Deer Diseases Don't Discriminate

Soon after their arrival on the continent, European cattle transmitted tuberculosis and other diseases to native populations of deer. Now, with their numbers exploding, deer are returning the favor.

Story by
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It is a species success story no one likes to talk about. Though intensive farming and widespread commercial hunting reduced the white-tailed deer population from an estimated 30 million when the colonists arrived to 500,000 in the early part of the last century, they have returned, with a vengeance.

Today researchers estimate that our national whitetail population has climbed back up to what it was before the arrival of the white man. In southern New York and northern Pennsylvania, recent counts put deer densities at twice that of colonial times.

No one can dispute that since the end of commercial hunting, the whitetail has been remarkably successful at adapting to human habitation. Unfortunately that success comes with a price, and that price could be paid, unwittingly, by seedstock producers.

"In Michigan we have been seeing the transmission of tuberculosis (TB) from deer to cattle," says Michael Dutcher, senior staff veterinarian for the U.S. Department of Agriculture's (USDA's) Bovine TB Eradication Program. "That can be devastating to a seedstock producer, especially when he has built up all [those] good genetics and is facing the potential depopulation of his herd."

TB isn't the only disease spread by deer. Recent scientific investigations confirm that hemorrhagic disease (HD), salmonella and *E. coli* can also be passed from deer to cattle. In addition, livestock producers face a direct disease threat from deer in the form of Lyme disease — a tick-borne pathogen.

Bovine tuberculosis

In a report released by the National Wildlife Center, bovine TB *(Mycobacterium bovis)* is characterized as a contagious, bacterial disease that has the potential of infecting wildlife, livestock and humans.

One of three types of TB, bovine TB is primarily associated with cattle and other ungulates, but it can be transmitted to humans and other animals. It is a chronic disease that rarely manifests itself outwardly until it has reached its advanced stages. Bovine TB has its origins in Europe and Asia and was introduced to the wildlife populations in the New World by infected livestock imported by the first settlers to the United States, Canada and Central America.

While bovine TB is not easily spread by human-to-human contact, its effect on public health has been significant. Prior to the introduction of the pasteurization process — the first mandatory milk pasteurization law passed in the U.S. in 1908 — it is believed to have been the cause of a large number of TB cases in humans. The Centers for Disease Control and Prevention (CDC) estimate that 20%-40% of human TB cases in the 1900s resulted from drinking unpasteurized milk from cows infected with bovine TB.

These human health implications as well as economic concerns have led agencies in the United States government to engage in aggressive TB eradication programs since 1917.

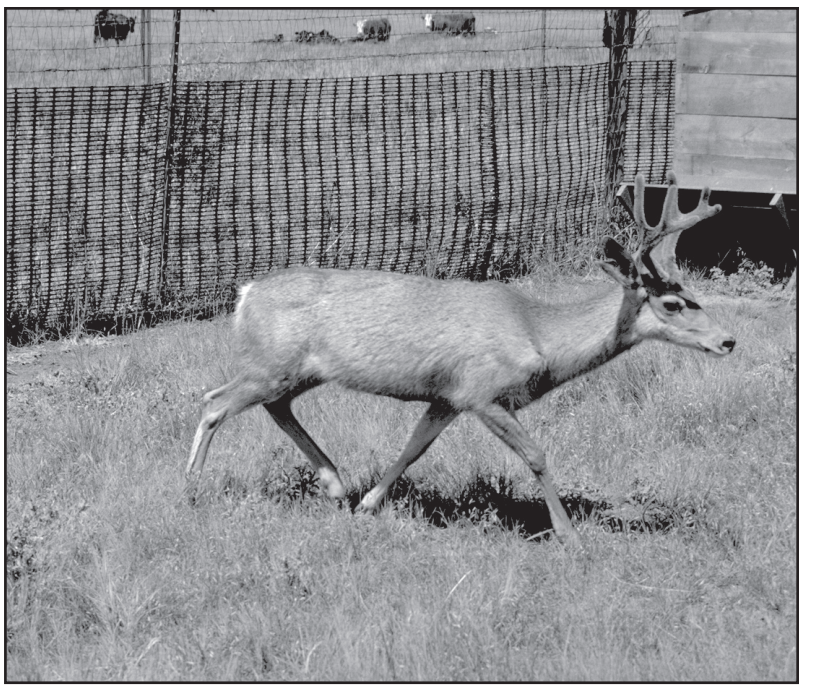
Since then, major progress has been made in eliminating TB from resident beef and dairy herds. It appeared that originally established eradication goals would be met by the turn of the century. However, while TB was being systematically eliminated from U.S. livestock herds, it appeared to be on the rise — along with a general population explosion — within the white-tailed deer population.

Research confirms that white-tailed deer infect each other when they inhale or ingest infectious organisms. It is believed that transmission is aided by high deer densities and prolonged contact with each other, as when browsing at a single feed source, such as a hay stack.

In deer, the bacteria attack the tonsils first, then spread to other cranial lymph nodes. With some animals, the disease is contained in the head cavity, but with others it spreads into other sites in the body. At this stage the animal is highly infectious, spreading the bacteria through aerosol or oral secretions, milk and feces.

Michigan cases a first

One of the first states to identify the growing threat of bovine TB in its resident deer herds was Michigan. Monitoring of Michigan deer populations by government wildlife and health agencies between 1975



Deer are responsible for the spread of a variety of diseases, ranging from TB to Lyme disease.

and 1998 confirmed a threat. By the 1990s, the suspected transmission of the disease from deer back to cattle was documented.

As a result, on Aug. 13, 1998, Michigan lost its "accredited-free status," a designation administered by the Animal and Plant Health Inspection Service (APHIS) certifying TB-free status and allowing for unrestricted interstate movement of cattle. Large economic losses to that state's livestock industry followed — an estimated $22 million to $77 million during the following five-year period.

In 2001 the National Wildlife Research Center (NWRC) began investigating bovine TB in Michigan. Research efforts focused on developing a greater understanding of the role deer and other wildlife species played as reservoirs and vectors of the disease.

It is believed that high-risk activities, such as feeding at concentrated sites, have been inadvertently encouraged by an emerging pay-for-hunting industry that establishes bait stations for deer.

Contaminated forage

What NWRC researchers also learned was that, while transmission between deer and cattle can occur via direct means, most commonly nose-to-nose contact, TB is more often transmitted indirectly through the two species sharing contaminated feed sources such as hay stacks, hay bales, feed troughs and bait/feed piles.

Deer spreading bovine TB to cattle in Michigan remains a serious problem to the beef industry in the state. In addition to losses relating to the export of cattle out of state, it has resulted in the depopulating of scores of beef and dairy herds in recent years.

For USDA veterinarians like Michael Dutcher, Michigan deer populations could represent, in a microcosm, a larger, more widespread problem directly related to the wide-scale proliferation of white-tailed deer in North America. It should be noted that bovine TB has been detected in five Minnesota herds since 2005. Prior to the current cluster of TB positives, the last diagnosed case in the state was in 1971.

E. coli and salmonella

E. coli O157:H7 and Salmonella spp. are two of the leading causes of foodborne illness in the United Sates, and these bacteria have been found in a variety of ruminants, including deer and cattle.

During the last 15 years, the two bacteria have come to public attention by two high-profile contamination cases, the most publicized being an *E. coli* O157:H7 outbreak that occurred in 1993 when hundreds of people in several western states became ill and four died after eating undercooked hamburgers. More recently, an *E. coli* contamination in raw spinach originated in California, and salmonella grabbed its own headlines in 2006 when it was detected in peanut butter manufactured in Georgia.

While no conclusive research data has been presented to confirm that deer pass *E. coli* and salmonella on to cattle on a regular basis, the circumstantial evidence is strong enough to warrant further research.

In a study reported in the *Journal of Veterinary Medicine* in September 1999, researchers from the Food Animal Health and Management Center at Kansas State

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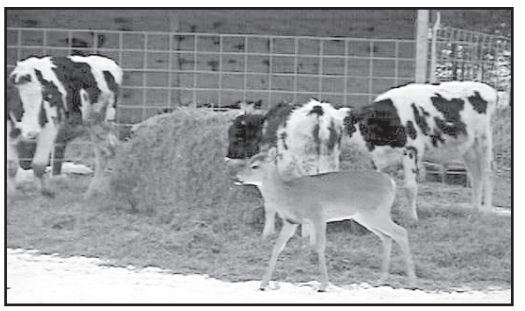

Next time you see deer feeding with your cattle, remember the cost associated with their presence might be a lot more than a couple bales of hay.

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University, Manhattan, measured the prevalence of fecal shedding of *E. coli* O157:H7 in white-tailed deer with access to cattle pastures. Researchers found that out of 212 fecal samples from free-ranging white-tailed deer, 2.4% tested positive for *E. coli.*

E. coli O157 has been isolated from deer in other states, suggesting a possible wildlife source for infection. In one case, the organisms isolated from two deer and five cattle on a ranch in Texas had identical PFGE patterns. PFGE stands for pulsed field gel electrophoresis, a technique used to separate strands of DNA to allow comparison of large genomic DNA fragments.

In another more recent study conducted at Texas Angelo State University, San Angelo, Texas, USDA-ARS, College Station, Texas, researchers assessed the incidence of *E. coli* O157 and salmonella in white-tailed deer *(Odocoileus virginianus)* and livestock simultaneously grazing the same rangeland. While *E. coli* was not detected in the deer and cattle populations simultaneously, salmonella was.

Both bacteria were detected in water samples drawn from water troughs.

Lyme disease

While Lyme disease, caused by *Borrelia burgdorferi*, has no visible economic effect on cattle, it can and often does have a significant health effect in beef producers who become infected.

The disease, a bacterium transmitted by the deer tick *(Ixodes scapularis)*, is the most common vector-borne disease in North America and is considered a serious threat to human health, especially if it goes undetected and untreated.

More than 23,000 cases of Lyme disease were reported nationally in 2005 alone. This represents a national average of 7.9 cases for every 100,000 persons. In the 10 states where Lyme disease is most common, the average was 31.6 cases for every 100,000 persons. Not surprisingly, most of those states have correspondingly high deer populations.

Experts confirm it is no coincidence that the rising incidence of Lyme disease and other tick-borne illnesses such as ehrlichiosis has been accompanied by a spike in the deer population. In more than one northeastern state, where 90% of Lyme disease cases occur, researchers have established links between the increased incidences of Lyme disease to the exploding populations of white-tailed deer. In fact, 95% of adult female deer ticks use white-tailed deer as a blood host.

Unfortunately, ticks, for most beef producers, are an occupational hazard. The odious blood suckers are most commonly found in brush, wooded areas and tall grass.

The initial symptoms for Lyme disease are flu-like — muscle aches, low-grade fever, headaches and general malaise. Another symptom found in more than 50% of infections is a skin lesion, popularly known as the "bull's-eye" rash. This can be identified as a red circle enclosing a lighter center that over a period of days expands in diameter.

In most cases these symptoms disappear within a week, but if not treated, the bacteria will remain in the body and eventually migrate into the heart, causing chronic cardiac abnormalities, or into the central nervous system, where the disease can be responsible for a variety of mental problems ranging from memory loss to dementia to paralysis.

One of the most commonly experienced consequences of Lyme disease is inflammation of the joints manifested by severe arthritis and swelling of the knees, elbows or other joints. These last symptoms can begin as early as one month after initial exposure.

Tests are available for the diagnosis of Lyme disease, and if caught early and treated with antibiotics, it is curable.

Advice from the CDC

Consider the following tips from the Centers for Disease Control and Prevention (CDC).

1. Avoid areas with a lot of ticks.

Ticks prefer wooded and bushy areas with high grass and a lot of leaf litter. These are areas to avoid. Take extra precautions in May, June and July. This is when ticks that transmit Lyme disease are most active. If you do enter a tick area, walk in the center of the trail to avoid contact with overgrown grass, brush and leaf litter.

Ask your local health department and park or Extension service about tick-infested areas to avoid.

2. Keep ticks off your skin.

Use insect repellent with 20%-30% DEET on adult skin and clothing to prevent tick bites. Effective repellents are found in drug, grocery and discount stores.

Permethrin is another type of repellent. It can be purchased at outdoor equipment stores that carry camping or hunting gear. Permethrin kills ticks on contact. One application to pants, socks, and shoes typically stays effective through several washings. Permethrin should not be applied directly to skin. For details on permethrin, visit the National Pesticide Information Center at *http://npic.orst.edu*.

Wear long pants, long sleeves and long socks to keep ticks off your skin. Light-colored clothing will help you spot ticks more easily. Tucking pant legs into socks or boots and tucking shirts into pants help keep ticks on the outside of clothing. If you'll be outside for an extended period of time, tape the area where your pants and socks meet to prevent ticks from crawling under your clothes.

3. Check your skin and clothes for ticks every day.

Remove ticks from your clothes before going indoors. To kill ticks that you may have missed, wash your clothes with hot water and dry them using high heat for at least one hour.

Perform daily tick checks after being outdoors, even in your own yard. Inspect all parts of your body carefully including your armpits, scalp and groin. Remove ticks immediately using fine-tipped tweezers.

If a tick is attached to your skin for less than 24 hours, your chance of getting Lyme disease is extremely small. To be safe, monitor your health closely after a tick bite, and be alert for any signs and symptoms of tick-borne illness.

Source: *www.cdc.gov/ncidod/dvbid/lyme/Prevention/ld_Prevention_Avoid.htm*