Comparative study of endoparasite burden of captive vs free-range white-tailed deer in Northwest Florida

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INTRODUCTION

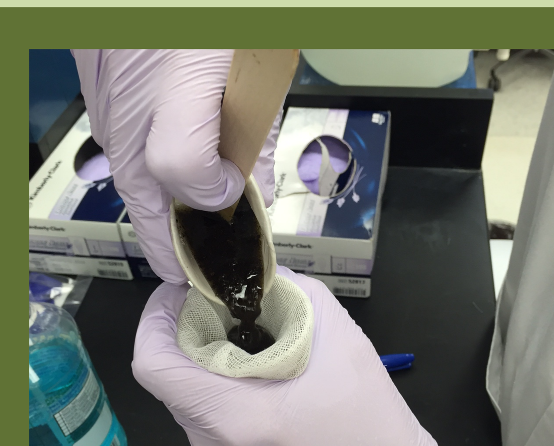
The deer farming industry has seen a dramatic increase in the last decade as a mean of sport as well as for human consumption, creating a need for more information about deer husbandry and health. Because endoparasite quantity of white-tailed deer is directly correlated to population density[1], the prevalence of parasites is higher now than in the past. Because deer gastrointestinal anatomy is similar to that of domestic species such as cattle, white-tailed deer can harbor similar parasites as food animal species. Understanding the parasites that can affect deer is highly important when managing deer farms or ranches, as they can severely decrease production if not managed. There is increasing concern for parasite cross-over between free ranging white tailed deer and domestic hoofstock for economic, as well as ecological, reasons. Identifying endoparasite species in free range deer can help manage internal parasites of domestic species used for human consumption and provide insight on wild deer diseases and how to treat them. A higher number of parasites with more diverse species is predicted to be seen in the samples collected from free-range deer compared to the captive deer and higher in wild deer compared to free-range deer.

MATERIALS & METHODS

In the study, fecal samples were collected from 71 white-tailed deer over a 4 day period from a 500-acre reserve at Elkhart Ranch in Quincy, Florida, a private property ranch and deer farm affiliated with UF's Cervidae Health Research Initiative (CHeRI) program. The samples were categorized based on where the deer were located: captive (in an small enclosure), free-range (free to roam the 500-acre property), or off-ranch (wild deer that trespassed onto the property). The samples were collected under the guidelines set forth by the Institutional Animal Care and Use Committee at the University of Florida. The parasite quantity and diversity of the samples were compared. Samples were stored at 4C until processed. After a sample was collected, it was given a unique ID and labeled with the date collected, GPS coordinates, any other source of identification. each fecal sample was evaluated by a fecal centrifugal flotation and simple sedimentation following published protocols[2] with some modifications. The flotation used a Sheather's Solution with a specific gravity of 1.25 and was centrifuged on 2000 rpms for 20 minutes. The simple sedimentation modifications included the use of a detergent solution and longer periods of resting between decantation. Sedimentations were repeated if no parasites were present on first slide preparation. Slide preparations were examined using a compound microscope. Any parasite ovum, oocysts, or larvae were measured at 400x and identified to genus or species. The genera Trichostrongyle, *Eimeria*, *Capillaria*, *Paraelaphostrongylus*, *Gongylonema*, and *Trichuris* were used when identifying ovum, oocysts, or larvae due to the inability to distinguish species with microscopy alone. Results from simple sedimentation and fecal floatation were combined for analysis of total endoparasite content.

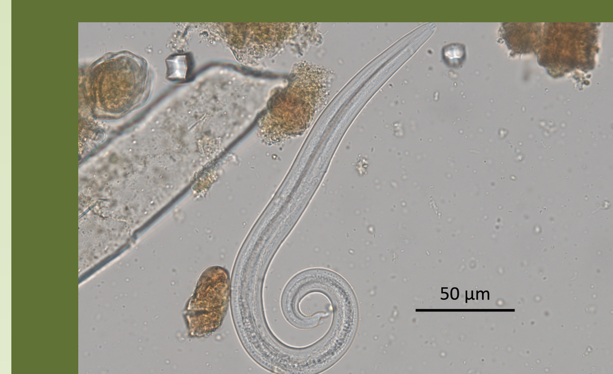
RESULTS

Total number of fecal samples collected was 71 (11 captive, 55 free-range, 5 off-ranch). Fecal flotations and simple sedimentations were run on each sample. Parasite prevalence in captive deer was 100%, in free-range deer was 74.545%, and in off-ranch deer was 100%. Although all of the captive deer samples contained parasites, the diversity was low with a total of two genera seen. Free-range deer had a lower prevalence, but higher diversity than captive deer with four parasite genera and one type of unknown nematode larva. The results were not significant. There was not a significant difference in the parasite content of captive vs free-range vs off-ranch white-tailed deer. Statistical analysis of the data includes a Chi-squared test of 3x2 contingency table with a Fischer's Exact test to determine the significance of the results. The Chi-squared p-value was 0.079141, which is not significant. The Fischer's Exact value was P= 0.11711535244176567.


Fecal sedimentation set-up


Fecal floatation set-up

Eimeria sp. and Trichostrongyle ova



Paraelaphostrongylus sp. larva

Capillaria sp. ova

Gongylonema sp. ova

DATA

	Captive (n=11)	Free-Range (n=55)	Off-Ranch (n=5)
Trichostrongyles	9	35	4
Gongylonema spp.	0	0	2
Trichuris spp.	0	1	0
Capillaria spp.	0	0	4
Paraelaphostrongylus spp.	0	1	2
Eimeria spp.	3	2	0
Unknown nematode larva	0	6	2

Figure 1. Quantities of white-tailed deer fecal samples containing each parasite genera


Sample collection at Elkhart Ranch in Quincy, FL June 2016

DISCUSSION

It was predicted that off-ranch deer would have the highest prevalence and diversity of endoparasite content, followed by free-range deer, and then captive deer. The results showed that there was not a significant difference between the three categories of deer; all categories of deer harbored similar quantities and diversity of parasites seen in fecal samples. Captive deer had the lowest diversity of parasites, most likely due to their seclusion on the ranch, their limited interaction with other deer, and consistent deworming. Free-range deer and off-ranch deer had similar diversity (each had 5 different types), although they contained different species of parasites. This is due to the ability of free-range deer to interact with approximately 240 other cervid and bovid species on the ranch, increasing the likely hood of cross-transmission. Free-range deer also had the opportunity to interact with the five off-ranch deer included in the study and/or their feces, making cross-transmission between them possible. The five off-ranch deer were most representative of a control population as they were wild, coming into the ranch without any prior known parasticide treatments. Possible shortcomings include contamination of fecal samples, small sample sizes, deworming regiments of captive and free-range deer, unrepresentative sampling. To improve the experiment, it would need to be repeated, ideally, in different locations, with larger sample sizes of each category, and none of the deer studied would be on any type of deworming regiment.

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REFERENCES

[1]Eve, J. Hammond, Forest E. Kellog. "Management Implications of Abomasal Parasites in Southeastern White-Tailed Deer". *The Journal of Wildlife Management.* 41. 2 (1977): 169-177. Web.

[2]Zajac, Anne M., and Gary A. Conboy. *Veterinary Clinical Parasitology Eighth Edition*. Ames: John Wiley & Sons, 2012. Print.