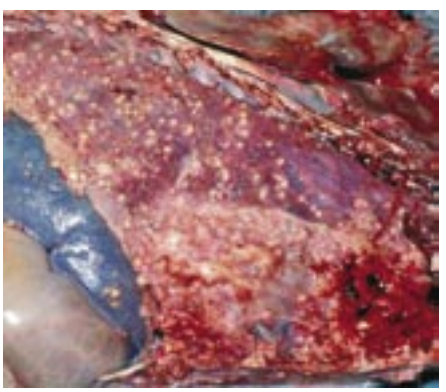
by Dr. Lana Kaiser

How does a cow become a bovine model? How is a cow chosen as the "Poster Cow" for a state campaign? Is it that she is a registered Maine-Anjou? A Cornerstone Dam? An excellent and photogenic representative of the breed? A red and white beauty? Or was it a matter of being in the right place at the right time? To understand how "The Lovely Lamont" became the poster cow for Michigan's bovine TB eradication effort, we must travel back to 1994.

In 1994, a wild white-tailed deer was shot by a hunter in the northeast part of the lower peninsula of Michigan. This deer was infected with bovine tuberculosis (bovine TB). At the time, it was believed deer were relatively resistant to bovine TB and that few deer infected had acquired the infection from cattle. This deer could have been buried and ignored, but because of concern for human and animal health it was not. In the end, two individuals, Mike Chaddock, state veterinarian, and Steve Schmitt, a wildlife veterinarian with the Department of Natural Resources, began thinking outside the box. Historically, in the United States, bovine TB was felt to be passed between cattle with occasional human infections occurring through unpastuerized milk. Mike and Steve wondered if infected white-tailed deer could transmit bovine TB to domestic cattle.



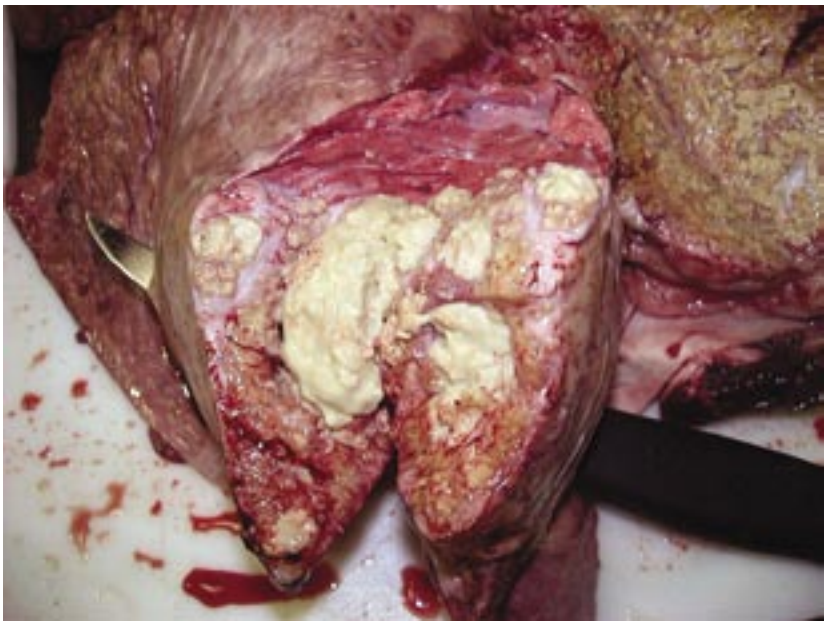
Lung from a wild white-tailed deer demonstrating the classic TB *lesions the "tubercules" can be seen as white bumps on the surface.*
Photo courtesy of Dr. Scott Fitzgerald, Michigan State University

Over a decade later, their foresight has changed the thinking on bovine TB and resulted in not only an enormous effort to eradicate bovine TB from Michigan's domestic cattle and wild white-tailed deer, but also a program of premise and animal identification not found anywhere else in the nation.

After the discovery of the infected deer, a massive multi-agency effort began to eradicate bovine TB. This involved testing all cattle herds in the state (as well as goat and privately owned cervid herds). In addition, TB surveillance of hunter killed deer. To date over one million cattle and all cattle herds in Michigan have been tested. Of more than 17,000 cattle herds tested, 33 herds (26 beef and seven dairy) have had one or more animals diagnosed with bovine TB. Of almost 3,000 head from these 33 herds, approximately 100 were found to test positive on either culture or molecular testing. Herd size varied from six to almost 300. Most of these herds were depopulated. The first herd diagnosed with bovine TB was in October, 1997 and the last herd identified in June, 2004. Surveillance testing continues in northeast lower Michigan and targeted TB testing occurs throughout the state. Having lived it for the past decade, Michigan cattlemen, as well as private veterinarians probably know more about TB testing, regulations, and movement requirements than individuals anywhere else in the country!

Bovine TB has had an enormous effect on the cattle industry in Michigan, especially northeast Michigan. The movement restrictions and additional testing required cattlemen to think outside the box to survive. John Molesworth, a veterinarian in the "TB area" almost single handedly organized cattle producers in the area and formed the North Country Beef Producers, to combine efforts, enhance market share and increase buying power. Producers in other parts of the state reorganized sales and realized to ship cattle, additional TB testing was required. For many, the annual whole herd TB test became business as usual.

Michigan's bovine TB eradication effort has been long and complicated and expensive; however, the effort has had many positive outcomes. Michigan has received "split state status" from the USDA, such that the "TB area" is classified as Modified Accredited, while the remainder of the state is Modified Accredited Advanced. This has resulted in opening borders, changes in movement requirements and improved trade for the state. Unique individual animal identification is required of all cattle in Michigan and all farms



Lung from a 2-year-old beef heifer with bovine TB. *Note the many pus-filled abscesses. These lesions were found on routine slaughter surveillance and the animal did not enter the food chain.*
Photo by Joe Dubas, courtesy of USDA FSIS

have premise numbers. All cattle from the modified accredited area are required to have electronic ID (EID). Many producers throughout the state are using EID.

Management and surveillance has demonstrated a decreased prevalence of bovine TB in the wild white-tailed deer. Although deer-to-deer, deer-to-cattle and cattle-to-cattle transmission of infection does occur, research has shown transmission of bovine TB from deer-to-cattle is NOT primarily the result of direct contact between deer and cattle. Interestingly, it is deer eating and contaminating hay, silage, hay silage and other feedstuffs that is the primary mode of transmission of bovine TB from deer-to-cattle. For example, when infected deer congregate to eat from round bales left in a field, they leave the bovine TB bacteria behind on the hay. The bacteria is hearty, and can live there for a long time. When the hay is fed to cattle, cattle often rip off a big piece and throw it into the air. This results in the bacteria becoming airborne. Airborne bacteria can be inhaled by cattle, resulting in bovine TB infection. The bacteria can also be ingested and potentially cause infection. The solution to prevent bovine TB in Michigan cattle herds is to prevent deer from contact with your hay, silage and other feedstuffs.

Back to the original question, how was the Lovely Lamont chosen as the poster cow for the TB eradication effort? Despite all her credentials, Lamont just happened to be a photogenic cow willing to eat hay and pose for the State Bovine TB Eradication Coordinator — who happened to be visiting the farm that day!

Question and Answer

Tuberculosis is a global public and animal health problem with approximately nine million new cases diagnosed each year in humans and three million deaths annually. Bovine TB is one of the causes of tuberculosis worldwide.

What is bovine TB?
Bovine TB is an ancient bacterial disease with the potential to infect any mammal, including humans. It is infectious, contagious and zoonotic. Bovine TB infects cattle, goats and other livestock worldwide. Wildlife serves as a reservoir for bovine TB.

What causes bovine TB?
Bovine TB is caused by the bacteria Mycobacterium bovis. M bovis is closely related to the bacteria that causes most of the human cases of TB (Mycobacterium tuberculosis), the bacteria that causes leprosy (Mycobacterium leprae) and the bacteria that causes Johne's disease (Mycobacterium avium paratuberculosis).

How do humans get bovine TB?
Prior to 1000 BC the major cause of TB in people was bovine TB. Pasteurization of milk dramatically deceased bovine TB as a cause of human disease. In industrial nations, pasteurization has all but eliminated bovine TB in humans. Test and slaughter programs markedly decreased the incidence of cattle infected with bovine TB. The greatest risk of human infection is the use of unpastuerized milk. This is a concern in developing countries where raw milk may be a staple.

Is there bovine TB in people in the United States?
Yes, there is and the problem is sporadic. Elderly individuals who drank unpasteurized milk decades ago have been diagnosed with bovine TB. Recently, 35 people in New York City were diagnosed with bovine TB. Thirty-four of the people recovered after drug treatment; a 15-month-old infant died. This outbreak of bovine TB was traced to fresh cheese imported privately from Mexico and made from unpasteurized milk. In Michigan, a hunter who cut himself while gutting an infected deer was diagnosed with bovine TB.

How is bovine TB spread?
Close contact of animals increases the chance of inhaling airborne

bacteria. However, it now appears a major mode of infection in cattle is through infected feed. Carnivores are infected by eating infected carcasses.

How is bovine TB diagnosed?

Although the gross lesions of bovine TB are characteristic, definitive diagnosis is made at necropsy by identifying the bacteria. The bacteria can be identified by culture or molecular techniques. Using molecular techniques, the bacteria can also be "typed", so the identity can be confirmed. For example, the strain of TB from deer in Michigan is different from the strain found in Canada.

What is the federal bovine TB eradication program?

Bovine TB can cause human and animal health issues, economic and social problems, and impede interstate and worldwide movement of cattle. To eradicate bovine TB, the USDA, in cooperation with the states, has a program describing testing and surveillance requirements, as well as defining "state status" based on the prevalence of bovine TB in the state. The state classifications are as follows (from best case to worse case):

- Accredited Free
- Modified Accredited Advanced
- Modified Accredited
- Accreditation Preparatory
- Non-Accredited

Movement of cattle between states is governed by the state status, such that cattle from the Modified Accredited states have more stringent testing requirements than those from the Accredited Free states.

What tests are used for bovine TB?

The most common test is the caudal fold test. This is similar to the TB skin test in people. It is a screening test. A small amount of tuberculin in injected under the top layer of skin on the caudal fold of the tail. Three days later the veterinarian reads the test (the vet should both look and feel the injected area). If there is no redness, swelling or bumps, the test is negative and no further action is required. About 95 percent of all cattle tested are negative to this test.

If there is redness, swelling or bumps, the animal is said to be a suspect or a responder, and further testing is required. This does not mean the animal has TB. Screening tests are designed to pick up all the infected animals and to do this they also pick up five to ten percent of animals who are not infected (this is called a false positive).

The next level is done by regulatory veterinarians and is more specific tests. They can either do the comparative cervical test or a new blood test called the gamma interferon test. Both of these compare the animal's responses to bovine and avian TB. If this test is negative, no further action is required.

It gets a little confusing if the test is positive. The animal can be classified as a suspect (in which case re-testing is an option) or a reactor (in which case the animal is sent for necropsy).

In addition to live cattle testing, slaughter surveillance is in place across the country. Each case of bovine TB identified at slaughter is traced back to the herd of origin and additional live animal testing is done.

Where has bovine TB been diagnosed in North America?

In the last decade, bovine TB has been diagnosed in cattle herds in Michigan, Texas, California, New Mexico, Arizona, Minnesota as well as Ontario and Mexico. Currently, all states but Michigan, New Mexico and Texas are classified as Accredited Free. The status of the state is dependent upon the number of herds infected with bovine TB, the eradication plan, the time lapsed since diagnosis, etc. State status can be down graded rapidly if more infected herds are found. Upgrading state status requires a request from the state as well as meeting federal requirements.

What's the bottom line?

Bovine TB is a chronic, contagious, infectious disease of cattle that can wreak havoc with the ability to market cattle. Eradication is expensive, financially, emotionally and socially. To protect your herd, your states status and the ability of the U.S. to export live cattle, follow the rules for TB testing when moving cattle.

For more information on bovine TB, visit *www.michigan.gov/emergingdiseases or www.aphis.usda.gov/vs/nahps/tb*.

For a copy of the Bovine TB Uniform Methods and Rules, visit *http://www.aphis.usda.gov/vs/nahps/tb/tb-umr.pdf*.

For more information on the Lovely Lamont, visit *www.kaisercattle.com*.

If you would like to support the bovine TB eradication effort with a bumper sticker on your truck, contact Bridget Patrick, State Bovine TB Eradication Coordinator — PatrickB@michigan.gov or (517) 335-9970.