



Wyoming Brucellosis Coordination Team REPORT & RECOMMENDATIONS

January 11, 2005

Wyoming Brucellosis Coordination Team

**Report presented to
Governor Dave Freudenthal
January 11, 2005**

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Executive Summary

The Wyoming State Brucellosis Coordination Team (BCT) was charged with identifying issues, describing best management practices, and developing recommendations related to brucellosis in wildlife and livestock in the State. The group was asked to provide recommendations that detail actions, responsibilities, and timetables where appropriate. Four topics were addressed:

- 1) Reclaiming Class-Free brucellosis status for cattle, surveillance, and transmission between species;
- 2) Developing an Action Plan of what to do in the event of a new case in cattle;
- 3) Addressing human health concerns; and,
- 4) Reducing, and eventually eliminating brucellosis in wildlife, specifically addressing winter elk feed grounds.

The team consisted of nineteen members and ten technical advisors. This report is a result of many educational presentations, a tour of winter elk feed grounds, eleven Brucellosis Coordination Team meetings, and multiple smaller subcommittee reports. The findings are presented in the form of a brief summary of discussions, itemized Best Management Practices (BMP's), and Specific Recommendations for each of the main topics. The recommendations are prioritized within each topic, with two high-priority recommendations that cross multiple topics presented first.

The team held comprehensive discussions about all four topics. It must be understood that brucellosis presents a variety of technical, biological, and political challenges. For the most part, consensus was achieved for all of the recommendations with the exception of two recommendations, both of which involved the potential for gradual phase out of winter elk feed grounds. In one case, the majority felt that closing of winter elk feed grounds was not recommended in the foreseeable future. However, in the other case, a majority of members of this team agreed that a gradual phase out or merger of winter elk feed grounds should be considered in the evolution of the proposed Brucellosis Management Action Plans (BMAP's).

Other challenges that the State will face in managing brucellosis in wildlife and cattle include gaps in technical knowledge, constraints on research due to designation of *Brucella abortus* as a 'select agent' by the United States Department of Agriculture and Centers for

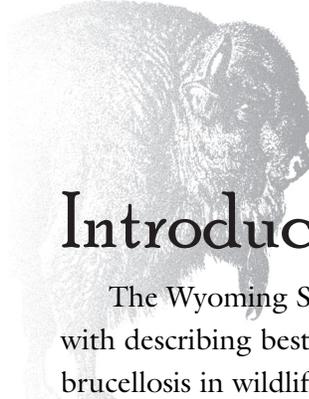
Disease Control, the need to obtain Federal agencies' and local citizens' cooperation to manage both the disease and wild bison and elk populations, and funding to achieve the goals of the brucellosis programs.

Recommendations

The Brucellosis Coordination Team has twenty-eight recommendations for the Governor and Wyoming State Legislature to consider. Funding is recommended to support many of these recommendations. Please note that a synopsis of each recommendation is provided in this Executive Summary. The full text of each recommendation is presented in the body of the report.

- A) Recommendations from discussions about all of the topics in the committee's charge:
- The Wyoming Game and Fish Department is asked to develop Brucellosis Management Action Plans (BMAP's) for each elk herd unit that has winter elk feed grounds in conjunction with Federal land managers, local producers, and State and Federal veterinarians. As part of this process, potential modifications to each winter elk feed ground will be considered.
 - Facilitate basic and applied research that is critical to managing brucellosis in wildlife and livestock. Seek an exemption or permission addressing select agent rules in order to allow for meaningful research on brucellosis in cattle, and elk and wild bison.
- B) Recommendations generated within the four discussion topics:
- 1) Reclaiming Class-Free brucellosis status for cattle, surveillance, and transmission between species:
- Surveillance for brucellosis must be maintained at an expanded level for the foreseeable future in order to assure trading partners and Federal officials of the health of Wyoming's cattle herd.
 - Continued support for testing cattle, elk and wild bison for brucellosis at the Wyoming State Veterinary Laboratory is recommended.
 - Investigate how changes in ranch enterprises might affect risk of brucellosis transmission. Quantify the economic impact of brucellosis in Wyoming.
 - Enhance veterinary support for managing brucellosis in cattle.
 - Develop the best vaccination program for cattle in the risk area around the GYA.
 - Work with producers to develop Certified Brucellosis-Free herds.
 - Require livestock trader/dealers to register with the Wyoming Livestock Board.
 - Create a program to compensate ranchers quarantined due to brucellosis that is likely a result of wildlife contact.

- 2) Developing an Action Plan of what to do in the event of a new case in cattle:
 - Convene a Regulatory Decision Group to follow the Best Management Practices road map in the event of an outbreak.
 - Authorize the Wyoming Livestock Board to utilize brand inspectors to help with animal quarantines and movement restrictions.
 - Ensure that affected tissues from positive brucellosis cases are held for one year after a case is officially designated as a positive.
- 3) Addressing human health concerns:
 - Develop a public communications response plan for future brucellosis cases in cattle.
 - Formulate appropriate protocols for Wyoming health care providers to consult when people are exposed to brucellosis.
 - Explore a prospective study to assess the incidence of human brucellosis in Wyoming.
- 4) Reducing, and eventually eliminating brucellosis in wildlife, specifically addressing winter elk feed grounds:
 - Establish a five-year pilot project that institutes a seroprevalence reduction program within the Pinedale Elk Herd unit.
 - Recommend that no winter elk feed grounds be closed in the foreseeable future.
 - Provide legislative general funding to manage brucellosis as a standard budget for the Wyoming Game and Fish Commission.
 - Secure and enhance winter habitat for elk and wild bison.
 - Evaluate elk herd unit population objectives on a rotating five-year cycle. Evaluate opportunities to modify or phase-out any winter elk feed ground as part of the BMAP process.
 - Work with all federal agencies to assure that objectives intended to eliminate brucellosis in elk and wild bison are addressed.
 - Encourage Governors Freudenthal, Schweitzer, and Kempthorne to meet and re-address the GYIBC's focus.
 - Encourage the U.S. Department of Agriculture (USDA) and U.S. Department of the Interior (USDO I) to partner with the State in funding brucellosis eradication efforts.
 - Cooperatively develop an aggressive public education and outreach program for brucellosis.
 - Pursue legislation prohibiting private, intentional feeding of elk and wild bison.
 - Convene the Brucellosis Coordination Team at least annually for five years to follow-up on implementation of recommendations.
 - Perform DNA genotyping ("fingerprinting") of archived isolates of *Brucella abortus*. Create a searchable database for the DNA fingerprints.



Introduction

The Wyoming State Governor's Brucellosis Coordination Team (BCT) was charged with describing best management practices and developing recommendations related to brucellosis in wildlife and livestock in the State. The group was asked to provide recommendations that detail actions, responsibilities, and timetables where appropriate. Governor Freudenthal specifically asked that four topics be addressed:

- 1) Reclaiming Class-Free brucellosis status for cattle, surveillance, and transmission between species;
- 2) Developing a road map of what to do in the event of a new case in cattle;
- 3) Addressing human health concerns; and,
- 4) Reducing, and eventually eliminating brucellosis in wildlife, specifically addressing feed grounds.

The issues were approached in the listed order. Recommendations for Topic 1 were developed first. Topics 2 and 3 were addressed during the summer. Topic 4 was the subject of the remaining discussions, and was the most difficult and contentious topic addressed by the team. Discussions about brucellosis in both wildlife and cattle took place throughout due to transmission issues.

Information and education about various issues related to brucellosis in Wyoming were presented at each meeting. Separate educational topics addressed basic information about brucellosis, brucellosis in elk, feed grounds, elk and wild bison populations, USDA and the Class-Free brucellosis status, the current cases, mapping and locations, vaccinations and regulatory approaches being taken by other states. The team also attended a half-day session on feed ground issues sponsored by the Greater Yellowstone Interagency Brucellosis Committee. The group toured the Muddy Creek and Soda Lake feed grounds in July.

This report will consist largely of itemized Best Management Practices (BMP's), which are the tools that can be used in various situations in managing aspects of brucellosis, and specific Recommendations. Background on discussions surrounding the development of the BMP's and specific Recommendations is provided in the minutes from each meeting. The minutes and additional information, including details of educational presentations, can

be found on the State of Wyoming, Governor's WEB site, http://wyoming.gov/governor/governor_home.asp

Background and Process

The impetus for the formation of the BCT resulted from a case of brucellosis in a herd of cattle from Sublette County Wyoming. This case is believed to be the result of contact with infected elk from the nearby Muddy Creek elk feed ground area. Figure 1, which is appended to the end of this report depicts the winter elk feed grounds in the Greater Yellowstone Area. Please note the areas where potential transmission of brucellosis between elk and cattle is thought to have occurred. This figure is also available on the Governor's WEB site.

The case was first recognized on a trace-back of several reactor cattle that tested positive at slaughter in November of 2003. By December of 2003, the case was confirmed and thirty-one reactors had been identified on the suspected ranch. The USDA designated the herd as "infected" officially on December 29, 2003. The USDA depopulated that index herd on January 15, 2004 after it was appraised for owner indemnification at market value. An additional six of twelve cows traced from the index herd to a Worland feed lot were found to be reactors. These twelve animals had passed through a sale yard that did not voluntarily test for brucellosis. Despite a common origin, the USDA designated these animals as a second infected herd. As a result, other states were notified and Wyoming lost its Class-Free brucellosis status in February 2004.

The thirty-one reactor cattle were necropsied at the Wyoming State Veterinary Laboratory (WSVL) in Laramie WY. *Brucella abortus* biovar 1 cultures were obtained from multiple animals. Further testing revealed that four of fourteen elk (28.6%) tested from the Muddy Creek feed ground were reactors to brucellosis, indicating they may have been infected. Three of those animals were subsequently harvested and one cultured positive for the bacterium. Subsequent genetic testing established a "99% similarity" in the genetic make-up of the isolates. This indicates that the cases originated in free-ranging elk and was transmitted to cattle. Although the potential for transmission of *Brucella abortus* from wildlife (elk and wild bison) has been recognized for years, the Sublette episode is the first in which compelling supportive laboratory genotyping data were obtained.

On June 16, 2004, a second brucellosis positive case was identified in Wyoming. On culture, one aged cow was infected with *Brucella abortus* biovar 4. She was one of 104 cattle in a Teton County herd. This index herd had spent time in Sublette County, and had commingled with elk in Teton County. The owner elected to depopulate the herd with Federal indemnification by the U.S. Department of Agriculture (USDA). A contact herd was in the Grand Teton National Park on summer pasture when the case was identified and officials elected not to test until October 2004 when the cattle came off the allotment. The fall testing of this contact herd revealed four additional brucellosis positive cows (*Brucella abortus* biovar 4) out of 750 original cattle. This producer also decided to depopulate the

herd with indemnification by the USDA. Testing of the contact herds from Sublette County was negative.

In July 2004, two aged cows from a group of 50 cows from Campbell County were found to be brucellosis suspects when sold in South Dakota. The cattle came from a herd of more than 300 cows. Follow-up cultures in South Dakota suggested field-strain brucellosis, biovar 1. The animals in this herd were reported to have commingled with elk. This index herd, plus five additional, contact herds for a total of about 2500 cattle were quarantined for testing.

The index herd from Campbell County, along with contact herds, tested negative for brucellosis. In October, a test on the index herd also was negative for brucellosis. Subsequent epidemiology studies indicated this was a largely closed herd and no bovine source of brucellosis was identified. Over 100 elk from that geographic area had no indication of brucellosis when tested through a Wyoming Game and Fish Department-sanctioned depredation harvest in fall 2004. Follow-up genetic tracing at the USDA Agriculture Research Service (ARS) laboratory in Ames, Iowa suggested that the bovine isolates from this case matched a ten-year-old isolate from the UUU bison herd in South Dakota. These findings, along with the text of an investigation of the laboratory in South Dakota suggest this was unlikely to have been an authentic case of brucellosis. It was probably a false positive result due to laboratory error.

These subsequent findings have prolonged the time that Wyoming will remain at Class A status for at least one year past the designation of the late fall positive herd in Teton County. At the time of this report, review of Wyoming's brucellosis status will not occur until at least December 2005 or January 2006.

Due to the ongoing challenge of having a wildlife reservoir of brucellosis in the face of a domestic cattle eradication program, this team was asked to study and make recommendations about brucellosis in Wyoming. The team consisted of 19 members and an additional 10 technical advisors. A roster of BCT members, affiliations, and roles is provided in Table 1:

Table 1.

Name	Home	Affiliation	Role
Rob Hendry	Lysite, WY	Rancher	Member
Joel Bousman	Boulder, WY	Rancher	Member
Bill Lambert	Osage, WY	Rancher	Member
John Etchepare	Cheyenne, WY	Director, WY Dept. of Agriculture	Member
Brad Mead	Jackson, WY	Attorney & Rancher	Member
Terry Cleveland	Cheyenne, WY	Director, WY Dept of Game & Fish	Member
Dr. Jim Logan	Shoshone, WY	WY State Veterinarian	Member
Cathy Purves	Lander, WY	WY Wildlife Federation	Member
Bob Wharff	Evanston, WY	Sportsmen for Fish and Wildlife	Member
Dr. Ken Mills	Laramie, WY	Wyoming State Veterinary Lab	Member
Dr. Tom Thorne	Laramie, WY	Advisor to Game and Fish Dept.	Member
Terry Pollard	Pinedale, WY	Outfitter	Member
Shawn Madden	Torrington, WY	Torrington Livestock Market	Member
Albert Sommers	Pinedale, WY	Rancher	Member
Dr. Bill Williams	Thermopolis, WY	Veterinarian, Game & Fish Comm.	Member
Dr. Karl Musgrave	Cheyenne, WY	WY Dept. of Health	Member
Sen. John Hines	Gillette, WY	WY State Senate	Member
Rep. Monte Olsen	Daniel, WY	WY House of Representatives	Member
Dr. Frank Galey	Laramie, WY	UW College of Agriculture	Member
Scott Werbelow	Pinedale, WY	WY Game & Fish (Feed grounds)	Technical
John Keck	Cheyenne, WY	US Park Service	Technical
Brent Larson	Jackson, WY	US Forest Service	Technical
Dave Roberts	Cheyenne, WY	BLM	Technical
Dr. Bret Combs	Cheyenne, WY	USDA-APHIS	Technical
Dr. Donal O'Toole	Laramie, WY	WY State Veterinary Laboratory	Technical
Dr. William Gern	Laramie, WY	UW Vice-President for Research	Technical
Ryan Lance	Cheyenne, WY	Governor Freudenthal's office	Technical
Dr. Terry Kreeger	Wheatland, WY	WY Game & Fish	Technical
Erika Olson	Laramie, WY	Attorney General's Office	Technical

Note that Dr. Jamie Snow from the WY Dept. of Health filled Dr. Musgrave's position when he left the department in September 2004. Dr. Dwayne Oldham, the new Wyoming State Veterinarian, began attending meetings in a technical capacity in November 2004. Dr. Jim Logan remained as a team member after he stepped down as Wyoming State Veterinarian in October. Dr. Arnold Gertonson, USDA-APHIS Greater Yellowstone Area Coordinator also served the committee as a technical advisor.



Results and Discussion

Justification: What brucellosis is and why it is important

Brucellosis has been virtually eradicated from the United States cattle herd. Due to the potential ramifications from the disease in terms of human health and economics, the USDA and animal industry embarked on a plan to eradicate brucellosis in the United States in the 1930's. This effort has required 70 years and an estimated \$3.5 billion in state, federal, and private funds. As late as 1957, 124,000 infected herds existed in the US. At this time, there are less than 10 infected herds in the country, in Wyoming and Texas. Wyoming is at special risk due to the large wildlife reservoir of brucellosis.

The disease remains endemic (widespread and common) in elk and wild bison in the Greater Yellowstone Area (GYA). Wyoming's cattle herd is at risk for contracting brucellosis from the wildlife in the region. The recent case in Sublette County indicated that brucellosis in elk can be transmitted to cattle and that winter elk feed grounds are a significant risk factor. The other major case was presumed to be transmitted from elk or bison as a result of commingling with cattle South of Jackson, Wyoming in Teton County.

Brucellosis in cattle, elk, and bison is a disease that is caused by a bacterium, *Brucella abortus*. It affects large ungulates including elk, bison, and cattle. Animals and humans that get the disease can develop fever, joint pain, and most importantly in animals, pregnant females often abort due to infection with brucellosis. The agent is one of the most infectious known bacterial agents in cattle, with the potential to cause large-scale outbreaks of abortion.

Of special significance is that brucellosis can also cause serious human disease. The disease in humans is called "undulant fever" and most commonly occurs from the ingestion of unpasteurized dairy products of infected cattle. Brucellosis in humans can also result from exposure to fetal fluids and other tissues that have large numbers of the bacteria or from exposure to the vaccine. Very rarely transmission has occurred from sexual contacts or breast feeding. In Wyoming, infections have also occurred from laboratory exposure.

The bacteria are found in especially high numbers in fetal fluids and in tissues related to the birthing process. After abortion or birth, the bacteria persist in low numbers and "hide" in an animal's tissues until the next pregnancy, when massive growth in bacterial numbers and seeding of the bacteria in large numbers in fetal tissues and fluids occurs. Thus, the disease is transmitted most easily from animal to animal during abortion or

birthing. The ability of *Brucella abortus* to survive inside cells creates a special challenge to developing effective vaccines and sensitive tests for the organism.

Brucellosis was identified in Wyoming cattle in the late 1800's, and in elk as early as 1917. It is now endemic in the elk and wild bison in the GYA. It is estimated that the Jackson Bison Herd has a brucellosis prevalence of 50 to 80% and may be considered a reservoir for contamination to elk and cattle. Elk on winter feed grounds in the GYA have an average serological (blood serum) prevalence of exposure of 30%. Elk that winter off feed grounds on less densely populated wintering ranges in the GYA have a prevalence of exposure of less than 3%; most herds have a 0% prevalence. Until 2003, Wyoming's cattle herd had been free of brucellosis since 1985.

Brucellosis is a major concern to the cattle industry due to the severe economic losses cattle producers experience. Losses occur from abortion "storms" with reductions in calf crops, limitations in marketing, and costs of testing cattle to reassure trading partners that the product is clean. Amy Bittner in "*An Overview and the Economic Impacts Associated with Mandatory Brucellosis Testing in Wyoming Cattle*", June 10, 2004, Wyoming Department of Administration and Information, Economic Analysis Division, summarizes economic impacts of brucellosis testing requirements on the Wyoming producer. The review indicated that Wyoming currently has 6200 cattle operations and that the State's livestock industry is worth approximately \$778 million. The State Legislature appropriated \$1.6 million to offset the costs of testing and funding to assist the Wyoming State Veterinary Laboratory to provide testing services. It was estimated that the cost of brucellosis to producers would range from \$495,000/year to \$3,700,000/year. Thus, over a seven-year horizon, Wyoming producers could spend from \$3,465,000 to \$26,000,000 in testing for brucellosis. Lost marketing opportunities are not included in those estimates. The BCT discussed the issue of splitting the State into two geographic areas for regaining Class-Free brucellosis status by separating the Greater Yellowstone Area from the rest of the State. The BCT agreed that at this time, split status is not an attractive option.

The direct impact of brucellosis on our wildlife population is modest. It has been estimated by the Wyoming Game and Fish Department that 7% of elk calves are aborted by younger elk cows on their first calving season following infection. Older cows are at less risk of aborting, although if infected they will still shed the organism at birthing. The maintenance of a healthy free-ranging elk herd is significant for the economics of those communities that serve hunters and tourists. Political and economic considerations must be weighed when considering measures to combat brucellosis in wildlife.

Managing this disease is not straightforward. Vaccines used to help prevent brucellosis are imperfect for cattle, and even less effective in elk and bison. The eradication of the disease in cattle has occurred through an integrated process. These steps have included proper management of breeding cattle especially through testing, tracing, and removal of infected animals; management of calving practices (using clean areas, removing aborted

fetuses, etc.); vaccination of eligible heifers; quarantine and testing of exposed herds; depopulation of infected herds; and, if needed, removal of contact animals.

Brucellosis seems to be self-limiting in free-ranging elk that do not use winter elk feed grounds. However, as is the case for any transmissible disease in animals or humans, concentration of elk on winter feed grounds has led to an endemic problem. Vaccination of elk on State and Federal winter elk feed grounds is being done by the Wyoming Game and Fish Department using ballistic “bio-bullets”. The vaccine is not preventing infection, although abortions may be reduced in the elk. Between one third to one quarter of elk on winter feed grounds in the GYA remain infected. Development of winter habitat and other measures to reduce reliance on winter elk feed grounds also need to be considered. Thus, eventual elimination of brucellosis in our high-risk elk populations may demand a total management solution, much like that done in cattle.

Brucellosis can be eliminated in bison as in cattle. That elimination would require testing, removal of infected animals, and judicious use of vaccination.

Issues raised in discussions about brucellosis in Wyoming

Wyoming’s brucellosis situation is complicated by both scientific and policy issues. These issues include stopping transmission between the different species as well as within species (e.g. eliminating brucellosis in bison may reduce the risk of transmission to elk), the crowding of wildlife populations at critical time periods, a reservoir of disease on lands under Federal control, a lack of basic scientific and economic information about the disease, and a lack of public or social awareness of the complications.

The most immediate concern in the region is the potential for transmission of brucellosis from elk and wild bison to cattle. Several of the elk feed grounds, as well as some patterns of cattle and bison movements, lead to commingling of cattle with wildlife. This commingling is most serious in the late winter and spring when calving occurs. Cattle, elk and wild bison are attracted to newborn and aborted animals. This curious attraction can lead to transmission of *Brucella abortus*. The first discussions about best management practices focused on reducing transmission in order to help the State attempt to regain Class-Free brucellosis status.

The core problem with brucellosis in elk is that concentration of pregnant animals occurs on the winter elk feed grounds. High population density at times of stress (e.g. winter weather and birthing) creates an optimal situation for disease transmission. For example, respiratory diseases are a serious concern in concentrated cattle feedlots. Diseases like flu and SARS spread quickly in densely populated areas of human habitation. As noted in the 1998 National Research Council report, *Brucellosis in the Greater Yellowstone area*, “*Brucella abortus* is unlikely to be maintained in elk in the absence of the bison reservoir and if the winter elk feed grounds are closed.” Although elk on winter elk feed grounds have a serological prevalence of around 30%, those wintering on native range have little or no brucellosis (less than 3%).

Population goals for elk in the region are set by a public process that relies on biology and social issues. The objective-setting process is part of the Wyoming Game and Fish Commission's strategic plan management scenario and is supposed to be reviewed informally and on a regular (five-year) basis. However, public reviews have not regularly occurred unless a request has been received to do so. Recent mild winter weather conditions and changed hunting patterns have left some herd units with elk populations that exceed objectives set by the Wyoming Game and Fish Commission. This increased population, in conjunction with loss of habitat due to subdivision, and oil and gas development has challenged management of wildlife. Hunters and sportsmen's groups want to keep elk populations as high as possible in order to provide the best available hunting and because many local economies rely on elk-related hunting and tourism revenues. Artificial winter feeding has been maintained in order to keep elk in the region off cattle feed lines to reduce commingling, transmission of brucellosis, damage to stored hay, and to prevent elk starvation. From the standpoint of reducing within-species transmission of brucellosis, feeding of elk in winter is undesirable. Reduction in feeding of elk without concomitant acquisition of winter habitat would necessitate reduction of elk numbers to avoid concurrent increases in commingling and elk-related damages to ranches. The severity of a population reduction following immediate closure of all winter elk feed grounds could range from 40% to 80% of the wintering population, depending on the herd unit and the accessibility of critical winter habitat. However, such an immediate closure was not envisioned in BCT discussions. Rather, gradual phase-out after improving habitat and elimination of brucellosis on selected elk herd unit winter elk feed grounds was considered though the impact of that type of move on wintering elk populations was not as easy to estimate.

Wild bison numbers are also a concern to Wyoming's effort to gain control of the brucellosis problem in the Greater Yellowstone Area. Responsibility for the management of wild bison is shared between the State of Wyoming, National Park Service, and National Elk Refuge. The Jackson bison herd increased from seventeen brucellosis-free animals in the 1960's in a captive situation to approximately 800 animals now, with an estimated brucellosis seroprevalence of 50-80%. The current population objective established by the Wyoming Game and Fish Commission is 450. When numbers exceeded 450, a hunt was planned. However, a lawsuit from a special interest group stopped the hunt on the National Elk Refuge. The Wyoming Game and Fish Department permits an annual hunt, but this is only allowed on lands outside both the Elk Refuge and Grand Teton National Park. As it is, this hunt does not serve as a significant population management tool.

A major obstacle facing efforts to control and eventually eliminate brucellosis is the lack of important research-based information. Winter range tolerance for elk needs to be further understood in terms of carrying capacity, availability, and accessibility. Vaccines are not as effective as desired and alternative delivery systems could be helpful; both issues need research. Diagnostic tests are not ideal and need to be improved. Basic elk immunology is not well understood. Ways of non-lethally removing infected animals have not been fully explored. The economic, social, and human impacts of brucellosis and the reductions of

elk numbers on local communities need better definition. Compounding these issues is the recent listing by the federal government of *Brucella abortus* as a potential bioterrorist agent, or Select Agent. This listing of *Brucella sp* has effectively halted current research on brucellosis in large animals.

Two major areas of conflict have been identified by the BCT. The first conflict involves the management of dense high winter elk population in the GYA. Some people do not want a reduction in animals. Others feel that the problem cannot be addressed until the numbers are reduced in order to reduce population density during critical times. The other area of conflict is with the National Park Service units and National Elk Refuge. These agencies' current management practices are likely to guarantee a permanent reservoir of brucellosis in wildlife. An expensive, intensive effort by the Wyoming Game and Fish Department and the Wyoming Livestock Board to eliminate brucellosis in elk and cattle may be futile unless our federal partners recognize that we need their assistance to ensure healthy wildlife in Wyoming.

What is being done now about brucellosis

Currently, most efforts are being focused on preventing commingling of elk, wild bison, and cattle during the critical periods of transmission in the late winter and spring. Elk are being fed at key catch points in order to keep them off cattle feed lines. Fencing and hazing are used to move elk away from the cattle and vice-versa. Cattle trailed early in the season are kept away from elk and wild bison whenever possible. Allotment use is timed on spring range conditions, but ranchers are encouraged to use caution when moving cattle near high-risk areas.

Although imperfect, vaccination is useful in cattle and may be helpful for elk on winter feed grounds. Heifer calves in the State are vaccinated for brucellosis using RB51 vaccine. High-risk cattle can be revaccinated as adults with permission of the USDA and the State Veterinarian, although the efficacy of that practice is poorly documented. Elk are vaccinated with Strain 19 via ballistic bio-bullets by the Wyoming Game and Fish Department on twenty-one of the twenty-two State elk feed grounds. An interim vaccination project is underway on the National Elk Refuge feed ground by the Wyoming Game and Fish Department. Yellowstone National Park is preparing an Environmental Impact Statement to assess the effects of implementing a remote vaccination program for wild bison and is working with the State of Montana on other management tools. Elk vaccination does not prevent brucellosis infection but it does cause a modest reduction in abortion rates in vaccinated female elk.

Surveillance is an important tool. Some voluntary herd testing of cattle is done in the region. In addition, due to loss of Class-Free brucellosis status, all test eligible female cattle and bulls are tested for brucellosis when moved interstate and upon change of ownership. Elk are trapped on selected winter elk feed grounds and tested for brucellosis. Bison testing is not done as routinely as elk testing in Wyoming, but is practiced adjacent to Yellowstone National Park on animals migrating west and north into Montana.

Process

The Wyoming Brucellosis Coordination Team met eleven times. The team met for one day in March. Two, one day meetings were held in April. Following that, the group met for two days a month. The December meeting was one day. In addition, subcommittee chairs for each of the four topics, and later for report and legislative action, met once monthly by teleconference. Sharing of the document by email facilitated report development. Group meetings were held in Pinedale (n=3 meetings), Lander (n=5 meetings), Jackson (n=1 meeting), Gillette (n=1 meeting), and Casper (n=1 meeting).

The team was enthusiastically supported by Dr. Arnold Gertonson (USDA APHIS) for technical advice, Muff Parker and John Etchepare from the Wyoming Department of Agriculture (meeting logistics), Eric Peterson from the UW Cooperative Extension Service (recorder), and Dr. Duane Williams and Mary Martin (facilitation of meetings) also from the UW Cooperative Extension Service. In addition to his role as an active technical advisor, accolades must include Ryan Lance from Governor Freudenthal's office for his diplomatic support and for an outstanding job of taking minutes at the meetings. Numerous speakers helped the team understand the issues. Special thanks for presentations are due Dr. Valerie Ragan from USDA, Dr. Tom Linfield (GYIBC Chair and MT State Veterinarian), Dr. Steve Olsen (USDA Agricultural Research Service), Dr. Randy Berrier (Colorado Serum Co.), Becky Frey (USDA APHIS), Brandon Scurlock (Wyoming Game and Fish Department), Dr. Ken Mills (Wyoming State Veterinary Laboratory), Dale Strickland and Hall Sawyer (West, Inc), Dr. Thomas Clarke (Centers for Disease Control), Chuck Hayes and Dr. Jamie Snow (Wyoming Department of Health), Scott Smith and Kathy Frank (Wyoming Game and Fish Department), Barry Reiswig (National Elk Refuge), Garvis Roby (Wyoming Game and Fish Department, retired), Steve Cain (Grand Teton National Park), Dr. Glenn Plumb (Yellowstone National Park), and Dr. Gerry Andrews (University of Wyoming). Members of the public addressed the Brucellosis Coordination Team at each meeting, providing a broader perspective and input for consideration by the BCT. The Wyoming Brucellosis Coordination Team recognizes fellow team member, Dr. Tom Thorne who died recently in a tragic auto accident, for his dedicated enthusiasm and encouragement in helping the team realize its full potential.

The BCT identified multiple issues related to the four topics to be addressed. Issues that were discussed are outlined in the minutes of the various meetings. Following those discussions, the group developed a list of Best Management Practices (BMP's). These items form a 'toolbox' that can be useful in helping livestock and wildlife managers, State officials, and public health officials address the topics of concern. BMP's are to be looked at as potential tools, applicable in many, but not all situations. The group then generated twenty-eight short- and long-term recommendations for the Governor and Legislature. Funding is requested for many of the recommendations. However, it must be noted that where funding requests are specified, they are short-term only. Longer-term commitments will need to be made in the future to address brucellosis in Wyoming.



General Recommendations

The BCT developed twenty-eight recommendations. Two recommendations span all four of the topics that the team was requested to address. Those recommendations are presented here. The remaining recommendations are presented within each of the topic areas. Though recommendations are numbered consecutively to ease searching, the top-listed recommendation within each topic is the BCT's top priority item for that topic.

The Team felt that the top priority recommendation to come from this effort has been to develop individual Brucellosis Action Management Plans (BMAP) for each elk herd unit that contains winter feed grounds. Local ranchers were also encouraged to develop their own brucellosis management plans. This idea received broad support and a pilot BMAP is currently being developed. This highest-priority recommendation is presented first, followed by a recommendation about research that must occur if brucellosis is to be managed properly.

1. Brucellosis Management Action Plans (BMAP):
 - a. The Game and Fish Department will develop herd unit brucellosis management action plans. These plans shall be formulated to include management plans for individual feed grounds developed in consultation with affected parties and livestock health advisors including the State Veterinarian and USDA-APHIS veterinarian. These plans are to be in place by two years from the date of funding (two years from July 1, 2005). Plans that are developed shall be subject to periodic review according to local concerns and conditions. The plans shall consider wildlife BMP's.
 - b. The State of Wyoming will ask the U.S. Fish and Wildlife Service (USFWS), National Elk Refuge, and National Park Service to develop similar brucellosis management plans for elk and bison, in consultation with neighboring landowners and State regulatory health and wildlife officials. These plans should also be in place by two years after July 1, 2005. Plans that are developed should be subject to periodic review by local managers, wildlife health officials, and neighboring producers according to local concerns and conditions.
 - c. Cattle producers in the vicinity of feed grounds should have their own brucellosis management plans in place. This should be done in conjunction with the development of individual State and Federal elk feed ground BMAP's.

- d. Funding is requested from the Wyoming State Legislature to support the development of the BMAP's.
2. Research. Facilitate critical research on managing brucellosis in wildlife and livestock. To do this, the Governor and Wyoming's congressional delegation must obtain either i) an exemption under the Select Agent rule so that applied research on *Brucella abortus* can be performed in secure federally approved outdoor facilities in Wyoming and elsewhere or ii) seek to have *B. abortus* reclassified an agricultural agent. It is recommended that the Governor and congressional delegation coordinate an effort to acquire research dollars for the development of more effective brucellosis treatments, tests, vaccines and vaccination strategies for cattle, elk and bison.

We recommend a minimum of \$500,000 be made available to the Wyoming Wildlife/Livestock Disease Research Partnership to initiate and promote brucellosis research. This amount will not accommodate all needed brucellosis research, but reflects Wyoming's support for research and is intended to encourage the Federal government and other entities to participate. Further, the USDA's major disease research program, the National Research Initiative (NRI) should include a targeted, funded, competitive program that addresses research on brucellosis in elk, bison and cattle.

The BCT identified research projects that it considered important for the control, management, and eventual eradication of brucellosis in Wyoming. Both cattle and wildlife research needs were evaluated. Each research project was assigned a value based on the reviewer's opinion on the criticality of the research. These research projects are listed below in descending order of importance.

- a. Immune response in elk
- b. Improved brucellosis diagnostics (i.e. a quick, accurate chute-side test)
- c. Efficacy of adult vaccination of cattle
- d. Development of immunostimulants and adjuvants in elk
- e. Strain 19 modifications in current elk vaccination plan (e.g., higher initial dosages, boosters)
- f. Efficacious vaccines for elk and bison (all types, including subunit and DNA vaccines)
- g. Effects of elk test and removal alone or in combination with vaccination
- h. Cost-benefit and risk analysis of brucellosis eradication in elk and bison
- i. RB51 vaccine immunity duration and efficacy of calf-hood vaccination in cattle
- j. Comparison of RB51 and strain 19 efficacy in cattle
- k. Dose-response of RB51 in cattle

- l. Vaccine delivery systems (including oral, aerosol, and biobullet) development for elk/bison
- m. Efficacy of contraception in elk and wild bison as alternative to test and culling
- n. Efficacy of RB51 in bison
- o. Develop better hazing strategies for elk
- p. Strain 19 (low dose, pre-1980) immunity duration in cattle
- q. Effect of feed methods and feed type on brucellosis seroprevalence
- r. Impact of stopping elk feed ground vaccination program
- s. Investigate bacteriophage therapy (as part of ongoing USDA initiative)

BMP's and the rest of the recommendations follow by topic.

Topic 1 – Reclaim Class-Free brucellosis status for cattle, surveillance, and transmission between species:

Discussions about this topic were focused on surveillance and reducing the potential for transmission of brucellosis between elk, wild bison, and cattle. It is recognized that surveillance will need to continue for the near future to allow the State to regain its Class-Free brucellosis status. Surveillance is also essential to assure trading partners of the health of Wyoming's cattle herd. The need to reduce contact between elk/bison and cattle was also a center of discussion. Ideas and best management practices are presented that emphasize separation of animals both spatially and temporally during the critical potential transmission period of February 5 to June 15. The development of Brucellosis Management Action Plans occurred as a result of these preliminary discussions followed by refinement during other discussions.

Additional topics addressed by the BCT included concerns about vaccine efficacy and vaccination strategies, animal identification and traceback capabilities, cattle herd health management, and previously successful eradication approaches in other states. The BCT investigated the need for indemnification of cattle owners in quarantine situations for losses. The BCT requested funding of the Wyoming Game and Fish Department for development of detailed maps of areas of high risk of contact between elk and cattle. That request was funded. Mapping of risk factors was underway when this report was submitted.

Best Management Practices for Cattle and Transmission of Brucellosis

- I. Cattle herd health practices:
 1. Blood test any cow that aborts for brucellosis.
 2. Submit aborted fetuses to Wyoming State Veterinary Laboratory for testing.
 3. Segregate any cow that aborts from the rest of the herd until her brucellosis status is clarified by a blood test.

4. Any open cow (not pregnant) that is retained should be tested for brucellosis.
5. Test and sell dry cows before breeding.
6. Cull every cow that is open; ship cows which don't bring home a calf for unknown reasons.
7. Producers should avoid bringing cattle near elk and bison calving areas when possible.
8. Continue mandatory calthood vaccination of eligible cattle as currently prescribed by law.
9. Enforce regulations regarding brucellosis vaccination of commuter cattle.
10. Vaccinate adult cows in high risk areas in coordination with appropriate officials and official protocols.
11. Monitor calving rates (percentages) in cattle.
12. Feed and calve in areas that are not proximate to elk feed grounds.
13. Notify the Game and Fish Department immediately upon commingling in the Greater Yellowstone area.
14. Know the source of replacement cattle.
15. Maintain official identification on cattle.
16. Wyoming State Veterinarian and USDA-Animal Plant Health Inspection Service (APHIS) shall identify herds which may be subject to whole herd vaccination.

II. Practices to minimize transmission from wildlife and between cattle:

1. Coordinate efforts among stakeholders to complete GIS mapping of risk factors, particularly land patterns, parturition areas, elk damage areas, feed grounds, seroprevalence of herd units, cattle feeding areas, type of cattle operation, stackyard locations, history of elk and cattle herd disease, habitat improvement areas, migration routes, allotments, land ownership, winter range, and precipitation patterns.
2. Make available applicable public data, including mapping, to stakeholders including the Wyoming Livestock Board, APHIS, producers, Wyoming Game and Fish, area veterinarians, agencies, and the public.
3. Consider additional elk-proof fencing through the BMAP plans.
4. Develop individual elk herd unit management plans with specific sections for each feed ground.
5. Maintain elk, wild bison, and spatial and/or temporal cattle separation during critical periods of exposure especially February 5 through June 15. Individual management plans should address those critical periods of exposure.

6. Fence livestock stackyards to be elk proof. Incorporate into management plans when appropriate.
7. Feed animals on fresh snow and spread them out as much as possible.

III. Surveillance:

1. Follow APHIS and Wyoming Livestock Board rules as required by law with regard to testing.
2. Work with State and APHIS in promoting voluntary certified brucellosis free herds in the risk area.

Recommendations:

3. Surveillance Testing:
 - a. The Wyoming Livestock Board shall make a formal response to the USDA-APHIS brucellosis program review.
 - b. The Wyoming Livestock Board will promulgate rules amending the existing Chapter 2 Brucellosis Rules to enhance brucellosis surveillance including implementation of the “workable provisions” of the USDA-APHIS program review.
 - c. The amended rules shall mandate the testing of all test eligible female domestic cattle and domestic bison that are over the age of 24 months on change of ownership and premises. Mandatory testing shall continue for a period of three years after the State achieves Class-Free brucellosis status again, at which time the State’s brucellosis surveillance program shall be reviewed by the Wyoming Livestock Board. The Wyoming Livestock Board will review the brucellosis issue every three years thereafter for a total of at least three reviews over nine years. Each review shall evaluate recommendations of the BCT, including timelines and adherence to deadlines, and formulate new recommendations as needed.
 - d. Producers should report, and veterinarians should investigate, cattle abortions in order to enhance surveillance in the risk area.
 - e. The legislature and the USDA-APHIS should fund ongoing surveillance testing of blood samples statewide and abortion cases from the risk area.
4. Ask the Wyoming State Legislature to continue funding for brucellosis testing at the Wyoming State Veterinary Laboratory. This funding is to be budgeted through the Wyoming Livestock Board.
5. Develop an understanding of how changes in ranch enterprises to reduce transmission of the disease, as well as brucellosis in general, may affect rural economies.
 - a. Funding is requested to investigate and explain incentive programs or alternative ranch enterprises which producers may voluntarily employ to reduce transmission risks between wildlife and cattle.

- b. Funding is requested to quantify the direct and indirect economic impacts of brucellosis in Wyoming.
6. Enhancement of veterinary support for managing brucellosis in cattle will allow for improved surveillance and responses to outbreaks.
 - a. It is requested that APHIS maintain a Federal veterinarian in the Northwest part of the State who is dedicated to brucellosis.
 - b. The Wyoming Livestock Board and USDA-APHIS should assemble local veterinarians from throughout the State to provide additional training in brucellosis management and surveillance.
 - c. The USDA-APHIS is requested to provide the best available screening test (specifically the Fluorescence Polarization Assay (FPA)) at sale barns throughout the State.
7. The Wyoming State Veterinarian should work with USDA-APHIS and USDA-Agricultural Research Service (ARS) to immediately develop the best vaccination program for cattle in the risk area, which could then be included in cattle Brucellosis Herd Management plans
8. The Wyoming Livestock Board and the USDA-APHIS will work with producers to develop Certified Brucellosis-Free herds.
 - a. It is recommended that the State Legislature pursue support from USDA-APHIS to assist producers with achieving certification.
 - b. The Wyoming Livestock Board should pursue MOU's with trading partner states to assure acceptance of Certified Brucellosis Free herds.
9. Pursue legislation requiring livestock trader and dealer registration with the Wyoming Livestock Board in accordance with APHIS regulations to facilitate regaining and maintaining Class-Free brucellosis status.
10. Create a Compensation Review Program and board, through appropriate legislation, to review all compensation applications from a brucellosis case in domestic cattle or farmed bison that is believed by the claimant to have originated from wildlife.

The reimbursement program would apply to infected and contact herds that are quarantined. However, reimbursements may not be available to owners of infected herds who do not opt for depopulation. The reimbursement program shall address:

- a. Transportation costs associated with depopulation
- b. Feed costs associated with quarantine
- c. Lost marketing opportunities during the quarantine period, including loss of a calf crop when appropriate

- d. Costs associated with testing
- e. Board membership to consist of:
 - i. A member of the Wyoming Livestock Board
 - ii. The Director of the Wyoming Department of Agriculture
 - iii. A representative of the Wyoming cattle industry
 - iv. A livestock producer from the area of the brucellosis case

Topic 2 - Developing an Action Plan of what to do in the event of a new case in cattle

The BCT developed an Action Plan for government agencies to activate should a new case be identified. Lists of State agencies including neighboring state veterinarians, as well as industry and other stakeholders were drawn up to ensure that accurate information is disseminated as quickly as possible in order to avoid misunderstandings. Part of the Action Plan includes the need to meet promptly with the community where a positive case is identified and to strive to work with neighboring state veterinarians and agriculture departments in disseminating accurate information to keep markets open.

Best management practices: An Action Plan to follow in the event of a new case in cattle

- I. The USDA-APHIS Uniform Methods and Rules for Brucellosis and the Wyoming Livestock Board Chapter 2 Rules will be followed in the regulatory handling of a confirmed case of brucellosis in Wyoming.
- II. Create a Regulatory Decision Group comprised of: The Wyoming State Veterinarian, APHIS Veterinary Services-Area Veterinarian in Charge (VS-AVIC), Designated Brucellosis Epidemiologist, Assistant State Veterinarian, APHIS-VS Veterinary Medical Officer.
- III. The Regulatory Decision Group will evaluate the test data and cattle herd history in cooperation with the owner and, if requested, the owner's veterinarian. The following will be considered: pregnancy status of the animal, calving history, vaccination history of animal and herd, age of animal, closed versus open herd status, potential exposure to infected wildlife, strength of the titer response, whether cattle are run alone or in common with other herds.
- IV. If a reactor is negative on culture and at the discretion of the Regulatory Decision Group, a herd test, a follow-up test of selected animals, or both could be completed.
- V. If serologic tests result or herd history suggests brucellosis:
 1. Quarantine is issued by Wyoming Livestock Board
 - a. of individual animal, if suspect, or

- b. of entire herd if reactor.
- 2. Animal may be slaughtered and tissues collected for culture, or if only “suspect”, retest of animal 30 days after initial test.
- 3. A whole herd test would take place, unless there is a reactor and the owner decides to depopulate the herd.
- 4. The Wyoming State Veterinarian notifies the Governor upon strong suspicion of infection.

VI. If follow-up testing confirms presence of field strain *Brucella abortus*:

- 1. Quarantine is continued and strengthened, if necessary, including whole herd test of affected herd.
- 2. APHIS AVIC and State Veterinarian notify producer and a personal meeting is scheduled.
- 3. Epidemiological investigation is then conducted.

VII. Notification Process (after the producer is notified):

- 1. The Wyoming State Veterinarian notifies Wyoming Livestock Board.
- 2. Confidentiality of herd-related information is maintained until confirmation.
- 3. The Wyoming State Veterinarian and USDA-APHIS Area Veterinarian in Charge (AVIC) notify contact herd owners when a case is confirmed.
- 4. APHIS VS AVIC notifies West Region Director and GYA Brucellosis Coordinator and APHIS Brucellosis Staff and other states’ AVICs.
- 5. Wyoming State Veterinarian Notifies:
 - a. State Homeland Security Director
 - b. Wyoming Department of Agriculture Director
 - c. Local Veterinarians
 - d. Wyoming Game and Fish Department Director
 - e. Wyoming Department of Health Director
 - f. Wyoming State Veterinary Laboratory Director
 - g. Executive Directors of Industry Organizations
 - h. Wyoming Livestock Auction Markets
 - i. Other Wyoming Licensed Veterinarians
 - j. Other States’ State Veterinarians
 - k. Local Cattle Associations
- 6. Conduct a public meeting, including the Wyoming State Veterinarian, APHIS AVIC and other members of VIII. “Communication Tree”, in the community when an initial case is found and conduct follow-up meetings at the discretion of the State Veterinarian.

VIII. Communication Tree Established to Share Information and Daily Updates, Including:

1. Affected and contact herd owners
2. Wyoming State Veterinarian and Assistant State Veterinarian
3. USDA Area Veterinarian in Charge
4. Wyoming Livestock Board
5. Wyoming Livestock Board staff members
6. Local Veterinarians
7. Other Veterinarians in Wyoming
8. Wyoming Veterinary Medical Association
9. Wyoming Department of Agriculture
10. Wyoming Game and Fish Department
11. Wyoming State Veterinary Laboratory
12. Wyoming Department of Health
13. Wyoming Governor's Office
14. Wyoming Stock Grower's Association
15. Wyoming Wool Grower's Association
16. Wyoming Farm Bureau
17. Rocky Mountain Farmer's Union
18. Local Cattle Associations
19. Brand Inspectors
20. Key State Veterinarians and Directors of Agriculture

IX. The Director of Wyoming Department of Agriculture and the Wyoming State Veterinarian should make personal contacts with key neighboring state veterinarians and directors of departments of agriculture.

X. The Wyoming State Veterinarian works with Governor's press secretary as media contact person.

XI. Meetings of the Regulatory Decision Group are held as needed.

XII. As epidemiological information becomes available:

1. Contact and schedule adjacent herd tests, and
2. Discussions with affected herd owner continue regarding removal of reactors and depopulation of the herd.

Recommendations

11. In the event of a new case, convene the Regulatory Decision Group to follow the Action Plan as outlined in the BMP's. That group shall include:
 - a. Wyoming State Veterinarian
 - b. USDA APHIS VS AVIC for Wyoming
 - c. Designated USDA brucellosis epidemiologist
 - d. Assistant State Veterinarian
 - e. APHIS VS Veterinary Medical Officer
12. Pursue legislation that would authorize the Wyoming Livestock Board to utilize brand inspectors to help with animal health quarantines and movement restrictions. Appropriate General Fund funding should be supplied.
13. For all positive brucellosis cases in Wyoming cattle, the Wyoming State Veterinarian, along with APHIS-Veterinary Services colleagues will work with diagnostic laboratories to ensure that affected tissues be held frozen at the USDA National Veterinary Services Laboratory, and the Select Agent Laboratory at the Wyoming State Veterinary Laboratory for one year after the case is officially designated as a positive.

Topic 3 - Addressing human health concerns:

Human health best management practices focused on hygiene for those people at high risk. These include ranchers, veterinarians, hunters, laboratory workers, and wildlife personnel. Pregnancy and compromised immunity are special risk factors for brucellosis in humans. The issue of mental health support in communities facing a brucellosis case and possible depopulation of a brucellosis-infected cattle herd was discussed. Discussions included a report of the two reports of human brucellosis from Wyoming that were investigated this year. The Centers for Disease Control (CDC) presented a discussion about the select agent status of *Brucella abortus*, which is making brucellosis research difficult.

The Wyoming Department of Health has already developed an action plan for communication and assistance with these issues as a result of this team's recommendation. Research at the level of the CDC on brucellosis incidence and tracking was proposed.

Best Management Practices

- I. Persons Handling Elk, Bison, and Livestock Tissues:
 1. Practice good hygiene during and after handling all raw meat and viscera
 2. Wear impermeable (latex) gloves.
 3. Minimize blood and uterine fluid contamination of clothing. Launder clothing properly.
 4. Protect open wounds, eyes, mouth and nose from exposure to blood and uterine fluids.

5. Do not handle female reproductive tract or fetal material and avoid cutting into swollen joint tissues.
 6. Wash hands thoroughly .
- II. Brucellosis Vaccine Exposure: Wash exposed area. Immediately see a health care provider. The health care provider should:
1. Collect a baseline blood sample for testing of antibodies.
 2. Administer appropriate antibiotics for three to six weeks.
 3. At the end of three weeks, recheck the patient with a second blood sample.
- III. Pregnant Women and Immunocompromised People:
1. Avoid animal birthing/abortion areas.
 2. Consume only pasteurized dairy products.
 3. Wash hands often.
 4. Others should remove visibly contaminated clothing and boots and wash hands thoroughly before entering the household of a pregnant woman or immunocompromised person.
 5. Avoid handling newborn animals and raw milk.
- IV. Persons Working In a Laboratory Setting with Brucellosis:
1. Follow current Biosafety in Microbiological and Biomedical Laboratories (BMBL) rules.
- V. Persons Living and Working on a Ranch Where Brucellosis Has Been Detected:
1. A family should consult with their local health care provider to assess exposure and risk of infection.
 2. If health care provider has questions, they are encouraged to contact the Wyoming Department of Health (WDH).
- VI. Wyoming Department of Health and health care providers:
1. Promote awareness of Brucellosis among area health providers to promote an index of suspicion in persons presenting with a compatible illness and consistent epidemiological history and to encourage testing.
- VII. Investigations:
1. An appropriate epidemiological investigation should be conducted around all confirmed brucellosis cases to identify possible sources of infection.
 2. All isolates of brucellosis should be identified to the species and biovar, and/or genotype level to facilitate recognition of the relevant food and or animal source of infection.

3. Confirmatory serologic testing should be performed to identify the species of *Brucella* in patients with brucellosis.

VIII. Veterinarians, Wildlife Personnel and Ranchers:

1. Wear impermeable gloves and eye protection when assisting calving or aborting animals.
2. Scrub with soap and water after all procedures.
3. Cover open wounds.
4. Clean and disinfect calving areas and other places contaminated with infective materials.
5. Contact health care provider in case of vaccine exposure.
6. Use appropriate procedures when handling fetal materials.

IX. Slaughter House Workers in Plants Accepting Known Infected Animals

1. Communicate risk of human brucellosis infection to workers.
2. Use personal protective equipment including eye shields, gloves, and masks.
3. Employ additional cleaning and disinfection practices.

X. Mental Health:

1. Provide timely and accurate information about the event or threat to the public during an event or threat.
2. Provide a forum to share concerns and to have questions answered during an event or threat.
3. Let people know the normal range of human responses to this type of event or threat.
4. Let individuals know about appropriate coping behaviors.
5. Let people know about professional mental health resources and how to contact them.
6. Develop a risk management communication plan and materials for brucellosis.
7. Have written materials and professional resources on mental health identified.
8. Have reminder information available to health care providers to be on the lookout for symptoms of brucellosis and symptoms of depression, anxiety, and general stress.
9. Have a distribution plan that alerts health care providers and puts mental health information in places where people naturally go.

Recommendations

14. The State Health Officer and/or State Public Health Veterinarian shall develop, by July 1, 2005, a public communications response plan to a future brucellosis case in cattle. This plan should be implemented completely upon notification of a new case.
15. The Wyoming Department of Health, in consultation with appropriate agencies, should formulate appropriate protocols for Wyoming health care providers, within the year 2004, to follow when individuals are exposed to Brucellosis, whether through exposure to an infected animal, infected animal tissue, a vaccine stick, laboratory exposure, or otherwise.
16. The Wyoming Department of Health will explore a prospective study to define the incidence of human brucellosis among high-risk exposure groups.

Topic 4. Reducing, and eventually eliminating brucellosis in wildlife, specifically addressing winter elk feed grounds

The Wyoming Brucellosis Coordination Team believes it imperative that all parties work together to assure success in achieving the goals of the Wyoming Brucellosis Program. State agencies should work with Federal agencies to assure cooperation and participation in all aspects of Wyoming's wildlife brucellosis programs.

Reducing, and eliminating brucellosis in wildlife with special attention to the feed grounds was the major topic discussed in committee. In terms of best management practices, the BMAP's were refined and a deadline for BMAP development for each elk herd unit containing winter feed grounds has been set at 2 years after availability of funding, with regular review thereafter.

The concentration of elk on winter feed grounds was the "800 pound gorilla in the closet" for discussions. Goals and various ways of reducing animal concentration are controversial. The group is recommending a limited test and removal program involving high-risk brucellosis-positive female elk within a specified herd unit. That pilot program, if successful, would not significantly reduce elk population numbers and would lead to a measurable reduction of brucellosis prevalence on a given feed ground and herd unit. The ongoing vaccination program would accompany the proposed pilot study. However, if this experiment is not eventually applied over a period of years to all elk feed grounds and herd units as well as on bison and elk under Federal jurisdiction in order to eliminate contamination from nearby animals, brucellosis prevalence rates could well return to previous levels.

Research efforts need to focus on ways of managing animals, habitat, and population numbers as well as the traditional questions of vaccination, vaccine delivery, and testing. It is strongly suggested that other, perhaps "outside the box" issues also be considered for research and pilot studies.

Measures and goals to reduce concentration of elk on winter feed grounds provided the most controversy for the BCT. Items that were considered included a gradual reduction of

elk numbers on key feed grounds (after the proposed reduction of high-risk female elk), vaccination, followed by gradual phase-out of feeding in that area. Merging of some feeding sites was considered. The group recommends a substantial commitment to habitat acquisition and improvement in order to mitigate some reduction in feeding. Geographic expansion of some feed grounds may permit better dispersal of animals and reduced exposure to brucellosis.

Summary of discussions regarding the fate of winter elk feed grounds:

Majority Report – Rationale for no on closure of elk feed grounds in the foreseeable future

Elk feed grounds are a focus of controversy in discussions but especially so when regarding brucellosis in elk. They have an undeniable role in concentrating the elk population during the latter half of gestation, facilitating elk to elk transmission of the disease. From a purely veterinary or scientific perspective, closure of winter elk feed grounds makes sense. Decisions regarding brucellosis eradication, elk management, and elk feed grounds should be made within biological and scientific parameters but are ultimately socio-political decisions.

Routine elk feeding occurs in Wyoming only in the high (7,000 ft. or more above sea level) valleys of the west. Historically, elk wintered in those geographically lower portions of the valleys that happened to also be most attractive to early settlers. These lands continue to be developed today. Those open meadows are no longer available to elk as winter range. Additionally, elk migrated through these valleys to distant winter ranges in Wyoming, like the Little Colorado, and perhaps the Red, deserts. Human development now blocks traditional migration routes to desert winter ranges, which are equally important to the livelihood of BLM livestock permittees and contain crucial sage grouse, pronghorn, and mule deer habitat. Feeding is unnecessary elsewhere in the State where these unique conditions do not exist.

Elk have been fed for nearly 100 years to reduce winter mortalities due to lost native winter range and to prevent depredation to stored crops. A 1939 Wyoming statute makes the Game and Fish Department liable for damages caused by big game animals. Many feed grounds were established in the 1940's and 1950's to prevent elk from entering private lands and damaging stored crops. Sportsmen, tourists, tourism-based businesses, ranchers, wildlife managers, and the public would not tolerate starving elk and damaged crops. Because of winter elk feed grounds, elk numbers in Western Wyoming have been relatively stable at or below summer range carrying capacity, but are well above current winter range carrying capacities. Closure of feed grounds without concurrent habitat acquisition or protection has been estimated by the Wyoming Game and Fish Department to result in an elk mortality ranging between 40-80 % depending on the elk herd unit and available forage, and increased damage to crops. For many decades large segments of the culture and economy of western Wyoming have become elk-dependent. Closure of elk feed

grounds to control brucellosis is a policy decision. It should be made by the people of Wyoming based on social and economic, rather than veterinary factors.

Although winter elk feed grounds sustain high levels of brucellosis among elk, a compelling argument can be made that feed grounds are the best tool available to managers and veterinarians to control and eliminate brucellosis. Clearly feed grounds reduce commingling of elk with cattle and provide access to elk for brucellosis control efforts that otherwise would not be available. These efforts include surveillance, vaccination, and, potentially, modified test-and-removal. No one on the committee advocates rapid closure of feed grounds, since that would increase commingling and risk to cattle, most likely result in deaths of elk, and eliminate opportunities for hands-on brucellosis management.

Minority Report – Rationale for supporting gradual closure of winter elk feed grounds after culling of seropositive elk

Concentration of elk on feed grounds at critical seasonal time periods is the reason why elk populations in northwestern Wyoming continue to have high rates of brucellosis. Concentration of wildlife in winter is an inherently risky practice from an infectious diseases standpoint. Winter elk feed grounds sustain brucellosis in elk and predispose them to other diseases, such as CWD and tuberculosis. If the State wants populations of healthy elk, it should commit to keeping sustainable populations dispersed on native range. Concentrating elk on winter feed grounds in Northwestern Wyoming maintains elk at unnaturally high population concentrations, adversely affecting summer forage for other species. Elk dispersed on native range do not have this disease problem in Wyoming or surrounding states. The implication is obvious: If Wyoming is serious about eliminating brucellosis in elk; it needs to commit to a long term, rational plan for eliminating feed grounds.

Artificial elk feeding reinforces the perception that habitat has ceased to be important for maintaining healthy elk in Wyoming. At a time when native habitat is under serious threat in the Upper Green River Basin, an aggressive policy by the State of Wyoming to secure and expand winter habitat available to elk, in conjunction with a pilot project test and removal policy, is the State's best chance to eliminate brucellosis.

One argument for maintaining winter elk feed grounds is the ability to administer vaccine. Most brucellosis specialists feel that the efficacy of Strain 19 vaccine in elk is marginal. We are not aware of any specialist who thinks that vaccination, as currently practiced, can eliminate the disease.

Assuming test-and-removal, which is recommended as a defined pilot project, can effectively reduce the seroprevalence of brucellosis in one herd unit, we recommend methodical elimination of feed grounds on a case-by-case basis using sound science and in combination with other proven successful projects. Closing the feed grounds can most effectively be done once the population of elk and the numbers of animals actively shedding the infectious bacteria are reduced and available habitat exists.

This minority opinion would like to emphasize that the majority decision of not to close any feed grounds in the "foreseeable future" ignores the weight of scientific opinion

about the best way to eliminate the disease. Our goal is the complete elimination of brucellosis in Wyoming. Given the nature of this disease, short-term efforts to reduce the seroprevalence invites prompt resurgence of brucellosis as soon as these efforts slow or cease.

Elk feeding operations are expensive. If practices focus on managing but not eliminating the disease, brucellosis control in elk will remain a permanent financial millstone around the neck of WGFD. If the State wants to persuade its federal partners, particularly on the National Elk Refuge, that this a serious threat to the health of wildlife and ranching operations, it needs to take bold steps, not “more of the same.”

Best Management Practices (BMP's)

Most, if not all, BMP's will be incorporated into Game and Fish Brucellosis Management Action Plans (BMAP), which will include elk feed ground management strategies and will be prepared with consultation and input from area livestock producers, the Wyoming State Veterinarian, and APHIS. Many BMP's identified by the Wildlife Brucellosis Issues Subcommittee are currently in use and are routinely followed. Other BMP's are new ideas and should be utilized in planning, most likely through a check-off process that will assure they are considered and, if not used, there will be an explanation why they were not used. The pro's and con's of each option will be explored in the decision making process.

Potential and existing BMP's were identified as practices that are considered in preparation of BMAP's. Issues were considered as controversial, potential recommendations, problematic because of one or more obstacles to implementation, and as appropriate topics for research. Most BMP's are relatively non-controversial and did not receive significant comment by committee members.

I. Habitat Improvements and Habitat Acquisition:

A. Habitat Enhancement:

1. Communicate early with all affected stakeholders about proposed habitat enhancements.
2. Completed habitat enhancements: Document completed enhancements and their effects on brucellosis management.
3. Explore opportunities for future habitat enhancements: Document opportunities for the next 5 and 10 years.
4. Identify ongoing and potential losses of winter range and/or existing migration corridors to urban migration, and oil or gas development: Notify appropriate administrative authorities.

B. Reduced Reliance On Elk Feed grounds:

1. Pursue opportunities for future habitat enhancements on private and public land to minimize time elk are fed, especially in spring.
2. Pursue opportunities to acquire habitat through easements or other mechanisms.

3. Pursue efforts to encourage early departure of elk from feed grounds. For example, terminate feeding early.

II. Prevent Interspecific (elk to cattle) Brucellosis Transmission:

- A. Cooperatively work with producers toward separation of feed ground elk and cattle during winter and early spring.
 1. Develop specific management strategies for each elk feed ground to reduce elk, wild bison, and cattle commingling during the critical period of February 5 to June 15. Identify and categorize risk factors and occurrence of sporadic or chronic co-mingling to achieve maximum spatial and temporal separation.
 2. Work with owners of at risk or exposed livestock to locate and map cattle use areas closest to feed grounds and document whether distances between elk and cattle use areas can or cannot be increased.
 3. Fence hay stack yards using permanent or temporary methods.
 4. Fence cattle feed lines using permanent or temporary methods where acceptable to producers.
 5. Fence between elk feed grounds and cattle: Document existing fences and potential to improve existing fences or build new fences.
 6. Identify and implement opportunities to relocate feed grounds to increase separation between elk and cattle.
 7. Identify and implement opportunities to redesign feed grounds that might reduce congestion and incorporate better feeding methods.
 8. Plan for timely and adequate response when livestock producers report commingling.
 9. Invite livestock producers in areas where damage and commingling have occurred to be a part of the BMAP process.
 10. Include State and Federal elk feeders in planning process.
- B. Separation of cattle from elk and bison during late spring and summer:
 1. Identify and map sites where commingling occurs or has a potential to occur after termination of feeding and before June 15 with emphasis on elk and bison parturition areas. Prioritize according to risk.
 2. Identify elk and bison spring and fall migration corridors. Prioritize according to risk and recommend changes to reduce the risk.
 3. Consider drift fences for achieving spatial separation of cattle and elk and bison. Document existing fences and potential to improve existing fences or build new fences.
 4. Invite livestock producers who have cattle in parturition areas to be a part of the BMAP process.

III. Elk and Bison Management

A. Brucellosis Control or Elimination:

1. Utilize all BMP's as a tool box of options in preparation and implementation of BMAP's. Document how each BMP was considered and included or was not included with explanation.
2. Formally review BMAP's annually and modify as needed. Document implementation, especially actions that were not implemented.
3. Establish measurable goals and objectives and bench marks toward brucellosis management/elimination. Document bench marks achieved and not achieved.

B. Population Objective:

1. Perform periodic scheduled review of the herd unit objective.
2. Meet with and educate landowners about the importance of providing access with respect to population and disease management.
3. Consider all the factors impacting population objectives; particularly hunting, socioeconomic impact, disease, habitat analysis, public input, historic numbers, distribution, private landowner concerns, and access.
4. Consider biological tolerance of the habitat in setting population objectives.

C. Vaccination:

1. Vaccinate elk and wild bison for brucellosis.

D. Surveillance:

1. Utilize hunter-killed elk and bison blood samples in non-feed ground areas in the Greater Yellowstone area to document distribution and prevalence of brucellosis. Evaluate validity of techniques, frequency, numbers, etc. to assure statistically valid surveillance.
2. Utilize hunter-killed elk blood samples to conduct state-wide surveillance for brucellosis in Wyoming outside the GYA. Surveillance may take 2-3 years to complete. Evaluate validity of techniques, frequency, and numbers to assure statistically valid surveillance and repeat on a 10 year cycle.
3. Trap and sample feed ground elk to monitor seroprevalence and efficacy of brucellosis elimination activities. Evaluate validity of techniques, frequency, and numbers to assure statistically valid surveillance.
4. Improve and expand traps on feed grounds, including the National Elk Refuge, as necessary to assure sampling of the feed ground population is adequate and representative.

E. Information and Education:

1. Develop, implement and distribute an information and education plan as part of BMAP's. Include an explanation of need to eliminate brucellosis, management or elimination efforts, sample collection progress, and social and economic impacts of management.

2. Encourage and facilitate intra-agency and interagency (Federal and State) communication, cooperation, and collaboration. If necessary, involve appropriate administrative authorities for resolution of conflict.

IV. Winter Elk Feed Ground Management:

A. Winter elk feed grounds:

1. Address proximity to high risk cattle operations and manage to decrease risk to cattle.
2. Utilize feed grounds to prevent elk-cattle commingling.
3. Consider feed ground location and land jurisdiction and manage to decrease risk to cattle.
4. Maximize opportunities for daily or frequent feed line change.
5. Recover all aborted elk fetuses and submit specimens to the Wyoming Game and Fish Department Disease Laboratory. Use appropriate protective practices for human and animal health.
6. Separate elk feeding and bedding areas. If space and logistics allow, feed elk as far as possible from bedding and loafing area.
7. Increase physical size or consolidate feed grounds if space and logistics allow, increasing dispersion of animals on the feed ground.

Wildlife Recommendations

17. As part of the BMAP process, specific short-term seroprevalence targets and timelines for achievement will be set in concert with minimal population impact (e.g., <10% loss in population objective via test and remove, contraception, etc.). Quickly (FY 06) establish a five-year Pilot Project which institutes a seroprevalence reduction program within the Pinedale Elk Herd unit. The Game and Fish Department's objective for this five-year Pilot Project will be to achieve a statistically significant reduction in seroprevalence at a 95% confidence level. This Pilot Project should not be a stand alone project; other projects should be concurrently developed with the seroprevalence reduction objective. Examples may include many of the BMP's discussed above. The Wyoming Game and Fish Department should obtain advice from outside experts to assure that the study is well-designed and able to withstand scientific and controversial scrutiny.

This Pilot Project must be viewed as an experiment. The program will be evaluated annually with a re-evaluation of the success of the project at the end of five years and should not be extended to other feed grounds without public review and comment. These data will be shared with the GYIBC. Options to reduce seroprevalence under this Pilot Project proposal may include but should not be limited to:

- a. Test-and-harvest by hunting low risk seropositive cows.
- b. Removal of high risk, seropositive elk.

- c. Research elk reproductive management which may include contraception, artificially induced abortion, or other reproductive management tactics in young positive cows.
 - d. Create a brucellosis team sufficient to implement the recommendation.
 - e. Permanently identify any elk trapped, tested and released from feed grounds.
 - f. Vaccinate the elk.
 - g. Enlarge existing feed ground acreages to disperse elk.
 - h. Use habitat manipulation and acquisition to help disperse elk.
 - i. Obtain portable and/or permanent, traps and corrals on feed grounds to help in the testing, vaccination, and removal of positive elk.
18. The BCT does not recommend closure of winter elk feed grounds in the foreseeable future. The vote in favor of this recommendation was 10-7 with two absent.
19. Provide legislative appropriated general funding as a standard budget to the Wyoming Game and Fish Commission for personnel, supplies, and equipment so the Department can fund and staff an adequate program that has the goals of 1) eliminating brucellosis in elk and wild bison; and, 2) eliminating the potential for spread of brucellosis from wildlife to livestock.
20. Create a fund to maintain and enhance elk and wild bison habitat in order to decrease risk of brucellosis transmission. Nothing in this recommendation shall be construed to create or convey a right of eminent domain.
- a. Provide diverse incentives for producers and landowners.
 - b. Provide incentives to discourage the loss of crucial habitat or migration areas.
 - c. Take advantage of every opportunity to improve or secure winter habitat to reduce reliance on winter elk feed grounds and to disperse elk and wild bison in a manner which will reduce elk, wild bison, and cattle commingling.
 - d. Use dollars from habitat improvement funds to purchase or lease agriculture-friendly open space or conservation easements, and term easements, from willing landowners (sellers) to maintain critical migration and habitat areas for elk and bison which reduce the risk of brucellosis transmission.
21. On a rotating five-year cycle, the Wyoming Game and Fish Department, with public input, will evaluate elk herd unit population objectives where brucellosis is present and, as part of the BMAP process, evaluate opportunities to modify, merge or phase out any winter elk feed ground, perhaps after reduction of seroprevalence, within the herd unit. The vote in favor of this recommendation was 12-4.
22. The Governor should work with all federal agencies in all federal processes to assure that elk and wild bison brucellosis management goals and objectives intended to

eliminate brucellosis are addressed and considered in the management of Grand Teton National Park, adjacent National Forests, the National Elk Refuge and Yellowstone National Park. The Governor should encourage the involvement of Wyoming's Congressional delegation in this effort. The Task Force understands that this may require litigation in some cases.

23. Encourage Governors Freudenthal, Schweitzer, and Kempthorne to meet and re-address the GYIBC's focus, and urge the GYIBC to more aggressively address its goal, mission, objectives, and funding.
24. Encourage USDA and USDOJ to partner with the State in funding brucellosis eradication efforts including all management practices.
25. The Wyoming Game and Fish Department, Wyoming Livestock Board, Wyoming Department of Agriculture, USDA APHIS, Wyoming Department of Health, and the Cooperative Extension Service shall cooperatively develop an aggressive public education and outreach program for brucellosis. Part of that outreach should entail education of landowners regarding the impaired ability to manage brucellosis when hunter and wildlife management access is limited.
26. Pursue legislation prohibiting private, intentional feeding of elk and wild bison.
27. The Governor should convene the Brucellosis Coordination Team at least annually for five years to follow-up on implementation of the recommendations. It is suggested that the team meet twice in 2005, the first time following the legislative session.
28. State and Federal partners should perform DNA genotyping ("fingerprinting") of archived isolates for prospective studies. Create a searchable database for DNA fingerprints archived in Wyoming, NVSL/ARS, and nationwide.



Conclusions

Funding

Adequate Federal, State, and private funding will be required for most of these recommendations. The Wyoming Game and Fish Department will require funding for development and management of the Brucellosis Management Action Plans. Funding for personnel and equipment is required for biologists and range scientists in the Department to conduct pilot programs, and, if the pilot is successful, possible expansion of the program to other affected elk herd units and winter elk feed grounds. The long-term surveillance in the State requires that funding for additional brucellosis testing at the Wyoming State Veterinary Laboratory be made permanent. Reimbursement for costs of impacted quarantined herds will require support. The acquisition (e.g. easements, etc) and development of habitat is an area that will benefit from an infusion of funding, and a long-term commitment by the State to its wildlife. Support for research is essential. This will require dollars, diplomacy, and public education. Immediate funding would benefit a national attempt to identify research priorities for brucellosis. Funding would also be needed for an economic impact study of brucellosis in Wyoming. Further support of the Wyoming Wildlife-Livestock Disease Research Partnership and requests for further Federal matching funds will help with the veterinary medical and biology research that must be done. Support of research requires full support from all State officials in asking that the Federal Government reconsider its classification of *Brucella abortus* as a select agent or to grant authority to conduct controlled, outdoor research with *Brucella abortus*. Until a way is found to allow outdoor research be done in Wyoming on this problem, all vaccine and management research, including one project that is federally funded and awaiting approval, is effectively at a standstill. The alternative is an expensive, and to the BCT's mind, cost-prohibitive, indoor animal facility to work with select agents. This issue must be addressed immediately. Failure to adequately fund recommendations will significantly impact the effectiveness of these recommendations.

Conclusions

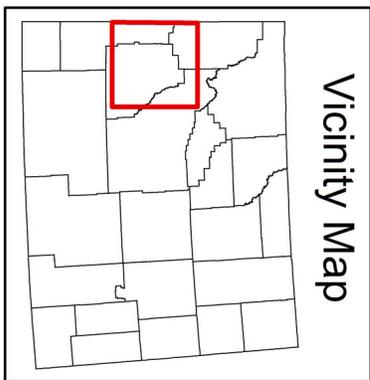
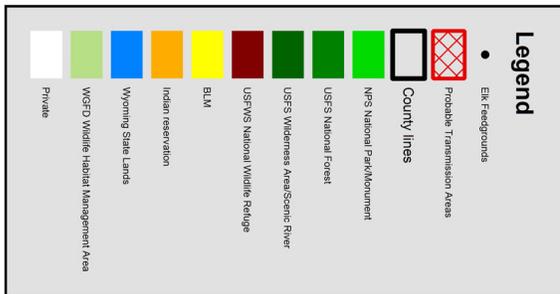
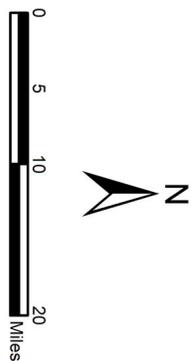
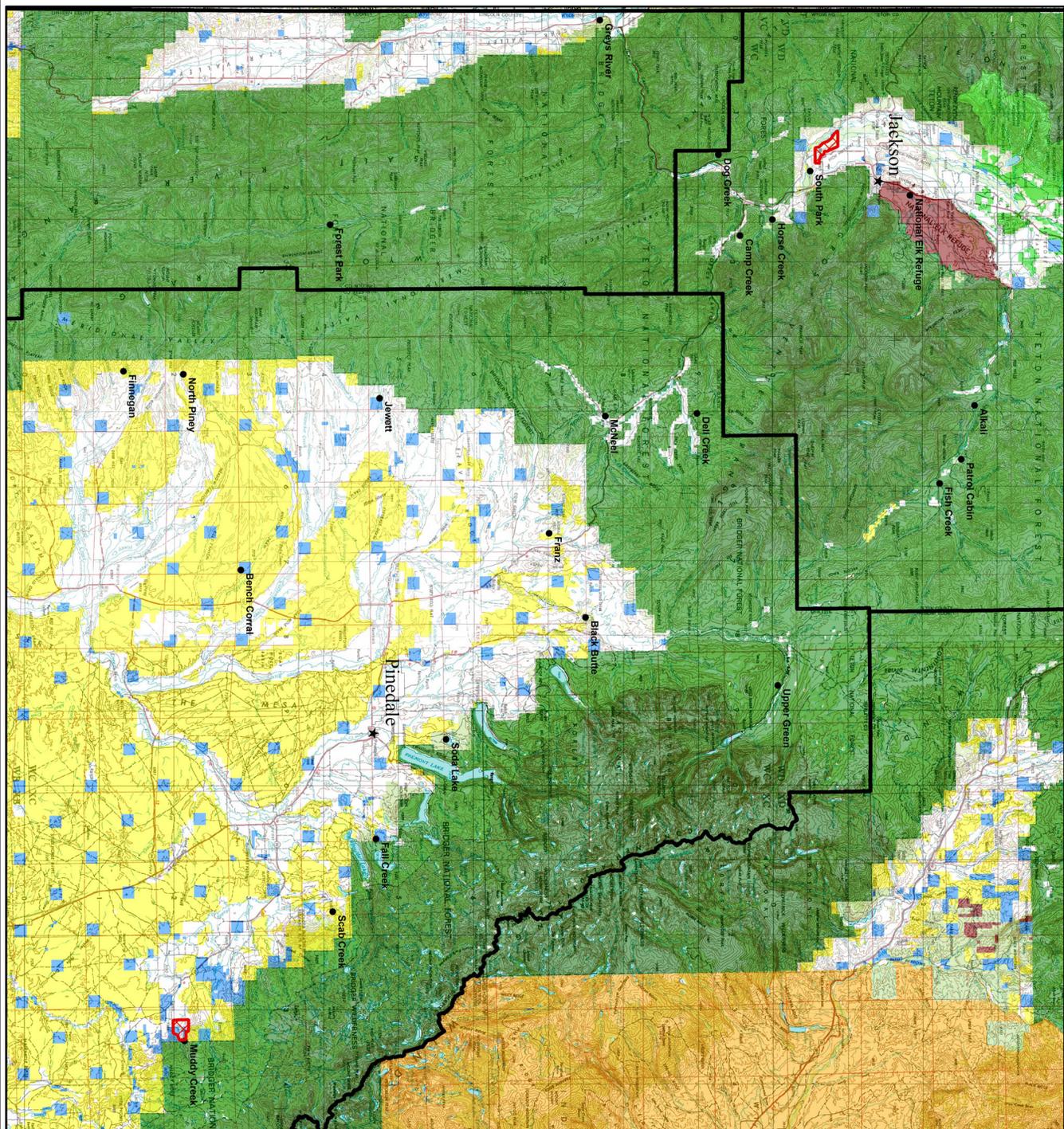
Brucellosis is a medically, biologically, and politically complex disease. **There is no “magic bullet” solution.** Any solution to the issues and disease in the GYA will be multi-faceted and must center on animal and habitat management, with vaccination, limited test

and removal, and perhaps population control measures as ancillary aids. Obviously, to accomplish this goal, both basic and applied research is needed. Funds are requested for a variety of topics. Some needs are immediate, such as surveillance, BMAP development, and indemnification. We must not ignore the need to fund the longer-term measures such as pilot feed ground test and removal, and habitat enhancements to allow population density reduction projects. Funding should include research about the biology and medicine of brucellosis in elk, bison, and cattle and the improvement and creation of habitat.

Finally, political barriers to solutions must be addressed. Our Federal partners in the GYA must be encouraged to continue their programs to work with brucellosis and funding and management support provided to assure they continue to deal with elk and wild bison under their jurisdiction. Any attempt to clean up Wyoming's elk herd will likely be a waste of time and money unless the elk and wild bison under Federal jurisdiction are addressed. The country has achieved virtual eradication of brucellosis in cattle. Eliminating the disease in wildlife is a worthy long-term goal.

Report Presented to
Governor Dave Freudenthal
January 11, 2005

Wyoming Elk Feedgrounds and Areas of Brucellosis Positive Cattle



No warranties are made as to the accuracy of this map
 Map created by WGFD, 12-20-04