

Facts about Brucellosis

1. What is brucellosis?

It is a contagious, costly disease of ruminant animals that also affects humans. Although brucellosis can attack other animals, its main threat is to cattle, bison, and swine. The disease is also known as contagious abortion or Bang's disease. In humans, it's known as undulant fever because of the severe intermittent fever accompanying human infection or Malta fever because it was first recognized as a human disease on the island of Malta.

2. How serious is brucellosis?

Considering the damage done by the infection in animals—decreased milk production, weight loss in animals, loss of young, infertility, and lameness, it is one of the most serious diseases of livestock. The rapidity with which it spreads and the fact that it is transmissible to humans makes it all the more serious.

3. What disease agents cause brucellosis?

The disease is caused by a group of bacteria known scientifically as the genus *Brucella*. Three species of *Brucella* cause the most concern: *B. abortus*, principally affecting cattle and bison; *B. suis*, principally affecting swine and reindeer but also cattle and bison; and *B. melitensis*, principally affecting goats but not present in the United States. In cattle and bison, the disease currently localizes in the reproductive organs and/or the udder. Bacteria are shed in milk or via the aborted fetus, afterbirth, or other reproductive tract discharges.

4. What are the signs of brucellosis?

There is no effective way to detect infected animals by their appearance. The most obvious signs in pregnant animals are abortion or birth of weak calves. Milk production may be reduced from changes in the normal lactation period caused by abortions and delayed conceptions. Not all infected cows abort, but those that do usually abort between the fifth and seventh month of pregnancy. Infected cows usually abort once, but a percentage will abort during additional pregnancies, and calves born from later pregnancies may be weak and unhealthy. Even though their calves may appear healthy, infected cows continue to harbor and discharge infectious organisms and should be regarded as dangerous sources of the disease. Other signs of brucellosis include an apparent lowering of fertility with poor conception rates, retained afterbirths with resulting uterine infections, and (occasionally) enlarged, arthritic joints.

5. How is brucellosis spread?

Brucellosis is commonly transmitted to susceptible animals by direct contact with infected animals or with an environment that has been contaminated with discharges from infected animals. Aborted fetuses, placental membranes or fluids, and other vaginal discharges present after an infected animal has aborted or calved are all highly contaminated with infectious *Brucella* organisms. Cows may lick those materials or the genital area of other cows or ingest the disease-causing organisms with contaminated food or water. Despite occasional exceptions, the general rule is that brucellosis is carried from one herd to another by an infected or exposed animal. This mode of transmission occurs when a herd owner buys replacement cattle or bison

that are infected or have been exposed to infection prior to purchase. The disease may also be spread when wild animals or animals from an affected herd mingle with brucellosis-free herds.

6. What is being done to fight brucellosis?

Before 1934, control of brucellosis was limited mainly to individual herds. Today, there is a Cooperative State Federal Brucellosis Eradication Program to eliminate the disease from the country. Like other animal disease-eradication efforts, success of the program depends on the support and participation of livestock producers. The program's Uniform Methods and Rules set forth the minimum standards for States to achieve eradication. States are designated brucellosis free when none of their cattle or bison are found to be infected for 12 consecutive months under an active surveillance program. As of June 30, 2000, 44 States, plus Puerto Rico and the U.S. Virgin Islands, were free of brucellosis. Six States currently have a herd infection rate of less than 0.25 percent and are considered to be in Class A status. There are no States in Class B (herd infection rate between 0.26 percent and 1.5 percent) or Class C status (herd infection rate greater than 1.5 percent).

7. What about free-ranging bison herds?

The presence of [brucellosis in free-ranging bison](#) in Yellowstone National Park and Grand Teton National Park threatens the brucellosis status of the surrounding States and the health of their livestock herds, which are free of the disease. Reintroduction of the disease into a brucellosis-free State could have a serious economic impact on domestic livestock markets and potentially threaten export markets. The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is working cooperatively with other State and Federal agencies toward containing the spread of brucellosis from bison to domestic livestock and eliminating the disease from the Yellowstone and Teton herds while maintaining viable free-roaming bison herds in the Parks.

8. How do epidemiologists help fight brucellosis?

Epidemiologists are specially trained veterinarians who investigate disease sources and the means of eliminating infection in affected herds and areas. Epidemiologists are concerned with disease in a group or population of animals and evaluate circumstances connected with the occurrence of disease. These veterinarians help eliminate brucellosis by identifying factors essential to its control and prevention.

9. How costly is brucellosis to the livestock industry?

The livestock and dairy industries and the American consumer have realized great financial savings from the success of the Cooperative State Federal Brucellosis Eradication Program. Annual losses from lowered milk production, aborted calves and pigs, and reduced breeding efficiency have decreased from more than \$400 million in 1952 to less than \$1 million today. Studies have shown that, if brucellosis eradication program efforts were stopped, the costs of producing beef and milk would increase by an estimated \$80 million annually in less than 10 years.

10. How effective is the Brucellosis Eradication Program?

At the beginning of the program, brucellosis was widespread throughout U.S. livestock, but eradication efforts have had dramatic results. In 1956, there were 124,000 affected herds found by testing in the United States. By 1992, this number had dropped to 700 herds, and as of June 30, 2000, there were only 6 known affected herds remaining in the entire United States. USDA,

APHIS expects the Cooperative State Federal Program to achieve the goal of nationwide eradication of brucellosis from domestic cattle and bison in the very near future.

11. What is the basic approach to eradication?

The basic approach has always been to test cattle for infection and send infected animals to slaughter. Identification of market animals for tracing, surveillance to find infected animals, investigation of affected herds, and vaccination of replacement calves in high-risk areas are important features of the current program.

12. How is infection found in cattle?

Two primary surveillance procedures are used to locate infection without having to test each animal in every herd. Milk from dairy herds is checked two to four times a year by testing a small sample obtained from creameries or farm milk tank for evidence of brucellosis. Bison herds and cattle herds that do not produce milk for sale are routinely checked for brucellosis by blood-testing animals sold from these herds at livestock markets or at slaughter. In addition, some States require adult cattle and bison to be subjected to blood tests for brucellosis upon change of ownership even if sold directly from one farm to another. The cattle and bison remaining in the herds from which such animals originated are not tested unless evidence of brucellosis is disclosed among the market animals.

13. What happens when evidence of disease is found by surveillance testing?

Once an infected herd is located, the infection is contained by quarantining all infected and exposed cattle and bison and limiting their movement to slaughter only, until the disease can be eliminated from the herd. Diagnostic tests are used to find all infected cattle and bison. Also, Federal and State animal health officials check neighboring herds and others that may have received animals from the infected herd. All possible leads to additional infection are traced.

14. How does the brucellosis ring test (BRT) surveillance work?

The BRT procedure makes it possible to do surveillance on whole dairy herds quickly and economically. Milk or cream from each cow in the herd is pooled, and a sample is taken for testing. A suspension of stained, killed *Brucella* organisms is added to a small quantity of milk. If the milk from one or more infected animals is present in the sample, a bluish ring forms at the cream line as the cream rises.

15. How does market cattle identification (MCI) work?

Numbered tags, called backtags, are placed on the shoulders of adult breeding animals being marketed from beef, dairy, and bison herds. Blood samples are collected from the animals at livestock markets or slaughtering plants and tested for brucellosis. If a sample reacts to a diagnostic test, it is traced by the backtag number to the herd of origin. The herd owner is contacted by a State or Federal animal health official to arrange for testing of his or her herd. Once the animals have been gathered, all of the eligible animals in the herd are tested at no cost to the owner.

16. Which animals are eligible for MCI testing?

At slaughter, all cattle and bison 2 years of age or older are tested, except steers and spayed heifers. At market, all beef cattle and bison over 24 months of age and all dairy cattle over 20 months of age are tested except steers and spayed heifers. Pregnant or postparturient heifers are

also eligible for testing regardless of their age. Herd tests must include all cattle and bison over 6 months of age except steers and spayed heifers.

17. Why is identification of market cattle important?

The key to the MCI program is proper identification of all animals so they can be traced to their herds of origin. Most livestock markets identify cattle and bison with numbered USDA-approved backtags. Backtags, as well as eartags and other identification devices, are collected and sent to the diagnostic laboratory along with the matching blood samples to aid in identifying ownership of test-positive animals.

18. What are the advantages of MCI?

MCI provides a means of determining the brucellosis status of animals marketed from a large area and eliminates the need to round up cattle and bison in all herds for routine testing. MCI, along with other preliminary testing procedures, is effective in locating infection so control measures can be taken to contain the disease and eliminate it.

19. What is a blood agglutination test?

It is an effective method of diagnosing brucellosis. To pinpoint infection within a herd, a blood sample is taken from each animal and tested in the field or at a laboratory. The blood serum is mixed with a test fluid or antigen containing dead *Brucella* organisms. When the organisms in the test fluid clump together in a reaction known as agglutination, the test is positive.

20. What is the brucellosis card test?

It is a rapid, sensitive, and reliable procedure for diagnosing brucellosis infection. It is similar to the blood agglutination test but employs disposable materials contained in compact kits. Brucella antigen is added to the blood serum on a white card. Results of the test are read 4 minutes after the blood serum and antigen are mixed.

21. Are there any other tests for brucellosis?

There are a number of supplemental tests based on various characteristics of antibodies found in the blood and milk of infected animals. These tests are especially useful in identifying infected animals in problem herds in which chronic brucellosis infection exists and from which infection is difficult to eliminate. Another diagnostic method involves culturing *Brucella* organisms from infected tissues, milk, or other body fluids, from aborted calves or fetal fluids and membranes.

22. What animals are eligible for testing?

With certain exceptions, herd tests must include all cattle and bison over 6 months of age except steers and spayed heifers.

23. What is the incubation period of brucellosis?

An incubation period is the interval of time between exposure to an infectious dose of organism and the first appearance of disease signs. The incubation period of brucellosis in cattle, bison, and other animals is quite variable ranging from about 2 weeks to 1 year and even longer in certain instances. When abortion is the first sign observed, the minimum incubation period is about 30 days. Some animals abort before developing a positive reaction to the diagnostic test.

Other infected animals may never abort. Generally, infected animals that do not abort develop a positive reaction to the diagnostic test within 30 to 60 days after infection, although some may not develop a positive reaction for several months to over a year.

24. Can brucellosis in animals be cured?

No. Repeated attempts to develop a cure for brucellosis in animals have failed. Occasionally, animals may recover after a period of time. More commonly, however, only the signs disappear and the animals remain diseased. Such animals are dangerous sources of infection for other animals with which they associate.

25. Can brucellosis be prevented?

The disease may be avoided by employing good sanitation and management practices. Replacement animals should be tested when purchased and retested after a 30- to 60-day isolation period during which they are kept separate from the remainder of the herd. These practices will allow detection of animals that were in the incubation period of the disease when acquired.

26. What about vaccination?

For cattle and bison in heavily infected areas or replacement animals added to such herds, officials recommend vaccinating heifers with an approved *Brucella* vaccine. The vaccine is a live product and must be administered only by an accredited veterinarian or State or Federal animal health official. For best results, female calves should be vaccinated when they are 4 to 6 months old. At the time of vaccination, a tattoo is applied in the ear; that tattoo identifies the animal as an "official vaccinate." The tattoo identifies the year in which vaccination took place.

27. How does the vaccine work?

Brucella abortus vaccine produces a bodily response that increases the animal's resistance to the disease. However, vaccination is not 100-percent effective in preventing brucellosis; it typically protects about 65 percent of the vaccinated cattle from becoming infected by an average exposure to *Brucella*.

28. Is Strain 19 the only approved *Brucella* vaccine?

No. USDA recently licensed a new *Brucella* vaccine, called [Strain RB51](#), for use in cattle. Strain RB51 is as efficacious as Strain 19 vaccine but virtually eliminates adverse postvaccination reactions in cattle, such as abortions and localized inflammation at the vaccine injection site. Most importantly, unlike Strain 19, Strain RB51 does not stimulate the same type of antibodies that can be confused on standard diagnostic tests with those antibodies produced by actual infection.

29. Is Strain RB51 vaccine approved for use in bison?

As of June 2000, *B. abortus* Strain RB51 had not yet been approved for use in bison. Preliminary studies indicate that RB51 is safe and efficacious in bison calves. However, in order for RB51 to be conditionally licensed in bison, additional safety and efficacy trials must be completed.

30. Where or when is calfhood vaccination most important?

Owners whose herds are located in areas of relatively heavy infection or who ship replacement cattle or bison to, or receive animals from, such areas should carry out a vigorous calfhood vaccination program. Every cattle or bison owner, regardless of location, should discuss the advantages and disadvantages of vaccination with his or her veterinarian. Some States do not allow cattle and bison to be imported for breeding if they are not official vaccinates and they are beyond the age at which they should have been vaccinated.

31. Where is vaccination less important?

In many areas of the country, low herd infection rates coupled with improvement in the detection of early infection through BRT, MCI, and other surveillance systems have lessened the need to continue calfhood vaccination. Vaccination should be reduced in such areas, provided that adequate regulatory measures are in effect to prevent reintroduction of the disease.

32. How does brucellosis affect humans?

People infected with the brucellosis organism usually develop symptoms similar to a severe influenza, but this disease, called undulant fever, persists for several weeks or months and may get progressively worse. Farmers, ranchers, veterinarians, and packing plant workers are infected most frequently because they come into direct contact with infected animals. The initial symptoms are fatigue and headaches, followed by high fever, chills, drenching sweats, joint pains, backache, and loss of weight and appetite. Undulant fever does not often kill its victims, but the disease is too serious to be dealt with lightly.

33. What are the main sources of human infection?

In years past, prior to pasteurization, raw milk was considered the prime source of brucellosis in humans. Today, most humans contract the disease by coming in direct contact with aborted fetuses, afterbirth, and uterine discharges of diseased animals or with infected carcasses at slaughter. However, one 1994 study suggests that human brucellosis in California is most likely to be a food-borne illness (unpasteurized milk or cheese products) acquired in Mexico or from Mexican products consumed in California. Rarely, if ever, does a human contract the disease from another human.

34. How common is human brucellosis in this country?

Fortunately, the combination of pasteurization of milk and progress in the eradication of the disease in livestock has resulted in substantially fewer human cases than in the past. Ninety eight cases of human brucellosis were reported in 1997, a fraction of the 6,400 cases reported in 1947. Sixty two (62) cases of brucellosis in humans have been reported to the Centers for Disease Control and Prevention for 1998 (provisional data).

35. Can people get brucellosis by eating meat?

There is no danger from eating cooked meat products because the disease-causing bacteria are not normally found in muscle tissue and they are killed by normal cooking temperatures. The disease may be transmitted to humans when slaughtering infected animals or when processing contaminated organs from freshly killed animals.

36. How can people be protected from brucellosis?

Ranchers, farmers, or animal managers should clean and disinfect calving areas and other places likely to become contaminated with infective material. All individuals should wear sturdy rubber or plastic gloves when assisting calving or aborting animals, and scrub well with soap and water afterward. Precautions against drinking raw milk or eating unpasteurized milk byproducts are also important. Ultimately, the best prevention is to eliminate brucellosis from all animals in the area.

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