
Bovine Brucellosis

Bovine Brucellosis is a bacterial infection which can infect several various species of animal including: sheep, cattle, bison, deer, goats, and humans.¹ This bacterial infection causes the infected animal to be less able to support reproduction. The rate of conception in the infected animal is lower than in a healthy animal, milk production is also lowered, and the incidence of spontaneous abortion is increased.² Infection spreads rapidly and causes many abortions in unvaccinated cattle. In humans, brucellosis can present as flu-like symptoms, enlarged spleen and lymph nodes, and arthritis.³

Brucella abortus was discovered in 1897 by Dr. Bernard Bang of Denmark. Brucellosis of cattle was formerly known as Bang's disease and/or contagious abortion in cattle. Before 1934, the Yearbook of Agriculture in the United States referred to the disease as contagious abortion disease and estimated that the U.S. government spent nearly \$20 million per year on the disease from 1900 through 1915. In 1934 a national program was started in conjunction with the states to eradicate Bovine Brucellosis under the direction of the USDA. At that time the average estimated rate of infection among all cattle in the United States was ten percent. This program provided for testing of herds, slaughter of reactors, and indemnity payments to owners. In 1940, vaccination of calves with Strain 19 became part of the overall program. An accelerated program of "down the road" testing to eradicate the disease began in 1954. This method included state and federal representatives contacting all owners of cattle in a region, coordinating for inspection and testing of the cattle at each location, conducting the testing, and destroying the infected cattle. This program resulted in the national infection rate in the U.S. cattle population being reduced from 11 percent to less than 1 percent during the time period 1954 through the early 1970's. Bovine Brucellosis among the bison and elk herds in Yellowstone National Park remains a problem.^{4 5 6} In 2008, for the first time in the 74 year history of the Brucellosis program, all 50 states, Puerto Rico, and the U.S. Virgin Islands were simultaneously declared brucellosis Class Free. This status lasted from February 1, 2008 when Texas was declared brucellosis free until September 2, 2008 when Montana was reclassified to Class A State status.⁷

¹ "Brucellosis," Centers for Disease Control (CDC), last modified October, 2005; accessed May 29, 2007; http://www.cdc.gov/ncidod/dbmd/diseaseinfo/brucellosis_g.htm.

² "2007 U.S. Animal Health Report," United States Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), pp. 35, accessed September 1, 2010, http://www.aphis.usda.gov/publications/animal_health/content/printable_version/ahr2007.pdf.

³ Pappas, et al., "Brucella as a Biological Weapon," Cellular and Molecular Life Sciences 63 (2006): 2229-2236, DOI: 10.1007/s00018-006-6311-4.

⁴ Manthei, et al., "Brucellosis," in *The Yearbook of Agriculture 1956: Animal Diseases*, (Washington, D.C.: The United States Government Printing Office, 1956), accessed May, 2010, http://naldr.nal.usda.gov/NALWeb/Agricola_Link.asp?Accession=IND43894660.

⁵ Paul Becton, "Biological Agents Causing Infections in Dairy Cattle: Brucellosis Status Report," *Journal of Dairy Science* 59 (1975), accessed May, 2010, DOI:10.3168/jds.S0022-0302(76)84338-X.

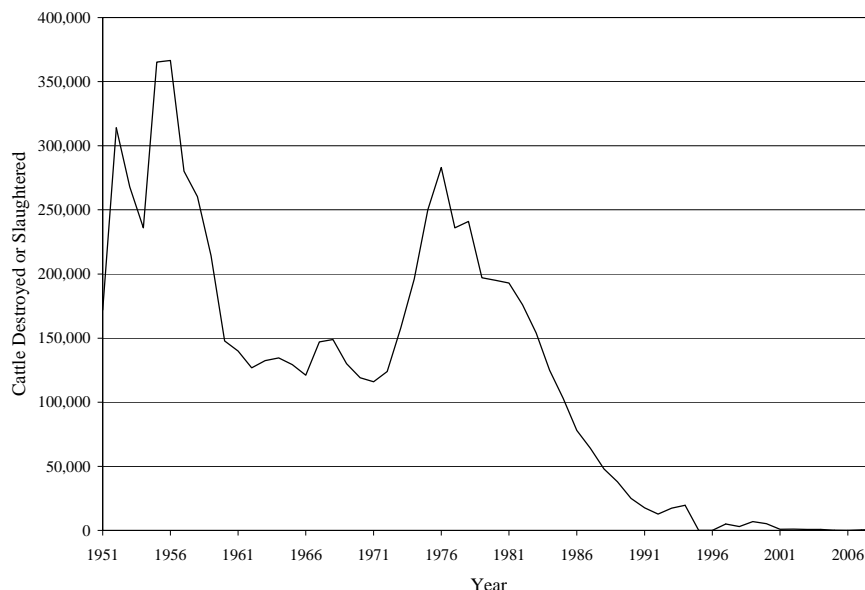
⁶ Neal Black, "Animal Health: A Century of Progress", U.S. Animal Health Association, 1996; accessed May, 2010, <http://usaha.org/AnimalHealth-ACenturyOfProgress.pdf>.

⁷ United States Animal Health Association, Proceedings: One Hundred and Twelfth Meeting of the United States Animal Health Association (Kansas City, MO: Richardson Printing, 2009), 187-189, accessed August 31, 2010, http://www.usaha.org/meetings/2008/2008_USAHA_Proceedings.pdf

Until 1990, the eradication program for Bovine Brucellosis was similar to that of Bovine Tuberculosis in that only those animals testing positive for the disease were destroyed. Thus, the “reactor animals” value from the reports was treated as the total number of destroyed animals related to Bovine Brucellosis for that specific year. In 1990, the USDA decided to encourage states with affected herds to depopulate the entire herd, not just the “reactor animals.” The company, uslp, was able to locate the data from the Agricultural Statistics 1995-96 which contained the number of “reactor animals” for the years 1991 through 1994. These numbers were used to help complete the dataset of destroyed and slaughtered animals for brucellosis. To discover the number of destroyed or slaughtered animals for the years 1995 and 1996, uslp was compelled to contact those states identified as having “reactor herds” for those years.

Please see the following figure illustrating the number of cattle historically destroyed or slaughtered due to brucellosis in the United States.

Cattle Destroyed or Slaughtered Due to Brucellosis (U.S. 1951 to 2008)



Source: USLSA/USAHA Annual Meeting reports for the years 1951-1990 and the 1995-1996 Agricultural Statistics Annual publication Table 463 for the years 1991-1994. OIE, World Organization for Animal Health

Infections in the United States are controlled through isolation and eradication of infected animals. A vaccine exists and is recommended in areas of high incidence of infection⁸ such as states bordering Mexico.⁹ Also, those states surrounding the Greater Yellowstone National Park area where the disease is endemic in the bison and elk populations are encouraged to use the vaccine. There are no states that prohibit the use of the vaccine and many producers choose to vaccinate heifer calves to maintain market access to those states requiring vaccination. Additionally, the United States uses herd tests and slaughter of the reactor animals and

⁸ “Brucellosis: Facts about Brucellosis,” United States Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), accessed August 31, 2010 http://www.aphis.usda.gov/animal_health/animal_diseases/brucellosis/downloads/bruc-facts.pdf.

⁹ Pappas, et al., “Brucella as a Biological Weapon,” Cellular and Molecular Life Sciences 63 (2006): 2229-2236, DOI: 10.1007/s00018-006-6311-4.

quarantine of the affected herds. Once a slaughter reactor is traced to the herd of origin, that herd is placed under quarantine and blood samples are collected from all test eligible animals in the herd. Any animal found to be positive on the blood tests is slaughtered and the herd is classified as affected and further classified as the index herd. At this point a herd plan is established determining whether the herd follows a test and slaughter approach or depopulation. If the herd plan establishes a test and slaughter schedule, the herd remains under quarantine until the affected herd qualifies for quarantine release under the National Brucellosis Eradication Program or scheduled for depopulation with agreement from the herd owner and APHIS. The retest schedule timeline interval is also established in the herd plan. Furthermore, any trace-in or trace-out leads associated with the index herd are subjected to this procedure and/or variants thereof. The Uniform Methods and Rules governing the Brucellosis procedure may be found at: http://www.aphis.usda.gov/animal_health/animal_diseases/brucellosis/downloads/umr_bovine_bruc.pdf

The occurrence of brucellosis in the United States has been reduced dramatically since the adoption by APHIS of the Rapid Completion Plan in 1989. However, brucellosis remains present in a particular area surrounding Yellowstone National Park. This region, known as the Greater Yellowstone Area, or GYA, continues to be plagued by outbreaks of brucellosis in cattle herds. The GYA contains wildlife herds which serve as a reservoir for brucellosis. These bison and elk herds serve as a continual opportunity for the disease to transfer to domestic cattle herds through shared pasture and calving areas. Procedures have been implemented which limit exposure of domestic cattle to bison during the bison's calving period, however, elk are more difficult to control. Thus, infected elk share similar grazing and calving areas with bison and domestic cattle, thereby increasing the opportunity and risk of exposure and infection in domestic cattle herds in the GYA. Since brucellosis does not present itself until calving or abortion and is not readily transferred horizontally between cattle except during calving and abortion periods, other diseases may be mistakenly diagnosed serologically in the place of brucellosis, i.e. the brucellosis blood test does have a history of false positives. Additionally, *Brucella suis*, the swine strain of the disease, can be transferred to cattle and is treated in the same manner as *Brucella abortus* when discovered serologically. Only a culture or microbiological test can determine the distinction and once the diseased animal is determined to have *Brucella suis* the associated herd is removed from quarantine. The *Brucella suis* strain historically has transferred to domestic cattle from feral pig droves in the southeastern United States, Texas, and Arkansas. Furthermore, there is a brucellosis vaccine and producers in those areas adjacent to GYA are encouraged to vaccinate their animals. Brucellosis vaccine is not required in all states; however, many producers vaccinate their animals to ensure access to those markets which do require vaccinated animals.

Supplementary to the containment and surveillance protocols in force in the United States, the animal health industry has also implemented training and testing classes for all levels of animal health practitioners and inspectors. Practitioners are given intense training on medical identifiers for the disease and current medical research relating to identifying the disease in a suspect animal, collection of tissue samples, transporting suspect animals to approved laboratories, chain of custody of tissue samples from suspect animals procedures, laboratory testing protocols, confirmation of infection protocols, notification procedures, among others. Inspectors and

surveillance personnel within the industry are trained and tested on notification procedures for suspect cases of infection and proper handling and security of the suspect carcass and tissue.