*Poster Presentation*

# Risks Associated with the Transmission of Bovine Tuberculosis from White-Tailed Deer to Cattle in Michigan: Current Research

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**Abstract:** Bovine tuberculosis (bTB) is a contagious disease of livestock, wildlife, and humans. Typically, it is transmitted through inhalation of aerosolized bacilli and direct or indirect contact between animals. In northeastern Michigan, bTB is endemic in white-tailed deer, and evidence suggests deer have spread the disease to domestic cattle. Previous research indicates bTB transmission likely occurs through contamination of cattle feeding sources by infected deer and subsequent use by cattle. We are investigating deer movements in relation to farm management practices such as feeding schedules as well as locations of cattle feeding areas, hay storage sites, barns, and water sources. All locations are plotted using ArcMap software. Regular communication with cooperators allows for updates in feeding schedules and locations. We are capturing free-ranging white-tailed deer and fitting them with radio collars equipped with a global positioning system (GPS). As of 15 February 2008, we have retrieved GPS collars from 7 of 16 deer collared in 2007, and 7 new collars have been deployed since 1 January 2008. Each retrieved collar has recorded over 2,500 data points, and preliminary results suggest individual deer are staying within 1.5 km of their capture site. Spatial analysis on deer locations relative to livestock management practices and farm structures will take place when all data is retrieved in late 2008 and early 2009. Once complete, we hope this information will allow us to recommend mitigating measures for livestock producers to reduce the risk of transmission of bTB from free ranging white-tailed deer to domestic cattle.

**Key Words:** bovine tuberculosis, disease, Michigan, *Mycobacterium bovis*, *Odocoileus virginianus*, white-tailed deer

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## INTRODUCTION

In 1975, a hunter-killed white-tailed deer (*Odocoileus virginianus*) was diagnosed with bovine tuberculosis (bTB). Because there were no livestock in the vicinity, bTB surveillance was not performed (Schmitt et al. 1997). In 1994, a second hunter-killed deer taken approximately 13 km from the 1975 case tested positive for bTB. Since 1994, the apparent prevalence of bTB-infected deer has fluctuated between 4.9% and 1.2%, and cases have been largely restricted to a 4-county area designated as Deer Management Unit 452 (DMU 452) (Figure 1).

Bovine tuberculosis is a contagious disease of livestock, wildlife, and humans. Typically, it is transmitted through inhalation of aerosolized bacilli and direct or indirect contact between animals. In northeastern Michigan, bTB is endemic in white-tailed deer, and evidence suggests deer have spread the disease to domestic cattle. Research suggests that shared feed is one method of bTB transmission between deer (Palmer et al. 2004). Due to the relatively high deer densities in Michigan and the lack of effective exclusionary devices to keep deer away from livestock facilities, there is a risk of bTB transmission from deer to domestic livestock.

We are collaring free-ranging deer with GPS collars to evaluate annual deer movements in relation to livestock husbandry practices, such as feeding locations, water sources, and feed storage facilities. We hope this information will allow us to provide recommendations to livestock producers on mitigating measures to reduce their risk of bTB transmission from white-tailed deer to domestic livestock.

**Figure 1. Deer Management Unit (DMU) 452 in Michigan.**

## STUDY SITES

Study sites are beef cattle farms ranging from 30-160 ha in and around DMU 452. Each farm manages ≥20 cattle annually and includes wooded areas that serve as cover and winter deer habitat (Figure 2). All farms use similar feeding and management practices, including pasturing cattle during the summer, storing hay bales in high fenced areas, and storing supplemental feed in a closed barn. One study site has been previously infected with bTB, and 3 of the study sites are in close proximity to infected or previously infected farms.

**Figure 2. Example of a study site.**

**Figure 3. Baited Clover trap.**

## METHODS

Deer were trapped from 19 January to 16 March 2007 and from 5 January to 5 March 2008 using collapsible Clover traps (Figure 3). Traps were baited with shelled corn soaked in molasses and checked daily after 8:00 A.M. If overnight temperatures were forecasted below -17.8ºC, traps were closed for the night. Captured deer were physically restrained or restrained by collapsing the trap (Figure 4). Upon capture, deer age (fawn vs. adult) was determined from body size and structure. Adult and yearling deer were fitted with uniquely colored and numbered ear tags and a radio collar equipped with a global positioning system (GPS) (Figures 5 and 6) (Advanced Telemetry Systems, Inc., Isanti, MN). Each GPS collar is programmed to record a location every 2 hours for 1 year after activation before dropping off. Deer are tracked bi-weekly using VHF telemetry to monitor for mortalities and determine whether deer are remaining on or near study sites.

**Figure 4. Restraining a deer captured in a collapsed Clover trap.**

**Figure 5. Attaching a GPS collar.**

## RESULTS AND DISCUSSION

To date, 137 deer have been captured during 2,357 trap nights, resulting in 27 collared adult does on 4 properties in 3 Michigan counties. Ten collars have been retrieved, and each collar has recorded over 2,500 data points. Preliminary movement data suggest most deer are staying within 1.5 km of their capture site. Movement data will be correlated with farming practices, the location of feeding and watering areas, farm structures, and habitat types to determine potential interaction and thus the spread of disease between deer

**Figure 6. Deer with blindfold, ear tags, and radio collar.**

and cattle. Spatial analysis on deer locations relative to livestock management practices and farm structures will take place when all data is retrieved in late 2008 and early 2009. Once complete, we hope this information will allow us to recommend mitigating measures for livestock producers to reduce the risk of transmission of bTB from free ranging white-tailed deer to domestic cattle.

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