Analysis of animal use of "4-Poster", a commercial host-targeted tick control device

Estefany Pineda Hernandez[1], Dr. Jennifer L. Mullinax[1], Dr. Andrew Li[2]

Department of Environmental Science & Technology, University of Maryland- College Park[1],

USDA ARS BARC Invasive Insect Behavior and Biocontrol Laboratory (IIBBL), Beltsville, Maryland[2]

Introduction

- White-tailed deer is a major host of the blacklegged tick that transmits Lyme disease. The expanded deer population has facilitated black-legged tick expansion throughout the northeast of the United States which has resulted in an increased incidence of Lyme Disease.
- The “4-Poster” is a host targeted tick control device used in USDA's Areawide Tick Control project in Howard County, Maryland. The device has a bait dispenser surrounded by paint rollers coated with permethrin-based “Tickicide” solution. While feeding, deer will brush against the rollers applying permethrin to their ears and neck.
- The objective of this project is to help evaluate the use of the "4-Poster" device by deer and non-target animals such as raccoons, rodents, birds, etc.

Figure 1. Impact of the “4-Poster” for tick control on White-tailed deer. Pound, M. (2010).https://www.newtown-ct.gov/sites/newtownct/files/uploads/deer_trtmt_tech_attach_7.pdf

Figure 2. Camera trap photo taken from Rockburn feeder, deer and raccoon apply permethrin to body as they feed from the bait dispenser.

Materials and methods

- Determine if the placement of the '4-Poster' deer bait self-treatment stations are being visited and used by white-tailed deer and other non-target individuals by scoring their feeder usage
- From 7/9/2018 - 8/19/2019, trail camera traps were placed in front of feeders in three parks: Rockburn, Cedar Lane, and Blandair.
- The camera traps have motion sensors and were set to take a photo every 15 minutes.
- For each photo, an ethogram is applied for the animal(s) in the frame to record deer and non-target score and identification.

Figure 3. Maps of the study area and feeder placement in Rockburn, Cedar Lane, and Blandair.

Deer Score (1, 3, 5)	Behavior	Non-target Score (1,3,5)	Behavior	Deer ID	Captured	Non-target ID	Captured
Deer=1	deer in photo, not interacting with feeder/ not touching feeder or not touching roller	**Raccoon=1**	raccoon in photo, not interacting with feeder/ not touching feeder or not touching roller	**fawn**	fawn	**raccoon**	raccoon
Deer= 3	deer eats from feeder BUT does not touch the roller/ deer touches roller BUT not eating from feeder	**Raccoon=3**	raccoon eats from feeder BUT does not touch the roller/ raccoon touches roller BUT not eating from feeder	**collared**	a GPS collared deer	**squirrel**	squirrel
Deer= 5	deer eats from feeder AND touches roller	**Raccoon=5**	raccoon eats from feeder AND touches roller	**eartag**	a deer without a collar but had an eartag	**redfox**	red fox
		Squirrel=1	squirrel in photo, not interacting with feeder/ not touching feeder or not touching roller	**no**	no deer ID present	**redcardinal**	red cardinal
		Squirrel=3	squirrel eats from feeder BUT does not touch the roller/ squirrel touches roller BUT not eating from feeder			**crow**	crow
		Squirrel=5	squirrel is eating from the feeder and tail touches the roller			**rabbit**	rabbit
						bird	Unidentified bird
						coyote	coyote

Table 1. Ethogram used to categorize behavior and identification of individuals captured in trail camera photos.

Graphs and Photos

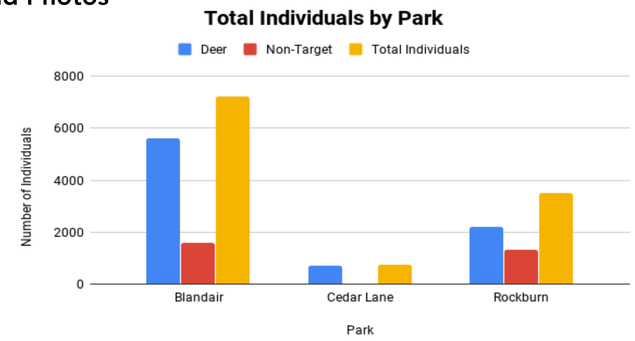

Figure 4. Total number of individuals, white-tailed deer and non-targeted animals observed by park. (Blandair: n= 4614, Cedar Lane: n= 827, Rockburn: n=2709)

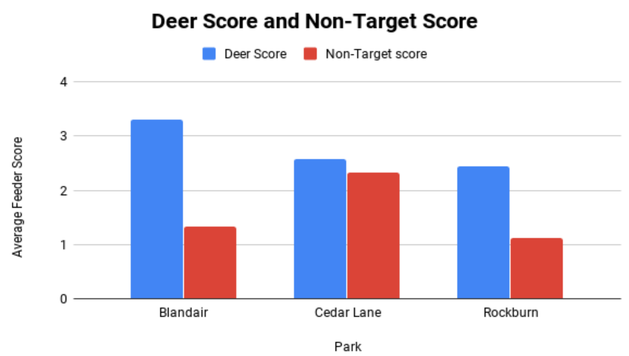

Figure 5. Total feeder use at all parks among white-tailed deer and non-targeted animals. Scores are reported as averages to account for the variation of total times each animal was observed by a camera trap photo. (Blandair: n= 4614, Cedar Lane: n= 827, Rockburn: n=2709)

Figure 6. Camera trap photo taken from Blandair feeder. This is an example of high feeder usage among non-targeted individuals. The five raccoons are given a score, from left to right, 5,1,1,1,5. The photo has a score total of 13.

Figure 7. Camera trap photo taken from Blandair feeder. This is an example of high feeder usage among white-tailed deer. The four deer are given a score, from left to right, 1,5,5,1. The photo has a score total of 12.

Results

- Observed and scored 8,150 photos captured from the trail cameras from all three parks.
- Figure 4 shows that Blandair has the highest number of deer and non-target individuals observed around the feeders, though this may be due to how this park has the highest number of photos scored compared to the other two parks. Nevertheless, in all parks, there are more deer observed than non-targeted animals. This suggests that the “4- Poster” devices are placed in areas where deer tend to frequent, thus, increases the likelihood that deer visit the feeder.
- Figure 5 shows that, on average, deer have higher scores than non-targeted animals for all the parks. This suggests that deer are more likely to use the feeder correctly by touching the permethrin-coated rollers when they visit the feeder compared to non-target species.
- Figure 6 demonstrates how non-target species can cause damage to the ”4-Poster” device. The lid has been moved by raccoons; therefore, allowing rain and moisture to seep through and may cause the corn bait to mold.
- Figure 7 demonstrates how the “4-Poster” device allows two deer to be simultaneously treated by the permethrin- coated paint rollers as they feed from the bait dispenser.

Discussion

- Camera trapping is effective for determining species presence, activity, and behavior.

Figure 8. Camera trap photo taken from Blandair feeders. Fawns and coyote observed to frequent around the “4-Poster.”

- Deer are observed to visit and use the “4-Poster” device correctly by touching the permethrin-coated rollers as they feed.
- Non-target use of the "4-Poster" device means losing of corn bait to non-targets, more damage of the device, and increased maintenance needs
- The next step is to record the absence or presence of “4-Poster damages” to determine the extent of how the damage may have lost its effectiveness to attract visiting deer.

Figure 9. Examples of maintenance work for the “4-Poster” devices. From left to right, maintenance work includes refilling the device with bait, reapplying permethrin to rollers, removing clogs and molding corn bait, and recording how much corn bait was consumed.

Literature cited

Stafford, K. C., & Williams, S. C. 2017. Deer-Targeted Methods: A Review of the Use of Topical Acaricides for the Control of Ticks on White-Tailed Deer. Journal of Integrated Pest Management 8:1.

Acknowledgments

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Further information

If you have a question or comment please contact:

Estefany Pineda epinedahz@gmail.com, Jennifer Mullinax wildlife@umd.edu, Andrew Li andrew.li@usda.gov