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Genetically, Bison Don't Measure Up to Frontier Ancestors

By MARK DERR (NYT) 1065 words
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ABSTRACT - Genetic study led by Texas A&M geneticist Dr James Derr finds that more than 90 percent of private bison and many animals in publicly owned herds are actually bison-cow hybrids; finding reduces pool of pure bison available for preserving species to fewer than 15,000 animals.

FULL ARTICLE - Genetically, Bison Don't Measure Up to Frontier Ancestors By MARK DERR

Nearly exterminated in the 19th-century conquest of the American West, bison today are considered a conservation success story, with some 300,000 of them roaming North America.

But recently geneticists have shown that many are actually bison-cow hybrids and should not figure in perpetuation of the true American bison.

The finding of domestic cattle genes in the bison reduces the pool of pure bison available for preserving the species to fewer than 15,000 animals scattered among national parks and preserves in the United States and Canada, said Dr. James Derr, a geneticist at the Texas A&M College of Veterinary Medicine, who is leading the research.

While investigating the extent of the hybridization, Dr. Derr and his team are also working with biologists from the National Park Service to find ways to maintain the levels of genetic diversity in wild bison that are essential to the long-term survival of the species.

Since the late 1990's, Dr. Derr said, his team has "tested thousands of animals from every public herd and 150 private herds," using a simple genetic test the members developed. They found that more than 90

percent of private bison herds had animals with cattle DNA that was passed on through the mother.

Publicly owned herds in the National Bison Range in Montana and in state parks in Kansas, South Dakota, Texas and Utah also contain hybrids.

Although hybrids represent only about 6 percent of all bison tested, Dr. Derr said, their distribution is widespread and in some herds reaches 100 percent. The hybrids look like pure bison, he added, and their presence in a ranch herd matters only if the rancher wants pure genetic stock.

But herds with hybrids should not be used in conservation efforts, Dr. Derr said, because even animals that do not show cattle DNA in his test may have it. That is because his test examines only mitochondrial DNA, which is inherited through the mother.

Because mitochondrial DNA, involved in the cell's energy system, is inherited only through the mother and is self-contained, it is simpler to analyze than DNA in the cell's nucleus, which is inherited from both parents.

If the bison's sire, but not the mother, was a hybrid, the cattle DNA would be in the cell's nucleus and would not be detected in the mitochondrial test.

Dr. Derr has reported his results in a series of articles beginning in 1999 in journals like *Animal Conservation* and *Animal Genetics*. To date, only the bison herds in Yellowstone, Grand Teton, Badlands, Theodore Roosevelt and Wind Cave National Parks, as well as a few private herds, have tested free of hybrids, Dr. Derr said.

An estimated 40 million to 70 million bison roamed North America before 1800. By 1900 fewer than 1,000 remained. Of those animals, 25 were in Yellowstone National Park, protected from poachers by the Army, and another 250 were in Wood Buffalo National Park in Canada. The rest belonged to five ranchers, who had collected bison to preserve the species and to crossbreed with cattle in hope of creating a more hardy animal.

All of today's hybrids appear descended from animals created by those ranchers early in the 20th century, Dr. Derr said. The national parks have no hybrids, he speculated, because bison used to supplement the Yellowstone herd were bought before the ranchers started their experiments. In turn, the Yellowstone herd provided animals for other federal herds and some ranchers, said Rick Wallen, a park bison biologist.

At least one rancher, the CNN founder and conservationist Ted Turner, has taken the findings seriously. With about 30,000 bison on 13 ranches in 6 states, Mr. Turner's company, Turner Enterprises, owns more bison than any government or individual, said the company's general manager, Russ Miller.

While genetic tests have revealed that some Turner herds have hybrids, he added, they have also identified one pure herd with more genetic diversity than the Yellowstone bison.

Mr. Turner believes that bison are to be managed for genetic diversity, Mr. Miller said. "We are to let bison be bison, to always choose the qualities of 'wildness' over domestication," he added.

But as a rule, even if they are not hybrids, ranched bison should not be mixed with their wild cousins, said Dr. Dale F. Lott, an emeritus professor of conservation biology at the University of California at Davis and author of "American Bison: A Natural History," to be published by the University of California Press in August. Ranched bison, he cautioned, are being turned into domestic animals. Their behavior, appearance and genetic makeup differ from wild bison.

Dr. Lott and other bison biologists have worried that the federal government's 5,000 to 6,000 wild bison have limited genetic variability because they passed through such a narrow genetic bottleneck at the beginning of the 20th century and are now confined to isolated herds, unable to mix or expand naturally into new areas. That isolation, the biologists have argued, could lead to inbreeding and a loss of genetic diversity, leaving the bison susceptible to disease and harmful mutations.

But Dr. Derr and his colleagues have found that such concerns are unfounded. "We were surprised to find that genetic diversity is high

among bison," he said, "and every genetic variation available in bison is found in the federal herds."

It is important now, Dr. Derr added, to determine whether government herds should be managed as a single population, with females moved around to maintain genetic diversity, or whether some or all of those herds contain unique clusters of genes that are best maintained separately.

Genetic testing could also help park officials culling their herds, or in the case of Yellowstone, sending to slaughter those who leave the park and test positive for brucellosis, to ensure that officials' decisions are not harming important bison lineages, he said. Brucellosis can cause spontaneous abortions in cattle.

A larger issue, to many biologists and ecologists, involves establishing a grasslands national park to allow for an expansion in the number of wild bison and for the restoration of an entire, vanished ecosystem.

"The whole prairie complex that existed in the 1840's and 1850's, when Europeans came here on safari, is gone," Dr. Lott said, "and we haven't put it back together yet."

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