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Bovine Tuberculosis: Infected Dairy Herd Identified in California

Many of you have heard by now that animal health officials have discovered a California dairy infected with bovine tuberculosis. We will use the space in this column for an excellent article on the subject by Dr. Hamlen and Dr. Davidson-York from the Animal Health Branch of CDFA. Next month we will give you an additional update on this problem. We felt it was very important for you to know as much about this problem as possible at this time. Additionally, we will devote much of our cattle health committee meeting at mid-year to this issue.

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Tuberculosis (TB) is a major cause of disability and death for people and animals in many parts of the world. The infected dairy cow and human consumption of unpasteurized milk and milk products play a critical role in the spread of tuberculosis. After a century of aggressive control measures, the occurrence of this devastating disease in both people and animals has dramatically decreased in the United States. However, the effort to eradicate bovine tuberculosis, first begun in 1917, has not yet achieved the goal, and is faced with serious challenges. The discovery of a TB infected dairy herd in California highlights the difficulties in eradicating this disease. Understanding the importance of continued vigilance against bovine tuberculosis will allow dairy and beef producers to protect their herds and the public health.

Introduction:

Tuberculosis (TB) is caused by *Mycobacteria*, a group of bacteria that are highly resistant to changes in pH, many disinfectants, and drying. The bacteria may survive for long periods in the soil. The bacteria is killed by sunlight, pasteurization, and phenolic disinfectants¹. Tuberculosis is classified into three types - human, bovine, and avian, and these conditions are caused by different species of *Mycobacteria*. Specifically, *M. tuberculosis* causes the human type, *M. bovis* the bovine form, and *M. avium* the bird condition¹. However, the "type" describes the host that is most often infected by that agent. In reality, bacteria don't read the medical textbooks! Although rare, human TB can also infect hogs, cattle, and dogs, while bovine TB can be transmitted from cattle to hogs, people, and essentially any warm-blooded animal. Avian TB, although primarily affecting birds, may also infect hogs and cattle, but is rarely transmitted to people with healthy immune systems. Transmission in animals occurs by inhalation of infected aerosol droplets or by ingestion of the agent in the water, feed, milk, or soil. Calves may be born with TB from an affected dam^{1,2} or acquire it by drinking infected, unpasteurized milk. People acquire TB by the same means as animals, by ingestion and inhalation. Any animal (calves, hogs, and people) drinking unpasteurized milk or eating improperly cooked meat from an infected animal is at risk of contracting TB or other milk-borne diseases. Once the Mycobacterium is ingested or inhaled, the disease may be "silent" or inapparent, even to an experienced farmer or veterinarian, until the advanced stage. Tuberculosis may remain "silent" for years. Unfortunately, infected people or animals that appear healthy may be capable of transmitting the infection. Tuberculosis lesions can affect any part of the body but generally affect the lungs and lymph nodes and the chest cavity. The normally smooth internal lining of the chest cavity may be marred by lesions. Production losses in cattle occur by early culling, ill-thrift, and decreased milk production³. In advanced stages, animals may show weakness, weight loss, and fluctuating fever. The complicated nature of TB transmission, the resistance of the agent to disinfection, and the long period of infection prior to development of overt signs of disease have made TB a difficult disease to control.

Challenges to Bovine TB Control:

Strategies to eliminate bovine TB in cattle include: 1) tuberculin testing and slaughter of reactors, 2) nationwide surveillance for TB lesions in slaughtered cattle, 3) tracing sales and purchases from herds with tuberculosis to determine possible spread and origin of infection, and 4) import exclusion of cattle testing positive for TB. However, the eradication program that made such great strides in the past has apparently stalled in the last 10 years⁴. The continual, low-level discovery of a few infected herds per year remains unchanged since the early 1980's. Most of the infected herds have been in the El Paso, Texas and New Mexico milksheds⁸ and Michigan. In June, 2002 an infected herd was discovered in California. In addition to the persistent discovery of newly infected herds, the eradication program faces new threats to its success⁴.

1. Dairy herds continue to increase in size. It is in the large dairy that the infection tends to persist. Depopulation of these large herds has not been possible because public funds are insufficient to compensate the producer for both infected and exposed animals. Without complete depopulation it is difficult to rid the herd of the last vestige of TB.
2. The number of Mexican cattle entering the United States as Holstein feeder steers, roping/rodeo steers, and bulls increased during the 1980's. The higher prevalence of TB in Mexican cattle led to the concern of reintroduction of bovine TB into the U. S. cattle herds.
3. Growth in the number of farmed deer, elk, and bison herds, and the movement of animals between herds presents a new threat to TB control.

Bovine TB in California:

The work of TB eradication in California has made great strides but is faced with a serious challenge that will require the cooperation of all California cattle producers and veterinarians. In May 1998, CDFA instituted a TB action plan with the goals of increasing the number of certified free dairy herds in California, enhancing existing slaughter surveillance, providing greater incentive to slaughterhouse personnel to find animals with suspect TB lesions, and achieving TB free status in 1999. This goal was achieved, but in June 2002 a dairy herd in Tulare County was identified as being infected with bovine TB following slaughter surveillance, trace-back to the herd of origin, and TB testing of the adult cattle in the herd. Animal health officials are now developing an eradication plan for this herd, investigating how TB may have entered the herd, and identifying other herds that may have been exposed through the purchase of animals. The most effective way to control the disease is by destroying infected and exposed animals to prevent spread. The affected herd is quarantined and cattle cannot leave the dairy without written permission to slaughter. The herd eradication plan involves repeatedly skin testing cattle and removing the cattle that respond to the test. Cattle will only be allowed to leave the herd to be slaughtered where they will receive a special slaughter inspection to ensure they are not affected with TB. Calves will be raised away from the adult cattle and will be fed only pasteurized products. Areas that may be contaminated with the TB bacteria will be cleaned and disinfected. The herd will be considered free of infection only when no TB has been found over a five-year period. As a precaution and to protect other states, all dairy breeding animals leaving California that are more than 6 months of age require a negative TB test within 30 days of movement.

Determining when and how the infection entered the affected herd is an enormous task because bovine TB can be a "silent infection" that can smolder undetected for years. Animals purchased for the last 5 years will have to be investigated as possible sources, and all animals sold from the herd will have to be traced so that those herds can be tested. Efforts are being made to purchase and slaughter all the cattle that have left the affected herd. Tissue samples will be collected from these exposed animals in addition to TB testing the herd that purchased them. Slaughter surveillance for TB has also been enhanced in California.

The summary of numbers of animals that have been TB tested demonstrates the magnitude of the effort required to identify suspect cases of bovine TB, and ferret out that last vestige of infection. The discovery of this infected herd is a result of enhanced surveillance.

Summary of Tuberculosis Surveillance in California Cattle

Number of Cattle Tested	1995	1996	1997	1998	1999	2000	2001
By Animal Health Officials	10,576	5,100	2,861	3,530	1,425	1,967	2,500
By Private Veterinarians	15,921	17,100	19,930	18,189	22,863	19,930	19,587
From Submissions at Slaughter	39	58	64	39	58	64	385

California does not allow captive elk farming, but does allow captive fallow deer farming. All deer are routinely tested for TB and no positive cases have been detected.

Bovine TB in Michigan - TB in deer complicates TB control:

No surveillance of bovine TB in species other than cattle was undertaken in the US until 1984, when 21 bison herds in 10 states were found to be infected⁴. Subsequently, infected elk and deer populations were identified. The detection of bovine TB in non-bovine populations has complicated TB control. The outbreak of TB in Michigan is an unfortunate illustration. Prior to 1994, only eight wild white-tailed or mule deer had been reported with bovine TB in North America⁵. In 1994, a

hunter killed a bovine TB-infected white-tailed deer in Michigan. To assess the extent of bovine TB in the wild deer and elk populations of Michigan, 88,373 wild animals were examined from 1995 to 2002. To date, 397 deer and two elk were confirmed with disease in a five county area of Michigan⁶. In addition, 16,500 privately owned cervid herds have been tested and are under herd surveillance plans. One captive cervid (deer) herd has also tested positive in 1997 and was depopulated. Since bovine TB can be transmitted by consuming improperly or uncooked meat it has also been seen in carnivores that may have consumed infected deer. In 2001, two coyotes, two bobcats, and three bear tested positive for TB bringing the total number of carnivores affected by the outbreak to 30. The identification of bovine TB in Michigan has had staggering implications for the cattle industry. Since 1995, 760,000 cattle, bison, and goats in Michigan have been TB tested. To date, 19 cattle herds have been diagnosed with bovine TB⁶. In April, 2002 the Michigan Department of Community Health announced that a human case of bovine TB had been identified in an elderly individual. The source of the infection is under investigation. This illustrates that although transmission from animals to people is rare (thanks to pasteurization), the potential still exists. An aggressive management strategy has been implemented in Michigan that includes continued surveillance of wild populations, livestock testing, elimination of supplemental feeding of deer, reducing the deer density in the TB control area, and educating the public⁵.

Bovine TB in Texas:

California and Michigan are not facing bovine TB challenges alone. Texas recently lost its "Free" status for bovine TB on June 1, 2002. The TB status downgrade will mean that the 150,000 or more breeding cattle moved out of Texas each year must have a negative TB skin test prior to movement. USDA has placed a moratorium on additional restrictions until at least January 2003, when the state's feeder cattle must be identified with official ear tags before being transported out of state. The downgrade in TB status comes as a result of the diagnosis and subsequent depopulation of two TB-infected cattle herds in South Central Texas during 2001. Both infected herds were detected by slaughter plant inspectors, who found carcasses with internal lesions indicative of TB. Animal health officials began skin-testing the herds where the animals originated and closely examined the carcasses of test-positive animals from the herds for examination and confirmation of TB. The herds have been depopulated and more than 130 other herds have been tested in the search for the origin of the disease outbreak, and where it may have spread. No other infected herds have been detected, and veterinary epidemiologists have been unable to pinpoint the source of infection.

Federal regulations mandate a loss of TB-free status when a state has two or more infected herds disclosed within a 48-month period. Texas will move from the TB-free status it has held since November 2000, to modified accredited advanced status, the second highest rung in an international five-tier ranking system for cattle TB eradication. It will take at least two years without an infected herd for Texas to regain its coveted TB-free status enjoyed by all other states except Michigan.

Prevention and control of TB in people:

In the U.S. today, the risk of people getting bovine TB from animals is extremely remote. The US has a meat inspection system designed to prevent the consumption of contaminated products by people. In addition, the TB bacteria is killed when meat is cooked and when milk is pasteurized, hence these products are safe to eat in the unlikely event that products inadvertently gained access to the food chain. It is also very unlikely that a person would become infected with bovine TB from an infected carcass, and people working with infected carcasses take precautions. People can be skin-tested to determine if they are infected with TB. These tests can be done at either the local health department or a private physician's office. A positive skin test does not identify the type or source of the infection. Remember, most people get TB from other people, not from livestock. People may require years of treatment to clear the infection.

Conclusion:

As we enter the 21st century, bovine TB maintains a persistent low-level presence in the United States. The detection of bovine TB in wildlife and farmed game animals has complicated control. Control of bovine TB in animals and elimination of the disease as a public health concern is an on-going challenge.

What can a beef producer do?

- Follow animal import regulations.
- Know the TB status of the herd that you purchase animals from.
- Require that animals be tested prior to purchase.
- If you share grazing land with other cattle, know their TB status.
- Maintain the permanent identification of your animals and keep records of animal movements into and out of your herd.

If your cooperation is needed during a TB investigation - remember that both animal and public health depend on the control and eradication of bovine TB.

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