SENATE FISH AND GAME
EXHIBIT NO. 26
DATE 1/20/11
BILL NO. SB 144

McCue, Kevin

From: Glenn & Laurie Hockett [glhockett@bresnan.net]
Sent: Wednesday, January 19, 2011 9:01 PM
To: McCue, Kevin
Cc: jim@domemountainranch.com
Subject: FW: Comments to be shared with the hearing Committee, Helena Montana - SB 144

Kevin:

Did you receive the following comment from Jim Klyap with the Dome Mountain Ranch? Please enter in the record and share it with all the Senate Fish & Game Committee members.

Thanks,

Glenn

From: Jim Klyap [mailto:jim@domemountainranch.com]
Sent: Wednesday, January 19, 2011 5:08 PM
To: fsmithg12@aol.com; resflyfish@aol.com
Cc: amfac2@gmail.com; Bryan Atwell; Tom Caffrey; Jason Smith; cobb@lrclaw.com; demps1955@yahoo.com; Donald Polacek; David Schneider; Dan "Rooster" Leavens; glenn@reflexseo.com; glhockett@bresnan.net; Greg Yocca; Jay Gustin; Kurt Dehmer; Luke Antonacci; Livingston Enterprise; greg munther; osha@comcast.net; Paul Williamson; 'Rick Kalish'; Chip Rizzotto; shawn colbert; Terry Wiles; Warren S. Bailey; Will Jordan
Subject: Comments to be shared with the hearing Committee, Helena Montana

Friends of Dome Mountain. My apologies for the lengthy emails. Below is the letter I've sent as my comments to be heard as testimony for some upcoming bills with the Senate Fish & Game Committee regarding Brucellosis Free Buffalo to be managed as a wild game animal in Montana. Please feel free to use any or all for your own comments. I've included some links on our blog at http://www.domemountainranch.com/domemountainelkhunting/ If you choose to send an email, you'll find the link to our Senate Fish and Game listed below and on the blog. Thanks for listening and thanks in advance for speaking up and your continued support of wildlife conservation and the ethics of fair chase hunting and wildlife management.

Dear Committee,
Please accept this email as my testimony and comments to be heard before the Senate Hearing Committee regarding SB 144 and placed for the record.

My name is Jim Klyap, I am the manager of Dome Mountain Ranch here in Paradise Valley, Montana.
2017 US Highway 89 South, Emigrant, Montana 59027

One of our goals here at Dome Mountain Ranch has been to conserve the integrity of our wild places and the wildlife which calls it home. There's been a controversial battle to bring back free-roaming Buffalo to our landscape, the most popular symbol the west is currently hazed back into Yellowstone National Park and as a result unable to migrate naturally like Elk, Deer, Wolves, Antelope and other wildlife that has used this 15,000 year old migration trail for many generations. Buffalo are currently managed by the Department of Livestock.
A WORD TO HUNTERS: I also want to point out that "hunting" is not a method in these near the park boundary I would want to be a part of. This is more "shooting" and does nothing but cast a negative eye on the sportsman, or anyone who enjoys the harvest of wild game over packaged meat from the grocery store. We must preserve the integrity and privilege of fair chase hunting. As Sportsmen, it's our responsibility to maintain certain ethics if we want to pass on this heritage to the next generation. As licenses are sold by Montana FWP, being a part of killing these Buffalo will be a true test of any hunter's integrity. While it may be legal, and you do have a "tag", you can bet, there will be an audience,

complete with judges and jurors who will have the opportunity to scrutinize not only your actions, but relay that inaccurate perception to the rest of the world.
Cattle producers have long been concerned about the spread of Brucellosis. Montana is a Brucellosis-Free state and we can keep it that way together! A couple of years ago, some cattle near us were infected from Elk, who also carry this disease which can cause aborted fetuses in domestic livestock and wildlife. The disease was originally introduced to wild Buffalo in 1917 when the last remaining genetically pure herd of Buffalo was penned up inside Yellowstone Park with domestic cattle. Since then, efforts continue to eradicate this disease have cost not only millions of dollars, but the integrity of our wildlife management practices here in Montana. However, I believe there are solutions and that the preservation of our way of life in Montana is possible, but it's going to take some work.

Currently, through a government approved test, there is a herd of confirmed Brucellosis-free Buffalo held in a pen just south of Dome Mountain. However, these Buffalo now may have nowhere to roam other than being placed behind another hi- fence far from their natural migration route. Some media has suggested that "private landowners and ranchers don't want Buffalo". For the record, Dome Mountain Ranch offers 5,000 plus acres of ideal habitat free of urban sprawl. In addition, the private property is adjacent to thousands of acres of public lands and the 4,000 acre Dome Mountain Wildlife refuge, which was purchased by Montana Fish, Wildlife and Parks to be "set aside for the wintering wildlife of Yellowstone Park". This is an area that should be strongly considered before another Buffalo is removed.

As I understand the current situation, domestic cattle can contract the disease if they ingest the aborted fetuses or materials from a Buffalo. However, since Buffalo have their calves during a time when there are no cattle grazing on the public landscape I can't find support in this argument, but do continue to understand the concerns of my friends who work so hard to continue a livelihood with the cattle industry. It's suggested that more than 50% of the Buffalo trying to leave Yellowstone Park are infected with Brucellosis. If you've even been in our country, you'll agree that nothing consumable remains on the ground for long at all. Ravens, Coyotes, Wolves, Magpies, Bald Eagles, Grizzly and Black Bears consume and clean up everything, it's a natural cycle. By the time cattle walk across these lands I'd find it hard to believe that they would find a way to contract a disease that was gone two months prior.

Since Buffalo have their calves long before any domestic livestock would be grazing these areas, such as Dome Mountain, the Dome Mountain Wildlife Refuge, Daily Lake, Slip & Slide Basin, R & D Ranch and thousands of public lands in the Gallatin National Forest, the argument for keeping free-roaming Buffalo from these areas deserves continued review and factual comment time from landowners, ranchers and the general public.
I suggest that domestic livestock be more carefully managed, both by their managers and the United States Forest Service who manages these permits in combination with wildlife management, not to mention Yellowstone Park management. I might also suggest the idea of a split designation within the state based on sound biology of just how far Brucellosis infected Buffalo would travel north from Yellowstone. The rest of the state's cattle industry shouldn't have to suffer from another part of the state. Since managing and vaccinating cattle is much more effective than doing the same with wildlife, I'd suggest. There are only a few cattle leases between Yellowstone Park and Dome Mountain, with thousands of acres of public lands which make ideal habitat for free-roaming Bison.

During this time of year domestic cattle are not in the high country and need to be fed hay and carefully cared for as they begin the calving season. These cattle are all on private lands in well maintained fenced in areas. If Buffalo or Elk try to use these areas there are proven programs in place and already tested to gently haze them back to areas where there are no cattle, like Dome Mountain, like Daily Lake, like the public lands that are currently available. In addition, cattle are expected to be given the Bang's Vaccine which helps curtail Brucellosis.

I believe that the Buffalo should be allowed to roam free for several seasons in our areas in order to establish new habitat and behaviors. Hunting can always be used as a management tool, but commercializing wildlife isn't the goal here. Hunting is a management tool, but also provides opportunity to enjoy wild game. The same elk that we see lazily grazing amongst tourists in Yellowstone Park are the same elk that migrate to our ranch and surrounding areas in search of much needed food, habitat and calving grounds. I assure you, that their behaviors change dramatically when they're able to freely act as truly wild animals. Most of us haven't seen this in Buffalo yet, but I think it's worth a look. The

concerns of them getting on highways, running through fences and being a threat can all be easily managed via a concerted effort between all those who care about the management, use and enjoyment of our wild places. It sounds to me like folks are ready to sit down at the table and come up with some reasonable solutions based on science and leave emotion to the side.

NO HIGH FENCES: As a promoter of fair chase hunting, I can't support "Hi fences" like those south of us or used on many "game farms, however, I can support a fencing plan combined with natural boundaries which allows Elk, Deer and other wildlife uninterrupted passage and natural habits, while proving a means to keep Buffalo within. This is a proven fence utilized on the Turner property. This fence would add further cushion of Buffalo entering areas where livestock may exist, the closest of which is 1.5 miles from Dome Mountain on the opposing side of the Yellowstone River. The basic make up of this fence is electric; Deer and Elk are able to jump this fence, whereas Bison cannot pass through. I believe this is a step in the right direction if utilized in an area where the Buffalo would want to naturally migrate to such as Dome Mountain/Daily Lake/Slip and Slide Basin.

Utilizing careful guided hunting as a management tool would still fall within the provisions of fair chase. By definition, if an animal can freely avoid a hunter to present a fair challenge, I don't think anyone would argue that the vastness of the areas behind Dome Mountain isn't big and challenging. Certainly more "Fair Chase" than shooting a bull elk from the side of a pickup as it crosses the road in Eagle Creek. We would certainly entertain this at Dome Mountain Ranch have already been in discussion with professional fencers who can provide bids. This would fit ideally with the current status of the tested bison since there would be no need to herd them into trailers and drive them to an unfamiliar place. Dome Mountain and the areas around it are historical habitat. They're right down the road and could be utilizing these areas in a short amount of time.
The costs of a fence like this may likely be much less than the current methods which are no longer working. Buffalo like all wildlife do have to be managed, but doing it in such a way that preserves our wide-open spaces is key to shedding a better light on our current practices. Yellowstone National Park must begin to take more responsible measures within. If this is about Brucellosis, what about all the infected elk that have already been shipped all over the United States? It's time to look at this from the right angle; otherwise we're going to be treading water for many years to come.
There is a way for Landowners, Wildlife Agencies, Ranchers, Hunters and all people to work together so that we can all enjoy the benefits of wild places!

I've also added much of this information with helpful links to a web-blog I manage. This also includes photos and descriptions of many of the lands on and surrounding Dome Mountain Ranch. We currently do not graze cattle on our property.

Please feel free to call me with questions at 406-223-0009.
Thank You
Jim Klyap, Outfitter #7843
Dome Mountain Ranch
2017 US Highway 89 South
Emigrant, Montana 59027
www.domemountainelkhunting.com
800-313-4868

McCue, Kevin

From: Darrell Geist [z@wildrockies.org]
Sent: Wednesday, January 19, 2011 12:03 PM
To: McCue, Kevin
Cc: z@wildrockies.org
Subject: Testimony for the record on SB 144

Dear Chairman John Brenden and members of the Senate Fish and Game Committee,

On behalf of Buffalo Field Campaign I am submitting testimony on SB 144. Please share my testimony with committee members prior to the scheduled hearing on Thursday, January 20. I would also request that my testimony be entered into the hearing record and transcript. **Unfortunately, I cannot be present for the hearing as a prior commitment requires me to be elsewhere.**

Buffalo Field Campaign is a nonprofit 501(c)(3) whose mission is to stop the slaughter of Yellowstone's wild buffalo herd, protect the natural habitat of wild free-roaming buffalo and native wildlife, and to work with people of all Nations to honor the sacredness of the wild buffalo.

Our members, who come from all walks of life and from places all around the world, envision a life for buffalo in which they thrive within a state of inherent wildness. We also envision a world in which buffalo and all other native wildlife are given precedence on public land, and where buffalo herds remain as a self-regulating sustainable population, and a viable genetic source for the future evolutionary potential of the wildlife species.

Buffalo Field Campaign is adamantly opposed to SB 144, for many reasons.

SB 144 would permit one of the last buffalo populations in the United States to be relocated only onto the National Bison Range, that is, with buffalo known to have cattle ancestry. Why is this important?

Scientists studying bison genetic health such as Dr. James Derr, Texas A&M, have observed lower weights and changes in metabolism for bison carrying cattle mitochondrial DNA. Cattle alleles displace and compromise the integrity of the bison genome where disease resistance, among other traits, are adapted and passed on in the population. The evidence has not been collected to date, but it appears that bison with cattle ancestry are susceptible to mitochondrial dysfunction and overall reduced fitness (Douglas).

The descendants of Yellowstone buffalo carry an exceptionally rare and unique genome of the wild species. They represent the one population whose identity as wildlife has not been diminished by cattle genes. They have adapted traits to fend for themselves amidst native predators, and survived and evolved for thousands of years in one of the harshest climates in North America. They retain the migratory instincts that their ancestors have bestowed upon them.

SB 144 would prohibit buffalo that were captured from Yellowstone National Park, placed in quarantine in the Gardiner basin, and repeatedly tested over several years for brucellosis from being relocated in Montana as wild, free ranging wildlife.

The whole purpose and goal of the multimillion dollar U.S. taxpayer funded quarantine study was to relocate buffalo descended from the Yellowstone population to start new Tribal and public herds.

Where augmentation of existing bison populations is needed, North American Bison Conservation guidelines wisely recommend **not** permitting bison that retain their wildlife identity to be relocated to bison populations with cattle ancestry.

Since April 2005, over 200 of America's last wild bison have been captured inside and taken from Yellowstone National Park to "determine if bison that have successfully completed quarantine are reliably negative for brucellosis and suitable for the establishment of new tribal and public herds." (Yellowstone National Park)

Over half of these bison, once belonging to present and future generations, have been killed as test subjects in a brucellosis-eradication experiment. By all credible accounts, bison remaining alive and awaiting translocation are free of brucellosis.

There is not one example in Montana of a wild buffalo population freely ranging on the landscape. Under SB 144, that circumstance would become law, and every sacrifice made by the buffalo and everyone's efforts to reestablish them as wildlife in Montana would be lost.

The wild American bison is ecologically extinct (Freese), currently occupying less than 1% of their historic range (Sanderson).

Montana needs wild buffalo, in a landscape big enough to support wild, free ranging populations, in an expanse of habitats to fulfill their keystone ecological roles in keeping grasslands and all of the species that rely upon buffalo healthy and abundant (Fallon).

A decade ago, the Montana Chapter of The Wildlife Society issued their Position Statement on Wild Bison in Montana. What they said then is still true today: *"Current management of private, state and Federal bison herds is leading towards domestication of bison that threatens their wild character and limits important natural selection processes."*

Relocating buffalo behind a fence in Montana is not a wildlife population, it's another game farm. Montanans have rejected game farms because we do not want our wildlife heritage compromised, nor exploited for private commercial benefit.

The state of Montana has a public trust obligation to restore wild buffalo populations in their native habitats.

To be given a chance to conserve, protect and restore wild populations of this missing keystone species in Montana is a gift, and an opportunity to correct an historic and on-going wrong that has decimated native buffalo in our state.

The wild American buffalo has been missing from Montana's landscape for well over 100 years. It's time for Montanans to make a generational commitment to conserve, protect and restore wild buffalo in their native habitats for the next 100 years to come.

Thank you for taking action to protect buffalo descended from Yellowstone as a valued wildlife species freely roaming Montana by voting to defeat SB 144.

Darrell Geist
Habitat Coordinator
Buffalo Field Campaign
PO Box 957
West Yellowstone MT 59758
phone: (406) 646-0070
fax: (406) 646-0071
email: z@wildrockies.org
http://www.buffalofieldcampaign.org/habitat.html

Support a Wish and Give: http://www.buffalofieldcampaign.org/aboutus/wishlist.html

References online: http://www.buffalofieldcampaign.org/habitat/bisonconservation.html.

Derr, James. 2009. Bison Conservation Genetics and Disease presentation. Department of Veterinary Pathobiology and the Graduate Faculty of Genetics Texas AgriLIFE Research, Texas A & M University, College of Veterinary Medicine.

Douglas, K.C., et al. 2011. Complete mitochondrial DNA sequence analysis of Bison bison and bison-cattle hybrids: Function and phylogeny. Mitochondrion 11: 166-175.

Fallon. 2009. The ecological importance of bison in mixed-grass prairie ecosystems.

Freese, Curtis H., et al. 2007. Second chance for the plains bison. Biological Conservation 136(2): 175-184.

Sanderson, Eric W., et al. 2008. The Ecological Future of the North American Bison: Conceiving Long-Term, Large-Scale Conservation of Wildlife. Conservation Biology 22(2): 252-266.

The Wildlife Society. April 11, 2000. Position Statement of the Montana Chapter of The Wildlife Society on Wild Bison in Montana.

Yellowstone National Park. December 8, 2006. Permit YELL-2007-SCI-5506. U.S. Department of Agriculture, Animal and Plant Health Inspection Service.

McCue, Kevin

From: Kathleen Stachowski [wildbison@bresnan.net]
Sent: Wednesday, January 19, 2011 12:21 PM
To: McCue, Kevin
Subject: SB 144

Greetings...

I'm opposed to SB 144; it's time to restore free-roaming bison to Montana. Wild bison are native wildlife who belong on our vast landscape. Thank you for relaying this message to the bill's sponsor and the Senate Fish & Game committee.

Sincerely,
Kathleen Stachowski
Lolo, MT

McCue, Kevin

From: jabailey34@aol.com
Sent: Wednesday, January 19, 2011 2:44 PM
To: McCue, Kevin
Subject: SB144

Please distribute these comments to the Senate Fish and Game Committee, especially to Joe Balyeat, my senator. Thank you. -- I oppose SB 144 for several reasons. Montana should be a leader in collaborative wildlife conservation. This bill forecloses any option for restoration of wild plains bison anywhere in our state - without public discussion of any specific proposal. -- There are several large areas of almost-all public land where bison could be reestablished without uncontrollable impacts to adjacent private lands. -- There are no adequate wild herds of bison on the Great Plains. There are only 2 such herds with >1000 bison. (At least 2000 bison are necessary to avert loss of genetic diversity, forever.) Both these herds contain cattle genes. One is privately owned. Both have annual roundups with culling of animals in an artificial way that jeopardizes genetic persistence. In Both cases, funds from selling bison are used to run the program (or the state park system of SD). Thus, there is incentive to manage these bison much like commercial bison herds. Montana can do better than this! -- The status of plains bison is so poor that they have been nominated for federal listing under the Endangered Species Act. This bill will be an argument to support federal listing.-- Bison from the quarantine study are as certain to be free of Brucella as any animal on the planet. Each animal has been tested more than 10 times. The threat of disease transmission is a red herring. It does not exist. -- Public and domestic-animal safety issues of bison restoration are also a red herring. There are hundreds of commercial bison herds, and a few "conservation herds" in the USA, with very few problems. -- Wherever they might go, bison would almost certainly replace some domestic cattle on our public lands. We have lots of public land, and almost all of it is grazed by domestic livestock. Yet we have no place for public bison on our public lands. This is a tyranny of a minority. -- The option of moving these bison to the National Bison Range is a diversion. The Bison Range bison have cattle-gene introgression. Placing these expensive, disease-free, pure bison on the Bison Range would be a waste. The Bison Range sells animals every year and is not looking for more animals. -- Thousands of dollars of public money have been spent to produce certified Brucella-free pure bison from the Yellowstone herd. The research plan promised that these animals would go to tribal lands and to public lands in Montana. Throwing them away would be a waste of money and effort. Please vote against SB144. Thank you, Jim Bailey, Belgrade, MT. 599-1343

McCue, Kevin

From: Gail RICHARDSON [envirogail@msn.com]
Sent: Wednesday, January 19, 2011 3:55 PM
To: McCue, Kevin
Subject: SB 144

To: Senate Fish and Game Committee Chairman John Brenden Please share my comments with committee members and enter my comments into the hearing record:

I've lived in the Greater Yellowstone Ecosystem for over 30 years, most of that time in MT (Gallatin County). I worked in Yellowstone for 10 years and still guide small group natural history tours. SB 144 is an abomination and a slap in the face of all of us who care about our native wildlife.
Yellowstone's genetically pure bison must have a place in MT, I mean a real place, not the National Bison Range whose bison have cattle genes. This livestock industry bill is wrongheaded and is intended to be sure that our native bison have no chance to repopulate on our public lands. You and I know that brucellosis is not the problem; the problem is competition for grass. The cattle industry has always been greedy as we saw with the near extermination of many species, including bison, in the late 1800s.

The public's wildlife belongs on our public lands; private cattle herds should only be allowed when they do not compete with our native wildlife. I want to see YNP bison on US Forest Service lands around both W. Yellowstone and Gardiner and on lands of willing private owners. I want to see YNP bison on tribal lands. I want to see YNP bison in our wildlife management areas. I want to see YNP bison on the C.M. Russell N.W.R.

Yellowstone's bison are the only species of our native wildlife that are not treated like wildlife. The Interagency Bison Management Plan has been totally unbalanced since the beginning in favor of private cattle interests.
This is wrong. I work in the tourism industry which brings millions of dollars a year into our state. Visitors want to see native wildlife, not cattle on our public lands. This bad bill should be relegated to the trash bin where it belongs.

Gail Richardson
5263 Cimmeron Drive
Bozeman, MT 59715

McCue, Kevin

From: Ciinnabar Foundation [cinnabar@bresnan.net]
Sent: Wednesday, January 19, 2011 3:07 PM
To: McCue, Kevin; senatorbrendan@gmail.com; joebalyeat@yahoo.com; grt3177@smtel.com; facey_tom@hotmail.com; steve.gallus@gmail.com; wranglergallery@hotmail.com; ghinklesd7@gmail.com; larry@imt.net; SenatorWittich@montana.com
Subject: SB144

Dear Legislators of the Senate Fish and Game Committee:

When the first European immigrants set foot in Montana in 1805 they reported a wildlife resource that *"for variety and abundance exceeded anything the eye of man had ever looked upon."* Eighty years later, Theodore Roosevelt wrote of a ranchman looking for grazing opportunity who made a journey from Little Missouri North Dakota to within sight of what would become Glacier Park. TR described the trip as a journey of 1,000 miles and then he wrote, *"to use the ranchman's own words, I was never out of sight of a dead buffalo and never in sight of a live one."* All Montana wildlife nearly vanished under the weight of its early management by commerce. Now, a century and a quarter later we stand restored or nearly so. Our wonderful restored abundance has put a few bears in our orchards, goose dung on every golf shoe in America, and if you look close you just might see deer tracks and droppings on the capital lawn. It is part of the greatest wildlife restoration saga in human history and the buffalo, of all animals, deserves to be a part of that legacy. To deny this consummate achievement in American wildlife restoration because of some dogmatically held political ideology would be a shameful tragedy. To do it in Montana would simply compound the shame. Who among us would stand before the children of posterity and tell them we came within one species of restoring, managing and appreciating all the wildlife of what we euphemistically called "The Last Best Place" – but then in 2011 -- we choked? Please vote NO on SB144, thank you.

Jim Posewitz
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Helena, MT 59601

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jim.posewitz@bresnan.net

McCue, Kevin

From: Bill O'Connell [bill@cowboyhvn.com]
Sent: Wednesday, January 19, 2011 8:25 PM
To: McCue, Kevin
Subject: SB 144 comment

Hello Kevin, Chairman Brendan, and members of the Senate Fish and Game Committee,

Please send this message to all the Senate Fish and Game Committee members, and enter it into the Hearing Record for SB144.
Several items that came up at the recent Fish, Wildlife and Parks Commission hearing on potential bison relocations are obviously relevant to this bill.
As I stated in my testimony at the FWP Commission hearing, existing law (MCA 81-2-121) clearly states unwelcome wandering bison can be lethally removed. This addresses private property rights concerns from those who fear bison. Unfortunately, the private property rights of landowners who welcome them are lacking, as things stand.
As a lifelong farmer, meat processor, and (more recently) buffalo skinner I have difficulty with the idea that bison will somehow be the death of agriculture. In fact we just had bison rib steaks for dinner! Exceptional...
In Montana we have areas where we can have wild bison, with minimal impact on agricultural operations, and create an enormous asset in the process. Clearly views on this diverge, and at the recent FWP Commission hearing we heard Senator Brenden say it would take the "Berlin Wall" to contain them.
But then it was also pointed out that Montana's bison "management" has been a national disgrace.
I'll go with that second viewpoint.
So I would strongly urge the members of this committee to vote against this extreme measure. I think it's clear the Berlin Wall was a failed model, and we're past due to take even the tiniest baby steps toward recognizing bison's role on the landscape, in even limited areas of public lands in Montana, where they once thrived.

Thanks for your consideration,

Bill O'Connell
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McCue, Kevin

From: Heath Nicolas Carey [hncarey@gmail.com]
Sent: Wednesday, January 19, 2011 5:00 PM
To: McCue, Kevin
Subject: Testimony for SB 144
Attachments: Yellowstone_Genotyping_2009.pdf; Yellowstone_Origin_1994.pdf

This testimony is addressed to Chairman John Brenden. I request that my comments on SB 144 and the attached documents be shared with the Senate Fish and Game Committee. I further request that this testimony and the attached documents be entered into the hearing record. Thank you.

Herein begins my testimony:

Hello, my name is Heath N. Carey. I currently reside in Missoula, MT. I have a BA in English from Shippensburg University in Pennsylvania and a MS in Resource Conservation from the University of Montana. My work experience includes hydrology, wildlife biology, phytoremediation, and biogeochemistry.

There is a major flaw within SB 144 which states, "wild" bison may ONLY be relocated onto the National Bison Range. In addition, the current wording of SB 144 would prevent MT FWP from allowing anyone, including themselves, to allow bison to roam free ANYWHERE in the great state of Montana. As a public citizen commenting on a species which is publicly owned - I call this legislation poppycock. This is not legislation to allow Montana's signature species to roam "freely" on Montana's publicly owned landscape! The state of Montana has a public trust obligation to restore wild bison populations in their native habitats and "Native Habitats" do not include fences or confined herds.

Furthermore, SB 144 contains an underlying message that confining bison to a range or fenced area will keep cattle safe from brucellosis. As the two attached documents attest, this is simply not the case. The 1994 study finds that brucellosis was brought to the western prairie by cattle around 1917. The 1994 study also suggests that brucellosis was transported from cattle to bison via free ranging elk. The 2009 study confirms these findings. In fact, DNA from brucellosis found in cattle more closely resemble the DNA from brucellosis found in elk. This is quite shocking, as the study finds brucellosis from cattle to be more similar to that found in elk as opposed to brucellosis DNA found in bison. That is to say, currently free grazing elk prove a greater threat to cattle than bison.

Given this knowledge, it would seem that SB 144 is more about protecting coveting grazing lands for cattle as opposed to open space for bison. As there is a lack of information available on Mr. Brenden's, Brenden Farms, I can only hope and pray that there is not a conflict of interest in this hearing. I trust that this committee will do what is ethically correct and morally just for Montana's iconic bison and squash SB 144. A caged bison is neither free nor wild, and no condition albeit free roaming is morally just for such an amazing and iconic American species.

Thank you for your time and this opportunity to testify.

Cordially,
Heath Nicolas Carey

--
Heath Nicolas Carey
MSc. Resource Conservation, University of Montana
Project Developer, www.biorootenergy.com

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"Let us work towards the solution of our problems rather than simply adding to them."

Journal of Wildlife Diseases, 45(4), 2009, pp. 1174–1177
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DNA Genotyping Suggests that Recent Brucellosis Outbreaks in the Greater Yellowstone Area Originated from Elk

Albano Beja-Pereira,[1,5] Betsy Bricker,[2] Shanyuan Chen,[1] Claudia Almendra,[1] P. J. White,[3] and Gordon Luikart[1,4,5] [1]Centro de Investigacao em Biodiversidade e Recursos Geneticos (CIBIO-UP), Universidade do Porto, Rua Padre Armando Quintas, 4485-661 Vairão (VCD), Portugal; [2]US Department of Agriculture, Agricultural Research Service, National Animal Disease Center, 2300 Dayton Road, Ames, Iowa 50010, USA; [3]National Park Service, Yellowstone National Park, Mammoth, Wyoming 82190, USA; [4]Division of Biological Sciences, University of Montana, Missoula, Montana 59812, USA; [5]These two authors contributed equally; [6]Corresponding author (email: gordon.luikart@mso.umt.edu)

ABSTRACT: Identifying the source of infectious disease outbreaks is difficult, especially for pathogens that infect multiple wildlife species. *Brucella* spp. are among the most problematic zoonotic agents worldwide, and they are notoriously difficult to detect and identify. We genotyped 10 variable number of tandem repeat (VNTR) DNA loci in 56 *Brucella abortus* isolates from bison (*Bos bison*), elk (*Cervus elaphus*), and cattle (*Bos taurus*) to test the wildlife species most likely to be the origin of recent outbreaks of brucellosis in cattle in the Greater Yellowstone Area. Isolates from cattle and elk were nearly identical but highly divergent from bison isolates. These data suggest elk, not bison, are the reservoir species of origin for these cattle infections. This study illustrates the potential power of VNTR genotyping to assess the origin of disease outbreaks, which are increasing worldwide following habitat fragmentation, climate change, and expansion of human and livestock populations.

Key words: Bison, *Brucella abortus*, elk, genotyping, DNA, pathogen transmission, reemerging infectious disease, trace-back study, zoonosis.

Information about the origin and transmission of infectious disease outbreaks is difficult to acquire, especially for diseases like brucellosis that are elusive and infect multiple hosts, including wildlife (Archie et al., 2008). Brucellosis is perhaps the most common zoonotic bacterial disease worldwide, causing widespread human health problems, millions of dollars in losses to livestock industries, and potentially reducing wildlife population reproduction rates (Joly and Messier, 2005; Pappas et al., 2006). Brucellosis infects reproductive organs and causes reproduction failure and abortions in domestic and wild mammals. Brucellosis in the Greater Yellowstone Area (GYA) is caused by *Brucella abortus*, an intracellular, gram-negative bacterium that is difficult to isolate and study because it hides in macrophages and lymph nodes of the immune (reticuloendothelial) system.

Bison (*Bos bison*) and elk (*Cervus elaphus*) are two alternate wildlife hosts capable of shedding and transmitting *B. abortus* in the GYA. Bison often are mistakenly considered to be the likely origin of outbreaks in cattle (*Bos taurus*) because the prevalence of brucellosis is higher in bison (40–60%) than in GYA elk populations (2–30%; Cross et al., 2009). However, bison seldom comingle with cattle because management agencies actively prevent bison dispersal and range expansion outside established conservation areas (e.g., in and near Yellowstone National Park) via hazing, hunting, and/or periodic brucellosis risk-management removals. Conversely, elk often comingle with cattle and can migrate long distances from the 23 winter feeding grounds in northwestern Wyoming where elk are fed hay by state and federal biologists to keep them away from cattle and ranchers' hay stacks. On the elk feed grounds, brucellosis prevalence is relatively high (~20–30%; Thorne et al., 1979; Cross et al., 2009).

The origin (elk versus bison) and management of brucellosis outbreaks in cattle are controversial and uncertain. This is due to a lack of data on *Brucella*

TABLE 1. Host species, geographic origin, and year of sampling for *Brucella abortus* isolates used in the study.

Host	Geographic origin	Year	No. of *Brucella* isolates
Cattle	Idaho (Freemont)	2002	12
	Wyoming (Muddy Creek)	2003	11
Bison	Montana (Park County)	1992	5
	Montana (Park County)	1995	1
	Montana (Park County)	1997	2
	Montana (Gallatin County)	1999	2
Elk	Idaho (Freemont/Teton Counties)	1999	2
	Idaho (Freemont/Teton Counties)	2000	1
	Idaho (Freemont/Teton Counties)	2001	9
	Idaho (Freemont/Teton Counties)	2002	6
	Wyoming (Sublette County, Muddy Creek)	2003	2
	Wyoming (Lincoln County, Dog Creek)	Unknown	1
	Montana	1992	1
	Montana (Madison County)	1998	3
		Total	56

transmission resulting from the limited sensitivity of molecular diagnostic tools and difficulties in sampling *Brucella* from wildlife species. Here, we present molecular data from highly variable DNA markers that suggest elk are the likely origin of recent outbreaks of brucellosis in Wyoming and Idaho. These data also demonstrate the usefulness of highly variable DNA markers in epidemiologic trace-back studies.

During 1992–2003, we obtained bacteria isolates of *B. abortus* from 25 elk, 10 bison, and 23 cattle from nine locations across the GYA (Table 1). Bison isolates were collected during winter migrations out of Yellowstone National Park, when bison were culled to prevent commingling with cattle (i.e., brucellosis risk-management program). Field strains of *B. abortus* in cattle were isolated during 2 yr of outbreaks, 2002 in Wyoming and 2003 in Idaho. The isolates are from diagnostic specimens that had been cultured, positively identified as *B. abortus*, and archived by the diagnostic laboratory at the National Veterinary Services Laboratories (Animal and Plant Health Inspection Service [APHIS], US Department of Agriculture) in Ames, Iowa.

We genotyped all isolates with 10 variable numbers of repeat loci (VNTR; known as microsatellites in eukaryotes) as described in Bricker and Ewalt (2005). Highly variable VNTRs in *B. abortus* are available thanks to recent genome sequences from *Brucella* species (Halling et al., 2005). The VNTRs are eight-base-pair repeats that are highly variable in number of repeats and thus useful as markers for genotyping (DNA "fingerprinting") and transmission studies of brucellosis. The DNA marker system was called "HOOF-Prints," an acronym for hypervariable octameric oligonucleotide fingerprints. The marker system has remarkably high power of discrimination among isolates and excellent reliability and repeatability (Bricker and Ewalt, 2005).

We analyzed genetic relationships among VNTR allelic combinations (i.e., haplotypes or alleles) using the software NETWORK V4.5 to build a haplotype network. A haplotype network visualizes genetic relationships among distinct isolates (genotypes or haplotypes) using lines to connect haplotypes and cross-hatches on the lines to represent mutational steps (see Fig. 1). The network was constructed using the median-joining algorithm (Bandelt et al., 1999; Almendra et al., 2009), which is considered the most appropriate algorithm to handle multiple-state data

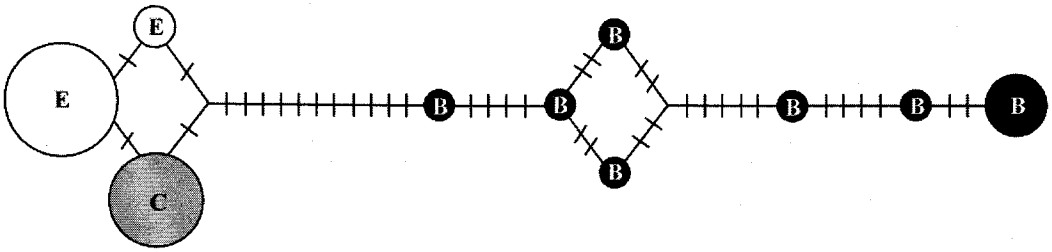

FIGURE 1. Haplotype network for the major *Brucella* haplogroups showing that cattle and elk *Brucella* are nearly identical, but they are highly divergent from all bison *Brucella* isolates. Haplotypes consist of unique multilocus alleles from the 10 VNTR loci. Haplotypes from each host species are shown by a different color and letter: white are elk (E), gray are cattle (C), and black are bison (B). The size of each circle is proportional to the frequency of that haplotype. Each cross-hatch line represents one mutation step, assuming a stepwise mutation model; some loci had more than one mutation step (repeat unit difference) between haplotypes (e.g., between the bison and the cattle/elk haplogroups). Thus, *Brucella* haplotypes of bison all differ by at least 12 mutational steps from elk and cattle *Brucella* haplotypes.

such as ours (e.g., Dos Vultos et al., 2008). The network analyses permit reconstruction of all possible genetic relationships (connecting lines) among haplotypes and also allow the visual representation of the frequencies of each haplotype. Node (circle) sizes indicate the number of bacteria sharing the same haplotype.

Our results indicate that elk and cattle isolates are virtually identical genetically, differing by only one to two mutational steps. On the contrary, bison *B. abortus* differed from cattle and elk by 12–20 mutational steps (Fig. 1). These results suggest that the recent brucellosis outbreaks in cattle in Idaho and Wyoming originated from elk, not bison. *B. abortus* multilocus genotypes from elk remained similar across many years and geographic locations. For example, elk *B. abortus* isolates from Idaho between 1999 and 2002 were almost genetically identical. *B. abortus* isolated in Wyoming elk in 2003 were very similar to *Brucella* from Idaho elk and differed by only one to two mutational steps. These results indicate that the *B. abortus* VNTR loci in elk are reasonably stable between years, and they also suggest that VNTRs are useful for trace-back studies to identify the wildlife species as the source of brucellosis outbreaks around the GYA. The results are also consistent with the fact that elk more often comingle with cattle than do bison because bison management agencies actively prevent dispersal and range expansion outside established conservation areas via hazing, hunting, and/or removals.

The relatively high genetic divergence between elk and bison *B. abortus* isolates suggests that *B. abortus* might not be exchanged extensively between elk and bison, though additional sampling (including more recent bison isolates) and genotyping are required to assess this issue. If true, this finding has important management implications. For example, if transmission between elk and bison is rare, then these two wildlife species might be treated with separate and parallel risk-management and brucellosis-elimination strategies.

Our results illustrate the potential power and promise of molecular genetic markers to assess the origin and spread of infectious disease outbreaks, even for pathogens like *Brucella*, which are difficult to isolate and have genomes with little variation (Archie et al., 2008). In fact, two of 10 VNTR loci were monomorphic among our *Brucella* isolates from GYA bison, elk, and cattle, consistent with the notoriously low polymorphism in *Brucella* genomes. Our study also illustrates that infectious disease outbreaks are increasing worldwide as wild and domestic animals come in closer contact following fragmen-

tation of wildlife habitats and expansion of human and livestock populations.

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On the Origin of Brucellosis in Bison of Yellowstone National Park: A Review

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Abstract: *Brucellosis caused by* Brucella abortus *occurs in the free-ranging bison (*Bison bison*) of Yellowstone and Wood Buffalo National Parks and in elk (*Cervus elaphus*) of the Greater Yellowstone Area. As a result of nationwide bovine brucellosis eradication programs, states and provinces proximate to the national parks are considered free of bovine brucellosis. Thus, increased attention has been focused on the wildlife within these areas as potential reservoirs for transmission to cattle. Because the national parks are mandated as natural areas, the question has been raised as to whether* Brucella abortus *is endogenous or exogenous to bison, particularly for Yellowstone National Park. We synthesized diverse lines of inquiry, including the evolutionary history of both bison and* Brucella, *wild animals as* Brucella *hosts, biochemical and genetic information, behavioral characteristics of host and organism, and area history to develop an evaluation of the question for the National Park Service. All lines of inquiry indicated that the organism was introduced to North America with cattle, and that the introduction into the Yellowstone bison probably was directly from cattle shortly before 1917. Fistulous withers of horses was a less likely possibility. Elk on winter feedgrounds south of Yellowstone National Park apparently acquired the disease directly from cattle. Bison presently using Grand Teton National Park probably acquired brucellosis from feedground elk.*

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Sobre el origen de la brucelosis en el bisonte del Parque Nacional Yellowstone: Una revisión

Resumen: *La brucelosis causada por* Brucella abortus *afecta al bisonte (*Bison bison*) de los Parques Nacionales Yellowstone y "Wood Buffalo" y al alce (*Cervus elaphus*) de la Gran Area del Yellowstone. Como resultado de programas de erradicación de la brucelosis a lo largo de toda la Nación, los estados y provincias próximos a los parques nacionales son considerados como libres de brucelosis bovina. Como concecuencia de esto, se ha prestado más atención a la vida silvestre dentro de estas áreas como posibles reservorios para la transmisión de brucelosis al ganado. Dado que los parques nacionales son asignados por mandatos como áreas naturales, ha surgido el interés en determinar si* Brucella abortus *es endógena o exógena al bisonte, en particular en lo que respecta al Parque Nacional Yellowstone. Nosotros sintetizamos varias líneas de investigación, que incluyen la historia evolutiva tanto del bisonte como de* Brucella, *el estudio de animales salvajes como portadores de* Brucella, *la información bioquímica y genética, las características de comportamiento del portador y del organismo, y la historia del área a los efectos de desarrollar una evaluación del problema para el Servicio de Parques Nacionales. Todas las líneas de investigación indicaron que el organismo fue introducido en América del Norte con el ganado, y que la transmisión al bisonte americano ocurrió directamente a partir del ganado poco despues de 1917. La transmisión a partir de cruzeras fistulosas de caballos fue una posibilidad menos probable. Los alces que habitan las áreas de pastoreo invernales al sur del Parque Nacional Yellowstone aparentemente adquirieron la enfermedad directamente del ganado. Los bisontes que usan en la actualidad el Parque Nacional "Grand Teton" probablemente adquirireron la brucelosis a partir de alces de las áreas de pastoreo.*

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Introduction

Brucellosis is primarily a reproductive disease caused by bacteria of the genus *Brucella.* It occurs mainly in domestic animals world-wide and secondarily as undulant fever in humans (Young & Corbel 1989; Nielsen & Duncan 1990). Abortion by females is considered the hallmark of the disease, but host-organism relationships demonstrate great variation on this basic theme. Transmission is mainly a function of abortions; other herd members ingest the organism with contaminated feed or by licking aborted tissues. Serology is commonly used to detect exposure, but culture of the organism provides the only definitive diagnosis. In cattle the correlation between serology and culture may be as high as 95% (Manthei & Deyoe 1970).

Numerous serological surveys of bison (*Bison bison*) and elk (*Cervus elaphus*) of the Greater Yellowstone Area show widespread exposure to brucellosis caused by the bacterium *Brucella abortus.* (Thorne et al. 1991). The bacteria have been cultured from members of both species. According to serological standards for cattle, the prevalence of brucellosis in the Yellowstone bison has been approximately 40%, but correlation with culture results was approximately 25% (Meyer & Meagher 1995). According to these data the true prevalence would be closer to 10%. Effects on the bison population appear to be minimal (Meagher 1973*a*; Meyer & Meagher 1994).

During the last decade, as a nationwide effort progressed to eradicate the disease from livestock, controversy increased and lawsuits developed over the question of possible transmission of infection from wildlife to cattle and the management measures necessary to prevent this. Attention has focused particularly on the Yellowstone bison as the presumptive source for the *Brucella* organism in other wildlife throughout the area. Brucellosis also occurs in the free-ranging bison of Wood Buffalo National Park (WBNP), Canada, where a complex of disease and bison subspeciation concerns resulted in a recommendation for depopulation of bison (Federal Environmental Assessment Panel 1990). Similar, less formal proposals have been made for the Yellowstone bison during the past 30 years (Meagher 1973*b*).

Brucellosis was first identified serologically in bison in the YNP population in 1917 (Mohler 1917). Because later investigators suggested that brucellosis might have existed in these bison for a long time and appeared to have little population effect (Rush 1932*b*; Tunnicliff & Marsh 1935; Meagher 1973*a*, 1973*b*; Meyer 1992; Meyer & Meagher 1995), the National Park Service questioned the origin of the *Brucella* organism as a native or exotic entity. Reynolds et al. (1982) suggested that brucellosis was present in North American wildlife prior to the arrival of modern man. The question of exotic versus endogenous origins persists because of diverse public opinions about proposed removals of wildlife to protect livestock.

Yellowstone National Park (YNP) is managed as a natural area to the maximum extent allowed by accommodation of human recreational use. Ecological processes generally are allowed to function as they would without the presence of modern man. Native biota are protected; exotic species would be eradicated where technologically and ecologically feasible.

The question of origin cannot be answered directly, but the general consensus of experts on brucellosis is the *B. abortus* was introduced by cattle. Cooperative interagency management planning efforts now underway for the Yellowstone bison, with attendant preparation of an Environmental Impact Statement and public review, generated a need for an evaluation of the origin question for the National Park Service. To do this we synthesized diverse lines of inquiry about the origin of brucellosis in North American bison in general and in Yellowstone bison in particular. We also examined the possible origin of brucellosis in several other North American wildlife hosts.

Origin in North America

An Evolutionary Perspective on Bison

Because cattle are the preferential host of *B. abortus* (Meyer 1964*a*) and because cattle and bison are Bovidae and relatively closely related (McDonald 1981), we reviewed the evolution of North American bison. Bison and cattle apparently diverged from a common ancestor in Asia in the late Pliocene Age (McDonald 1981), some 2 million years ago. Bison evolution remains controversial (Meagher 1986). *B. priscus,* the so-called steppe bison, may have reached North America after the middle Pleistocene Age and may be ancestral to the modern North American bison. Alternatively, Wilson (1988) proposed that a post-glacial influx about 10,000 years ago might have led to the modern form. A later influx would seem more likely to have facilitated the mutual arrival of host and organism with a relationship that persisted to the present but resembled Old World bovid host-organism relationships.

A consensus does not exist at present for modern bison subspeciation. Because of gradation in size and form, modern bison were dated arbitrarily by McDonald (1981) to 5000 years ago. Two subspecies commonly were recognized (Reynolds et al. 1982; Meagher 1986). Genetically the two appeared to be very closely related. Ying and Peden (1977) could not distinguish chromosomal differences. Peden and Kraay (1979) argued that the subspecific distinction perhaps was not valid; they found that blood types and carbonic anhydrase polymorphisms were similar. Geist and Karsten (1977) described phenotypic differences, and Van Zyll de Jong

(1986) endorsed the subspecific designations using morphometric analyses. More recently, Geist (1991) concluded that phenotypic differences were widely distributed historically and appeared to reflect a major environmental component, and that available information no longer warranted subspecific designations. Recent mtDNA analyses suggested geographic isolation only (Bork et al. 1990). Strobeck (1991, 1992, 1993) determined that genetically distinct subspecies were not supported. The foregoing suggests a very recent divergence. Accordingly, associated disease organisms likely would have been found throughout the distribution of modern bison if those organisms arrived when bison colonized North America.

An Evolutionary Perspective on *Brucella*

Compared with vertebrates, organisms such as *Brucella* provide scant evidence of their possible origin in time. Bovine brucellosis was "known in ancient times" (Stableforth 1959:53); presumably, the term ancient refers to Biblical or other early written accounts. Pavolovskii et al. (1987:25) stated that "We consider brucellae an independent taxonomic group of pathogenic microorganisms—the constituents of specific biocenoses, which existed long before wild animals were exploited by man." Others (discussed by Pavolovskii et al. 1987) proposed a Mediterranean origin during early domestication of sheep and goats.

Taxonomic affinities within the genus *Brucella* and with other microorganisms may provide insight. Meyer (1990*a*, 1990*b*) presented an evolutionary model for *Brucella* with *B. abortus* biovar 2 as ancestral to the presently extant species and possibly as ancestral to all other species and biovars. Prior to 1966 three classical species were recognized (*B. abortus, B. melitensis, B. suis*); subsequently, three new species were added to the genus (*B. neotomae, B. canis, B. ovis*). These latter species appeared to be of recent origin, perhaps in the last 50 years. Meyer (1990*a*, 1990*b*) observed that this was a genetically labile organism; most changes among species biovars could be explained by one-step sequential mutations. She reviewed recent DNA work and concluded that, by all available molecular genetic techniques at the genome level, all *Brucella* appeared to be very closely related. Hoyer and McCullough (1968), Verger et al. 1985, and Ficht et al. (1991) agree that all *Brucella* share more than 90% homology in DNA sequences. Current technological methods for identifying evolutionary relationships indicate that the genus *Brucella* is unrelated to other pathogens but is closely related to the agrobacterium-rhizobium complex and perhaps shared a common ancestor (De Ley et al. 1987). Given the generation time of microorganisms, divergence might have occurred more recently than for vertebrates.

Meyer (1964*a*, 1981) evaluated the species identity of 550 strains of *Brucella* by the combined use of conventional determinative bacteriological methods, bacteriophage typing, oxidative metabolic patterns, and correlations with data on host and tissue of origin. All forms of *B. abortus* obtained worldwide could be grouped into the currently recognized biovars regardless of host or geographic loci, including the strain obtained from Yellowstone bison by Tunnicliff and Marsh (1935). Each of the recognized species of Brucella have a decided host preference, and the organisms are not readily transmitted to a dissimilar host. Tessaro (1987) found no differences in *B. abortus* taken from bison of WBNP and cattle. Assuming *B. abortus* biovar 2 is the progenitor, with cattle as the preferential host, it seems probable that strains of *B. abortus* with different characteristics would have evolved if there had been a long association with bison.

The foregoing lines of evidence (evolutionary model, new forms, mutability, close genetic relationship, possible common ancestry with plant pathogens) suggest a relatively recent origin for the organism. Otherwise, we would expect more distinct forms with additional preferential hosts. The spectrum of the host-organism relationships indicated that this is mainly an organism of aggregation. Cattle were first domesticated about 8000 years ago in Greece and western Asia (Clutton-Brock 1989). With bovine brucellosis *B. abortus* biovar 2 as the apparent progenitor of the other forms (directly or indirectly), *Brucella* appeared to be of more recent origin than are bison and to have arisen in a geographic locale at a time that precluded long association with North American bison.

Wild Animals as Hosts

Wildlife appear to be widely exposed to members of the genus *Brucella*, including North America (Moore & Schnurrenberger 1981; McCorquodale & DiGiacomo 1985; Tessaro 1986; Davis 1990). But with the demonstrated preferential host relationships of the various *Brucella* species, most are considered end hosts. This does not exclude wild animal hosts from a potential transmission role in some instances, nor does this preclude the enzootic presence of *Brucella* in some wildlife populations. Rementsova (1987) surveyed more than 18,000 wild animals from five orders of mammals and a variety of nonmammals. Seventy *Brucella* cultures were obtained and compared with 768 serological reactors. Rementsova focused primarily on ticks and rodents as reservoirs of infection in domestic animals and humans. Infected wild animals appeared to be mostly associated with foci of infection in domestic animals, although hares (*Lepus* sp.) in some areas of Europe maintained *B. suis* independently. Meyer (1964*a*) identified this as *B. suis* biovar 2. While infectious for swine,