

Bovine Tuberculosis

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Background Information: Tuberculosis was once the most prevalent disease of cattle and swine causing more loss at the beginning of the century than any other disease.

Eradication of tuberculosis started in the United States in 1917 using testing of livestock and removal of positive animals as well as monitoring for disease in slaughtered animals. As a result bovine tuberculosis is close to being eradicated. However recently there have been outbreaks in California, Michigan, Texas and New Mexico. It is believed that California, Texas and New Mexico outbreaks are due to exposure of cattle imported from Mexico. In Michigan the outbreak is believed to have stemmed from infection of the wild cervids population crossing over into dairy cattle.

Etiology: *Mycobacterium bovis*- It is an acid fast staining rod shaped bacteria. The bacteria require a host in order to replicate and do not live outside the host but for a few weeks because of the susceptibility to heat, sun and dry conditions.

Host Range: Animals that are affected include cattle, sheep, goats, swine, wild cervids, and humans.

Clinical Signs: Animals that are infected usually have non specific signs such as weight loss, decreased appetite, or fever. Because the respiratory system is the typical route of invasion, animals may suffer from dyspnea, tachypnea, and lung sounds (such as crackles, wheezes, silent spots or plural rubbing). Other signs may be associated with enlarged lymph nodes. Bloat may be seen due to enlarged mediastinal lymph nodes or choke due to enlarged retropharyngeal lymph nodes. However the incubation of disease is extended and infected animals are often asymptomatic.

Lesions: Encapsulated granulomas that contain thick yellow to orange creamy caseous purulent material are most common. These may be calcified. Lesions may occur in any lymph node but most often are found in bronchial, mediastinal and mesenteric. Liver and lungs are the organs most commonly affected. There may also be miliary tubercles throughout any organ.

Pathogenesis: Reservoir for the disease is other livestock or wildlife that are infected. Transmission occurs through aerosolized droplets, feces, milk, urine, semen, vaginal discharge or drainage from lymph nodes. Infection usually occurs most often through the respiratory or digestive system. Once in the body the animal's immune system recognizes the bacteria within the tissues and macrophages are sent to dispose of it. *Mycobacterium* is resistant to destruction and once ingested by the macrophages may replicate and kill the macrophage instead of being killed. The animal's immune system continuously sends more macrophages to help destroy the bacteria, resulting in an accumulation of living and dead macrophages at the site of the bacteria. The accumulation of the living and dead macrophages, bacteria, and tissue cells in a focal area is called a tubercle. Over time, a thick capsule may form around the tubercle, walling it off from other tissues, forming the granuloma.

Diagnosis: Diagnosis is made from observation of clinical signs or gross lesions typical of tuberculosis. The intradermal skin test can be used to identify animals that are infected bacterial culture or PCR of nasal exudates or tracheal washes may also be used to identify and infected animal.

Differential Diagnosis:

- Chronic Pulmonary infection
- Chronic Suppurative Pneumonia
- Actinomyces pyogenes abscess
- Corynebacterium pseudotuberculosis
(caseous lymphadenitis in sheep and goats)
- Foreign Body Granuloma

Testing: To control and monitor tuberculosis there is a test and slaughter program in place. The test is administered by an accredited veterinarian by injecting 0.1 ml of mammalian tuberculin protein in the caudal tail fold of the animal. The site is then observed 72 hours after the injection for any change of appearance. Any positive animal identified by the caudal fold test is considered suspect and is then retested by a Federal Veterinarian using the comparative cervical test (CCT). The CCT is administered by injecting avian tuberculin protein and mammalian tuberculin protein 12 cm apart SQ in the neck. It is then read 72 hours later using calipers to measure both sites for size of reaction. Any positive to the CCT is considered a reactor. Any heard in which a reactor is present in should be quarantined and depopulated.

Control: To prevent infection of a heard, any animal that is acquired should be tested using the caudal fold test before the animal is brought into the herd. The herd should also be kept from commingling with other herds to reduce the risk of exposure.

Zoonotic potential:

The most common spread of human tuberculosis comes from ingesting unpasteurized milk from an infected cow. This should be considered a human pathogen and care taken when dealing with infected animals.

References:

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