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Bovine Tuberculosis in Michigan White-tailed Deer

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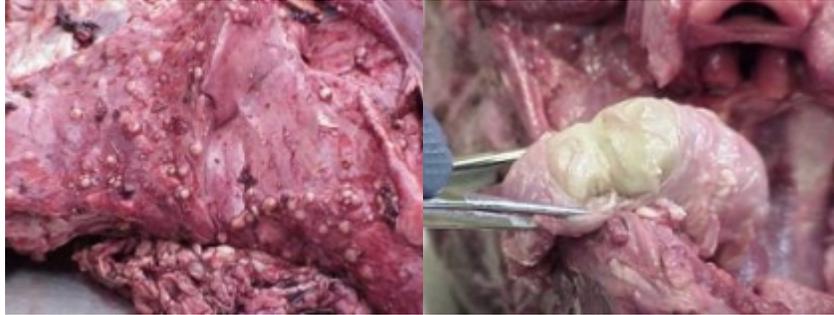


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Bovine Tuberculosis



Description

Tuberculosis (TB) is a serious disease caused when bacteria attack the respiratory system. There are three types of TB - human, avian, and bovine. Human TB is rarely transmitted to non-humans, avian TB is typically restricted to birds (pigs and occasionally other animals have been found to be susceptible), and bovine TB - or cattle TB - is the most infectious, capable of infecting most mammals. Bovine TB is caused by the bacterium *Mycobacterium bovis* (*M. bovis*) which is part of the *Mycobacterium tuberculosis* complex.

Distribution

Although bovine TB was once relatively common in cattle in the U.S., it has historically been a very rare disease in wild deer. Prior to 1994, only eight wild white-tailed and mule deer had been reported with bovine TB in North America.

In 1994, a hunter in southwestern Alpena County shot a 4-year old male white-tailed deer infected with bovine TB. The only other time TB had been found in a wild deer in Michigan was in 1975, when a hunter killed a 9-year old bovine TB infected female white-tailed deer in Alcona County.

Starting in 1995 hunter harvested, road killed, and other dead deer were examined for bovine TB infection. White-tailed deer in Michigan have since been tested year round for bovine TB. Testing revealed that most of the TB positive animals were located in a core area in the northeastern part of Michigan's Lower Peninsula. The core area is located around the four corners where the counties of Montmorency, Alpena, Oscoda and Alcona meet. Antrim, Crawford, Emmet, Iosco, Mecosta, Osceola, Otsego, Presque Isle, and Roscommon Counties have also had animals test positive for bovine TB.

In Michigan bovine TB has been found in white-tailed deer, elk, black bear, bobcat, coyote, opossum, raccoon, and red fox.

Transmission and Development

Bovine TB is spread primarily through the exchange of respiratory secretions between infected and uninfected animals. This transmission usually happens when animals are in close contact with each other. Thus, animal density plays a major factor in the transmission of *M. Bovis*. Bacteria released into the air through coughing and sneezing can spread the disease to uninfected animals. Research suggests that bovine TB can also be contracted from ingesting contaminated feed. Survival of *M. Bovis* in the environment is primarily affected by exposure to sunlight. Reports on the length of survival of *M. bovis* vary from 18-332 days at temperatures ranging from 54-75 F. In a number of studies under laboratory conditions, *M. Bovis* has been isolated for up to 8 weeks from various feeds kept at 75 F and 14 weeks from various feeds kept at 32 F. However, under field conditions, it is difficult to isolate *M. bovis* from pastures grazed by animals known to be infected with bovine TB. Non-cervid animals most likely contract TB from feeding on infected tissues from deer carcasses.

Bovine TB is a chronic disease and it can take years to develop. *M. Bovis* grows very slowly and only replicates every 12-20 hours. The lymph nodes in the animal's head usually show infection first and as the disease progresses lesions will begin to develop on the surface of the lungs and chest cavity. In severely infected deer, lesions can usually be found throughout the animal's entire body. Non-cervid animals on the other hand do not develop the disease as extensively and lesions are usually not found in lungs or other tissues.

Clinical Signs and Pathology

Small lesions in wild white-tailed deer are not always readily recognized by hunters. Abscesses may not be visible to hunters when field dressing deer. In fact, most infected white-tailed deer appear healthy. Only 42 percent of the TB positive deer in Michigan have had lesions in the chest cavity or lungs that would be recognized as unusual by most deer hunters. These deer had tan or yellow lumps on the inside surface of the rib cage and/or in and on the lung tissue.

Bovine TB infected deer not showing lesions in the chest cavity can be diagnosed by performing a visual inspection of the lymph nodes in the deer's head. Affected lymph nodes, when cut, will contain one or more necrotic nodules. These nodules may vary in size and be filled with yellow-green or tan pus.

Tuberculosis is a chronic, progressive disease that can cause gradual debilitation, emaciation, depression, and intolerance to exercise. Coughing, nasal discharge, and difficulty breathing can result in cases where the lungs become severely affected. In some instances, superficial lymph nodes in the neck will develop large abscesses that may rupture and drain through the skin.

Diagnosis

After performing a visual inspection of the lymph nodes, any suspicious looking lymph nodes are removed for further testing. *M. Bovis* is unique among the bacteria because they have a lot of waxy material in their cell walls. Because of the waxy material (known as mycolic acid), the usual stains for looking at bacteria with a microscope do not work. The mycolic acids give the Mycobacterium the ability to hold onto special bacterial stains, allowing them to be seen with a microscope. The special stain is called an acid-fast stain. The stain causes the Mycobacterium to look like very small red rods that are called acid-fast bacilli.

The rest of the sample is transferred to culture (growth) media which will allow any acid-fast bacilli which are present to multiply. Over the next two months, culture media is examined regularly looking for growth typical of *M. bovis*. This normally appears in 10-14 days. The growth is tested using genetic probes to determine whether the culture contains *M. tuberculosis* complex, of which

M. bovis is a member. Additional biochemical testing, which requires three to five weeks, will confirm the final identification.

Treatment and Control

Since there are no effective vaccines for disease prevention and no effective medications for treatment of bovine TB in wild deer, a combination of wildlife disease surveys and deer management strategies are being used to eliminate the disease in wild deer. The wildlife surveys monitor the spread and occurrence of the disease, while hunters are asked to examine their deer from all areas of the state.

Humans can be skin-tested to determine if they have been exposed to TB. These tests can be done at either the local health department or a private physician's office. A positive skin test, however, does not identify the source of the infection. Remember, most people get the infection from other people.

Significance

In the U.S. today, the threat of humans contracting bovine TB from animals is extremely remote. Health officials have confidence in the state's meat and milk supply.

At risk are Michigan's deer herd and other wildlife species with their many social, ecological, and economic values as well as Michigan's livestock industry. By continuing to eliminate TB-infected animals from wild and domestic animal populations, paying close attention to the meat inspection and pasteurization processes, using proper food handling, and good management practices, the chance of bovine TB transmission from animals to humans is virtually eliminated.

For questions about wildlife diseases, please contact the [Michigan DNR Wildlife Disease Laboratory](#).

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