## Student Clinical Paper

# Brucellosis in Bison: Past and Present

**Barry K. Hartup**, *Class of 1993*
*School of Veterinary Medicine, Madison, WI*



Brucellosis, or Bang's disease, caused by the bacterium *Brucella abortus*, is a potentially devastating cause of abortion and unthriftiness in cattle. The distribution of brucellosis is widespread; in 1986, infected herds were reported in 120 of 175 countries worldwide. Since the early part of this century, test and cull programs in the United States have helped limit economic impacts from poor animal health and decrease the risks of human disease from this infection. In fact, many states are now considered to be brucellosis-free: May, 1992 USDA figures show 29 states are classified as free of brucellosis and 19 are Class A (on the threshold of achieving free status). Two states, Texas and Louisiana, are considered Class B due to higher herd infection and market cattle test reactor prevalence. As official programs recognize success, other potential reservoirs of the disease become important in the elimination of threats to domestic livestock production. Yet, when these reservoirs are found to be treasured wildlife and private non-traditional hoofstock populations, political controversy, logistics and lack of understanding of the disease in non-domestic species complicate implementing solutions. Such has been the case with bison, or buffalo, and brucellosis.

The *B. abortus* organism was first isolated from a bison bull of the Yellowstone National Park (YNP) herd in 1930, but testing for serum antibodies had already identified three infected bison by 1917. Today, as many as 30% of the YNP herd have positive antibody titers for brucellosis. Similar findings have been reported for bison in Wood Buffalo National Park in Canada. Fortunately, many other wild herds in the U.S. are considered brucellosis-free, yet the majority of bison in the U.S. are privately owned. In 1982, the Animal and Plant Health Inspection Service of USDA considered brucellosis a significant problem among 500-1000 privately owned bison herds, and since that time has actively encouraged eradication of the disease from this population.

*B. abortus* is commonly shed by infected cows either via aborted fetal membranes or through milk to calves. Life-long infections with reproductive failure in both females and males, and unthrifty surviving offspring are the common result of Brucella infection. Recent studies at Texas A & M University have shown that the transmission and course of the disease is essentially identical between cattle and bison. Research has also shown that many elk populations exhibit high levels of infection with *B. abortus*, and some of these share range with bison and cattle.

Prevention of introducing *Brucella abortus* into livestock herds depends primarily on the following factors: replacement animal source and purchase frequency, test history, and proximity to infected herds. Spread of infected animals through private sale is a common mode of brucellosis introduction into a herd, as was shown with outbreaks in cattle from Alabama and Canada in the 1980s. Investigations of brucellosis outbreaks have generally failed to substantiate transmission from wildlife to domestic stock, though the potential is accepted by most animal health experts. Game ranches maintaining bison and elk may pose the greatest treat as a reservoir of disease, especially if interherd transportation of these species is left unregulated and/or unmonitored. Brucellosis testing has historically suffered from a lack of adequately specific serological tests for antibodies to *B. abortus*. Positive antibody titers often resulted from earlier vaccination or cross reactions with other antibodies, and were not due to infection with the brucellosis bacteria. With modifications, currently available tests, especially a newly developed ELISA test, exhibit fewer false positive than in the past. In wildlife species, however, the use of multiple tests has shown to be superior for determining the level of infection in herd situations. This is important to consider given that complete herd blood tests are used in the brucellosis-free herd certification process. It also underscores the need for retesting animals after purchase.

The *B. abortus* strain 19 vaccine is currently the only licensed vaccine available for use in cattle and bison, both in approved calf and adult vaccination programs. Though considered to provide increased protection from abortion in cattle, this attenuated live organism vaccine has been associated with persistent infections and serological reactions. Such results interfere with determining truly infected animals and the success of eradication programs. As a control measure for wild and privately owned bison, the vaccine may pose other problems less evident in cattle. Recent vaccine trials in bison have shown that the USDA recommended strain 19 dosage for bison caused unacceptable numbers of

induced abortions, chronic infections and lower levels of protection against infection and abortion compared to those reported in cattle. for prevention programs to complement test and cull, new vaccines will have to be more protective, less risky to humans, and not interfere with serological testing, it was concluded.

Cooperation between private livestock producers and state and federal veterinary authorities must be enhanced to eradicate brucellosis in remaining problem cattle herds around the country. In addition, monitoring and control programs will have to keep pace with the increased popularity of game ranching and privately held bison herds. Though the debate continues over whether wild populations contribute to patterns of brucellosis in livestock, the need for more effective prevention through vaccination in these animals would not only contribute to further safeguarding domestic operations, but would likely improve wildlife health as well.



---

# Abstract:

## A long term epidemiological study of bovine viral diarrhoea infections in a large herd of dairy cattle

**A. Moerman, P.J. Straver, M.C.M. de Jong, J. Quak, Th. Baanvinger, J.T. van Oirschot**

*Veterinary Record* (1993) **132,** 622-626

Epidemiological aspects of bovine viral diarrhoea virus (BVDV) infections were studied longitudinally in a large dairy herd for three years. At the start of the study, practically all the cows more than four years old had BVDV antibody titres, whereas the younger stock were almost all seronegative. The spread of the virus was monitored in a part of the population that contained only transiently viraemic cattle and in another part that contained persistently viraemic calves. Among the lactating cows the virus circulated for two-and-a-half years, although they had no direct contact with persistently viraemic cattle during this period. The highest transmission rate occurred when a large number of susceptible heifers was added to the population of cows that contained transiently viraemic cattle. The circulation of BVDV among the lactating cows ceased while 27 seronegative cows were still present. Both findings are in accordance with predictions from simple epidemic models. The susceptibility of the cows that remained seronegative was confirmed experimentally. In contrast with the limited circulation of BVDV caused by transiently viraemic cattle, virtually all susceptible cattle that came into contact with a persistently viraemic calf became seropositive within three months. Transplacental BVDV infections were not detected in the calves born to cows that had antibodies against the virus due to an infection that had occurred at least four years earlier. Transplacental transmission of BVDV did not occur in most of the pregnant cows that were infected before approximately the 60th day of gestation, but when cows became infected later in gestation the virus virtually always invaded the fetus. Clear conclusions on transplacental infection were not always possible in fetuses infected in late gestation. The precolostral sera of six of 42 prenatally infected calves contained both virus and antibodies; the antibody titres were low. After retesting four to five months later, the two calves remaining on the farm were still viraemic, but they had become seronegative.