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KEEPING THEM APART

How Montana is working to reduce the growing risk of brucellosis transmission from elk to cattle in the Greater Yellowstone Area.

BY SCOTT MCMILLION

Close your eyes and say two words: "brucellosis" and "wildlife."

Chances are, bison appear on the back of your eyelids. After all, the possibility of diseased bison infecting Montana's cattle herds—and the various reactions to it by state officials and the livestock industry—has dominated headlines for nearly three decades.

But think again. Over the past several years in Montana, Idaho, and Wyoming near Yellowstone National Park, animals in nine cattle herds and two domestic bison herds tested positive for the infectious disease. Scientists say the most likely source of the infections is not wild bison; it's elk.

In recent years, growing numbers of elk in southwestern Montana have tested positive for exposure to the disease. These "seropositive" elk, as they are called, aren't necessarily infected with brucellosis or infectious to other animals, but they do harbor antibodies indicating exposure to the disease. The elk have been discovered increasingly farther from Yellowstone National Park, considered the last reservoir of brucellosis in the United States. The wild ungulates mix with cattle primarily in late winter, when they move down from deep snow in high elevations searching for snow-free forage.

A bacterial disease, brucellosis can cause pregnant cattle, bison, and elk to abort their calves. It spreads primarily through contact with infected birthing material, which both wild and domestic animals lick and eat.

Montana Fish, Wildlife & Parks has embarked on an ambitious five-year plan to learn more about how widespread the disease has become in elk, how it affects the animals, how they might spread the disease, and possible threats to elk herds and Montana's beef industry.

The research is difficult and expensive. It starts with a helicopter, a stout net, GPS radio collars, and other high-tech tracking equipment. Results will depend on hard work and finding enough money to complete the task. But because there's a lot at stake, FWP officials say the agency is committed to seeing the project through.

FOLLOWING THE ELK

Neil Anderson, who runs FWP's laboratory in Bozeman, department veterinarian Jennifer Ramsey, and wildlife research biologist Kelly Proffitt designed the elk brucellosis study to answer questions. And there's no shortage of them: How often do seropositive elk abort? Do they shed the bacteria into the environment during a normal birth? What contributes to increasing seroprevalence in elk? What are the risks to cattle? What are the best ways to reduce risk? And perhaps most important: How widespread are seropositive elk in Montana's portion of the Greater Yellowstone Ecosystem, and why is their range expanding? "We're seeing brucellosis in areas where ten years ago we didn't think we'd see it," Anderson says.

Anderson and other agency scientists hope the study, which costs roughly $300,000 a year (and is funded for now by the U.S. Department of Agriculture), will shed light on these questions and more. Here's how it works:

Last winter, in southwestern Montana's Ruby

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FOLLOW THE BACTERIA FWP's five-year study began last winter in the Ruby Valley, where helicopter crews (top) captured 100 cow elk and transferred each animal to a staging area (1). There, biologists tranquilized the elk and drew blood samples. In a nearby ice-fishing tent (2), set up to keep equipment warm, blood serum was tested for the presence of the brucellosis antibody, indicating exposure to the disease. These "seropositive" elk were then fitted with GPS collars, along with radio collars and vaginally implanted transmitters (VITs) on some of the animals. Biologists then released the elk (3) and followed the animals via signals picked up from portable radio receivers (4). At sites where births or abortions took place, biologists collected tissue samples from afterbirth. One of the study's goals is to learn the proportion of seropositive cow elk that leave brucellosis bacteria behind.

ALL PHOTOS: FWP

Valley, a skilled helicopter crew captured 100 cow elk, one at a time, using a powerful gun that shoots a large net over the animal. Once hobbled and blindfolded, each elk was carried in a sling beneath the chopper to a staging area, where an FWP crew went to work. Crew members drew and tested blood to see if the animal had been exposed to brucellosis. Anderson and Ramsey conducted the analysis in a nearby ice-fishing tent to keep the blood-testing equipment warm enough to function. Of the 100 captured elk, eight tested positive for exposure in the field tests (at a laboratory, blood from an additional four later tested positive). Elk testing positive in the field were also checked to see if they were pregnant.

The seropositive elk were fitted with GPS collars. Collars of eight seropositive elk, along with 23 others, also contained radio transmitters so they could be located, captured, and tested again later. Pregnant collared elk were fitted with vaginally implanted transmitters (VITs), which produce a signal when the mother gives birth or aborts the fetus. When field technicians heard that signal last spring, they hurried to the area to find the spot where the birth or abortion took place. They swabbed the discharged VIT and collected any tissue samples found from afterbirth. Analyzing this and similar samples over the next several years will help them determine, among other things, the proportion of seropositive cows that leave afterbirth containing the brucellosis bacteria.

The GPS collars, which record the locations of elk every half hour, are programmed to release after one year. Scientists will locate the dropped collars and plot the stored data on computer maps to see where elk travel, especially during late winter and spring when brucellosis-induced abortions are most likely. "One thing we want to learn is whether conditions such as elk group densities on winter range result in higher seroprevalence rates, and then figure out if we can do anything about it," Anderson says.

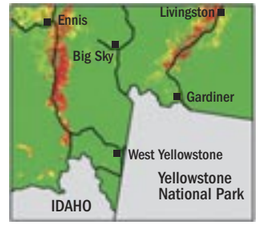
ERADICATED, ALMOST

Americans have been trying to figure out what to do about brucellosis ever since the disease arrived from Europe more than a century ago and spread among cattle. Before widespread milk pasteurization, brucellosis was a significant public health threat. It made people seriously ill, with joint pain and recurring fever.

Accordingly, the federal government decided before World War II to eradicate the disease from the United States. After decades of work and many millions of dollars, brucellosis has been almost entirely eliminated from this country's cattle herds. In addition to protecting public and livestock health, the near-eradication means that ranchers don't have to conduct expensive and bothersome testing when they sell breeding animals across state lines.

To ensure brucellosis remained at bay, the eradication effort, led by the USDA's Animal and Plant Health Inspection Service (APHIS), created a huge system of rules and regulations. The regulations (recently modified by APHIS) required that if cattle tested positive for exposure to the disease in two separate herds over 12 months, the USDA could revoke a state's "brucellosis-free" status. That would require every cattle grower statewide to test for the disease before shipping breeding cattle out of state, adding costs and reducing marketability. In addition, every animal in the infected herd had to be slaughtered, even if only one cow tested positive.

The last major reservoir of brucellosis is in elk and bison living in and around Yellowstone National Park. There's never been a documented case of bison transmitting brucellosis to cattle in field conditions. That's likely not the case with elk. Strict management programs keep wild bison and livestock separate as much as possible. But maintaining segregation is much harder with elk, because they are more numerous, wander farther, and easily hop fences. Their mobility also makes elk harder to locate—and thus keep separate from cattle. That's where the new FWP study comes in.



RISKY BUSINESS In maps made available to ranchers and the Montana Department of Livestock, FWP scientists compare the probability of elk using areas of the Greater Yellowstone Area with potential cattle grazing areas to develop maps like this one. It shows the relative probability (red for high, yellow for medium, green for low) of elk and cattle commingling during late winter and early spring.

> "If we can't eliminate brucellosis in wildlife—which we feel pretty strongly we can't—then we need to manage around it as a long-term endeavor."

Until recently, FWP scientists learned the whereabouts of seropositive elk mainly by testing blood samples collected by cooperating hunters. Since the early 1980s, the department has tested roughly 8,600 samples. The samples have come primarily from the Gardiner and Madison Valley areas, which provide winter range to elk that summer both in and outside Yellowstone. The tests showed that on average about 2 percent of elk in the areas were seropositive (compared with about 50 percent for bison). But in recent years, the exposure rate has spiked: 8 percent to 12 percent in the Gardiner area and 5 percent to 12 percent in the Madison Valley. And now seropositive elk are showing up in the Ruby Valley to the west.

Earlier, researchers had assumed the disease was spreading within Yellowstone area elk herds through occasional contact with bison in and around the park. Or infections came from elk that had wintered on several feed grounds in Wyoming, where thousands of the animals congregate in artificially high numbers and seropositive rates can top 30 percent. The increasing exposure rate could mean the disease is now self-sustaining in Montana elk herds, not just "spillage" from Wyoming. "That's a lot more worrisome," Anderson says.

Exposed elk spreading from the Yellowstone area increase the risk to cattle. Brucellosis was confirmed on a ranch near Bridger in 2007 (although the cattle likely picked up the disease in Paradise Valley) and in Paradise Valley the following year. In response, the USDA revoked Montana's brucellosis-free status (which it reinstated in 2009). The most probable source of infection? Elk.

Concerned about elk herds and beef cattle operations, FWP and state livestock officials have widened the focus of brucellosis management beyond bison, which have dominated discussions and management activities for decades, to include elk. Some Montanans want stronger action. Legislators and lobbying groups have called for

MAP GRAPHIC: FWP; PHOTO BY DIANE HARGREAVES

eradicating brucellosis in Montana elk. Some have gone so far as to recommend widespread culling to eliminate elk where the wild ungulates mix with cattle.

State officials say disease eradication is not viable. Elk are so numerous and range so widely that delivering a vaccination would be impossible. And existing vaccines don't work well on elk anyway. Because the Department of Homeland Security has declared brucellosis a potential weapon for bioterrorists, vaccine research must be conducted in highly secure facilities costing millions of dollars. "For that reason, very little brucellosis vaccine research is going on," says Marty Zaluski, state veterinarian at the Montana Department of Livestock. Pharmaceutical companies haven't jumped into brucellosis vaccine research either, largely because costs could be huge for a product with a relatively small market.

As for the idea of culling elk herds, that doesn't sit well with wildlife officials and conservation groups. "We strongly oppose any proposal to capture and slaughter elk that test seropositive," says Glenn Hockett, president of the Gallatin Sportsman's Association. FWP's Anderson adds there is no proof that the capture, test, and slaughter approach successfully eradicates brucellosis in elk. "Even if it did work, it would be extremely expensive and hugely unpopular with hunters," he adds.

Another controversy has surrounded the Montana Department of Livestock's recent decision to establish what it calls a "designated surveillance area" (DSA) in parts of the counties adjoining Yellowstone National Park where FWP scientists have documented seropositive elk. The good news for the livestock industry is that, under new APHIS rules, Montana ranchers won't lose their coveted brucellosis-free status if diseased cattle are found inside the surveillance area. What's more, when an exposed cow shows up inside the surveillance area, the owner doesn't have to lose the entire herd.

The bad news is that ranchers inside the zone must test their livestock for the disease more frequently than before. And though the possibility of having to slaughter a cattle herd no longer looms, a cow that tests positive for brucellosis can still hurt a ranch's finances, says Druska Kinkie, who ranches in Paradise Valley inside the DSA. She points out that if a cow tests positive in spring, the entire herd must be quarantined, perhaps for months. No animals from the herd, except steers, can be sold until the disease is cleared up (by removing, over time, the infected cattle). Meanwhile, the quarantined cattle must be fed expensive hay while summer pasture goes ungrazed. "You're just stuck there with all your animals," she says.

MANAGING THE RISK

With neither vaccinations nor test-and-slaughter options available, state livestock and wildlife officials, the beef industry, and conservation groups are focusing efforts on "risk mitigation." That means finding ways to reduce opportunities for cattle to contract brucellosis from elk. "If we can't eliminate brucellosis in wildlife—which we feel pretty strongly we can't—then we need to manage around it as a long-term endeavor," says McDonald. Adds Zaluski, "Our main goal is to protect the livestock industry in Montana. It's not us against politicians, or against elk and bison, or against FWP. It's us against brucellosis."

> "As a hunter, I don't want to see elk on feed grounds any more than ranchers do."

One challenge to reducing risk is that late winter, when brucellosis transmission is most likely, is also when ranchers feed cattle to get them through Montana's tough winters, and the hay they put out also attracts elk. "As a hunter, I don't want to see elk on feed grounds any more than ranchers do," says Hockett. Another challenge is that growing numbers of wolves in mountainous areas could keep elk at lower elevations longer than normal. And then there are the massive elk feed grounds in Wyoming. Though closing them down might help reduce the disease in elk, Wyoming has rebuffed calls to do so.

FWP officials say that among the biggest obstacles to managing brucellosis risk are landowners who close their ranches to public hunting and let large herds of elk congregate, known as harboring. The property owners close access because of past problems with hunters or to profit by providing exclusive hunting access. Without public hunting to help reduce or disperse herds, elk numbers unnaturally grow to the point where the risk of brucellosis spreading within herds increases. Higher elk concentrations could also lead to more mixing with cattle during late winter and early spring, when elk abortions and births take place. "We strongly believe that the loss of public hunting access may be increasing the brucellosis risk to cattle," says McDonald.

State agencies and ranchers have begun exploring various techniques that could reduce opportunities for cattle to come into contact with brucellosis bacteria. Herd dogs can drive elk from cattle feed grounds. Portable fencing can separate cattle and elk at critical times. Horseback riders, such as a few employed by FWP, can keep livestock and wildlife segregated. Kinkie says her family has increased fencing, and an FWP herder has done a good job hazing elk away from their beef herd. Fortunately, their ranch abuts Dome Mountain Wildlife Management Area, giving elk a place to go. That isn't an option everywhere. In some areas, she says, "you're just chasing them onto the neighbor's place."

Other ways of reducing risk include improving elk habitat in key areas to draw the wild ungulates away from ranches. Wildlife biologists also can work with ranchers on the timing and location of cattle grazing. And more ranchers who've closed land to public access can open gates so hunters can help disperse oversized elk herds. "We definitely will help those landowners manage hunters and coordinate hunts," McDonald says.

Maps are another tool. Using previous information gained from elk blood samples sent by hunters, FWP has mapped where seroprevalent elk exist in the Greater Yellowstone Area. Other maps show the relative probability of elk and cattle mixing in various parts of that area. The maps are available to livestock operators to help them make decisions about where they might want to restrict cattle movement in late winter and early spring.

FWP's five-year study aims to inject more hard science into the discussions and decision making. To keep the study going will require cooperation among landowners, state and federal agencies, and wildlife advocates. Unfortunately, too often discussions about brucellosis, cattle, and wildlife have deteriorated into name calling, finger pointing, and taking entrenched positions.

That won't solve anything.

But with enough research, knowledge can increase. And knowledge can, if nothing else, reduce risk.

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STEVE LOVAS

LEGISLATIVE DIRECTION In 2011, Montana legislators authorized FWP to hire staff and spend money so the agency can better understand how elk transmit brucellosis, critical for reducing the risk of transmission to livestock.