

Brucellosis and Yellowstone Bison



Overview

Brucellosis has caused devastating losses to farmers in the United States over the last century. It has cost the Federal Government, the States, and the livestock industry billions of dollars in direct losses and the cost of efforts to eliminate the disease. Brucellosis causes abortions, infertility, and lowered milk production in cattle and bison and is transmissible to humans as undulant fever. In people, the disease causes severe flu like symptoms that can last for months or years. Treatment in humans is not always successful. Moreover, treatment is not successful in animals.

The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) has been working cooperatively with the livestock industries and State animal health authorities to eradicate brucellosis from the United States. As of March 1, 2002, 48 States have achieved brucellosis-free status with no known infection.

The only known focus of *Brucella abortus* infection left in the nation is in bison and elk in the Greater Yellowstone Area (GYA). With respect to this area, APHIS is cooperating with State and Federal agencies to implement a bison management plan, in order to provide for a free ranging bison herd and to prevent exposure of cattle to potentially infected wildlife.

There has been concern about the presence of brucellosis in the Yellowstone National Park (YNP) bison herd since the inception of the Cooperative State-Federal Brucellosis Eradication Program in 1934. Until the last few years, the number of infected cattle and bison herds in the Nation was so large that efforts were focused in other private and public park herds. In addition, YNP officials felt they could effectively manage the disease risks with a border control program. Until 1988, the number of bison leaving YNP was limited. The few bison that did migrate were either hazed back into the park or shot at the border by Park Service, State of Montana personnel, or licensed hunters.

During the winter of 1996-97, with the herd population at record levels, the limited forage in YNP was covered with record levels of ice and snow. As a result, larger numbers of bison moved to areas outside the park looking for food; 1,079 bison that exited the Park were shot or sent to slaughter. An additional 1,300 or more bison starved to death inside the park. The involved Federal agencies-APHIS, USDA's Forest Service, and the Interior Department's National Park Service-then proposed a series of contingency measures to address the problems caused by that year's severe winter weather in YNP. The short-term objective was to limit as much as possible additional killing of bison during the balance of the winter season, while also preventing transmission of brucellosis to livestock outside the park.

The long-term objective was to develop a long-range plan for management of the Yellowstone bison herd to prevent the transmission of brucellosis from bison to cattle and maintain a viable bison herd.

While USDA is charged with eradicating brucellosis from the United States, it also remains committed to maintaining a viable and free-roaming bison herd in YNP. The goals of the eventual elimination of brucellosis from the GYA and maintaining a free-roaming bison herd have been jointly agreed to in a Memorandum of Understanding between the U.S. Department of Interior, the States of Montana, Idaho, and Wyoming, and USDA. Eliminating brucellosis and managing a free-roaming bison herd at YNP are not incompatible goals, and achieving them will require a cooperative effort by all involved agencies. The Record of Decision for Final Environmental Impact Statement and Bison Management Plan for the State of Montana and Yellowstone National Park was signed December 20, 2000. The goal of the bison management plan is to maintain a wild, free ranging bison population while minimizing the risk of transmitting brucellosis from bison to domestic cattle on public and private lands in Montana adjacent to YNP. This plan is a bison management plan, not a brucellosis elimination plan.

Threat from Bison

More than 50 percent of the bison in YNP test positive for brucellosis. A positive test indicates that animals have been exposed and are most likely infected. The concern is that when these bison leave YNP, they may transmit brucellosis to cattle in the surrounding States. All three States surrounding YNP are officially free of brucellosis.

In 1990, researchers at Texas A&M demonstrated that bison infected with *Brucella abortus* could spread the disease to cattle through contact. Although this was proven under controlled conditions, it is difficult to document transmission of a disease in the wild. In order to document this, a researcher would need to be present when the transmission occurred and collect samples for tissue culturing. In addition, the animals would have to have been previously tested before the transmission had occurred to verify that the event was caused by the bacterial transmission at the observed time. Therefore, it was necessary to conduct this research under controlled conditions.

Even though transmission in the wild is difficult to document, results of epidemiological investigations point to domestic bison as the likely source of the disease in infected cattle herds found in Wyoming and North Dakota. In addition, wild elk or bison in the GYA have been identified as the most probable source of infection for five additional cattle herds. Infected elk were the most probable source of brucellosis infection (fistulous withers) in horses in Wyoming. Most recently, elk were the source of infection of a cattle herd in Idaho.

About Elk

The bison and elk populations in the GYA are the only wildlife populations in the United States known to be infected with *B. abortus*. Due to the behavior of bison and elk, there is more risk of disease transmission from individual bison than from elk. Bison are more gregarious than elk and tend to congregate together more than elk during calving time, which is when disease transmission is most likely. There is a greater chance of spreading the disease to herd mates through direct contact with birthing fluids and contaminated soil and vegetation during calving than at other seasons.

On the other hand, under natural conditions, elk prefer to calve in seclusion, meticulously cleaning up the area by consuming the placental tissues and fluids to avoid attracting predators. They prefer to keep the calf separate from other animals for the first few days before returning to the herd, a behavior pattern that also reduces the chance for disease transmission.

However, under unnatural conditions, such as at artificial elk feedgrounds, elk are more concentrated and less likely to calve in seclusion. Infected elk also may abort during the time they are congregated in the feedgrounds. Under these conditions, the risk of disease spread from elk is increased. APHIS has assisted the State of Wyoming with funding to vaccinate elk on elk feedgrounds to reduce the prevalence of the disease and to fund habitat improvement efforts to keep the elk dispersed over a larger area and away from cattle and feedgrounds. Eliminating brucellosis in elk remains a high priority with APHIS.

What About Other Wildlife?

Other species of wildlife are more resistant but can become transiently infected with the brucella organism.

Predators and scavengers, such as coyotes, crows, vultures, and bears, are rarely infected and are not at high risk for shedding the bacteria. However, predators can serve as mechanical vectors by dragging infected tissues, placentas, and fetuses away from abortion sites.

Developing a Vaccine for Bison and Elk

Strain RB51 vaccine is a brucellosis vaccine conditionally approved for cattle in 1996 that does not interfere with blood test results. Tests of the RB51 vaccine in bison look promising. Preliminary studies indicate that RB51 is safe and effective in bison calves. In order for RB51 to be conditionally licensed in bison, it must pass additional safety and efficacy trials.

Researchers are testing this vaccine on bison calves, male bison, and pregnant bison to determine its safety and effectiveness. Strain 19, the traditional brucellosis vaccine is about 65 percent effective in preventing infection in cattle and bison under field exposure. (Sixty-five percent is considered effective for a brucella vaccine.) The primary difficulty with Strain 19 vaccine is that it can cause an animal to produce antibodies to brucellosis blood tests and, therefore, produce false-positive results when tested. The RB51 vaccine does not cause animals to produce antibodies that can be detected with standard tests and, therefore, eliminates this problem.

Brucellosis Research Efforts

APHIS has committed in excess of \$3 million toward research on the brucellosis problem in the GYA.

APHIS continues to support brucellosis research at universities and is also working with USDA's Agricultural Research Service to further study RB51 vaccine, and to develop alternative brucellosis vaccines that would be more effective in wild bison and elk herds. Current vaccines are about 65 percent effective. It is unlikely that new vaccines would protect 100 percent of vaccinated animals. However, new vaccines may provide additional protection for the animals and help reduce the incidence of the disease within the herds. APHIS is also involved in studying the brucellosis disease agent-how it is transmitted and shed by infected animals into the environment.

Research efforts are also underway to develop a safe and effective vaccine delivery system so that bison can be vaccinated remotely, as opposed to only hand injection. In addition, APHIS has a veterinarian with wildlife management training and experience stationed in Montana, to function as a liaison among involved government agencies. APHIS is confident that, as more activity is generated on this issue, this liaison position will become increasingly important in ensuring that all involved parties are informed and that APHIS' involvement is coordinated.

Can Brucellosis Be Eradicated From Yellowstone Wildlife?

Yes. APHIS officials are confident, based on experience in other public and private bison and elk herds and on other successful disease eradication programs, that use of a combination of disease-eradication and herd-management measures will lead to the successful elimination of brucellosis from bison and elk in the Yellowstone ecosystem.

APHIS' Position

APHIS is interested in protecting the bison and neighboring livestock from diseases introduced into the herds from outside sources. APHIS intends to work with the cooperating agencies to develop a plan to eliminate brucellosis from the GYA while ensuring a wild, free-roaming, and viable bison herd in Yellowstone. Similar eradication efforts have been successful in other parks, including Wind Cave National Park and Custer State Park in South Dakota and Wichita Mountain Wildlife Refuge in Oklahoma.

Additional Information

For more information concerning the brucellosis problem in Yellowstone bison, contact APHIS Legislative and Public Affairs at (202) 720-2511, Forest Service Public Affairs at (202) 205-1760, or the National Park Service Office of Public Affairs at (202) 482-6843.