is no relationship between body weight and winter fat levels in infected coyotes. Overall, study suggests that heartworms affect only fur quality in regards to physical conditions.

Results from the third objective proved that there is a relationship between the fertility of infected females. Infected females were more likely to be non-breeders due to a lack of placental scars. Although a relationship did exist, the affects were relatively small, only 4.1% of infected females were considered non-breeders. In conclusion, researchers determined that heartworm disease is a minor factor influencing the coyote population. Considering all results, the overall effects of heartworms concludes no prospective ecological impact.

Although the study discovered breakthroughs in comparison to former studies, the study had several limitations. Based on the condition of the carcass collected, some information could not be gathered from all 920 carcass samples, “Because the organs and tissues used to assess conditions were sometimes missing or damaged, complete data sets were available for 637 coyotes” (Thomas A. Nelson, 2003). As a consequence, sample size decreased, “Sample size varied among tests because individual organs and tissues could not be used when they were damaged during harvest” (Thomas A. Nelson, 2003). Nevertheless, the data collected from the study is a huge stepping stone to understanding the influence of heartworms on the coyote population.
Bibliography
(n.d.).