The Last Bison

WHILE THE BISON HAS RECOVERED FROM ITS LOW OF 1,091 ANIMALS, THE SPECIES MAY NOT BE HOME-FREE YET.

By Jennifer Winger

PHOTOGRAPHS BY ANN E. CUTTING

LAST OF A BREED: A century ago, ranchers bred many of the remaining bison with cattle to help save the species—a genetic legacy that lives on in today's herds.

BOB HAMILTON ADJUSTS HIS CAP and fixes his gaze on the jagged seam of earth and sky on the northern boundary of the Tallgrass Prairie Preserve in Oklahoma. From here, waves of prairie roll nearly a dozen miles straight into Kansas.

"Look over that hill," says Hamilton, who is the director of this 40,000-acre Nature Conservancy preserve. "There's our gang of outlaws."

In a fog-bound field a mile away, nearly a thousand bison mill about, probing the ground for grass and sedge. Six feet high at the hump, the animals can weigh up to 2,000 pounds. Some bulls measure nearly 12 feet from nose to tail. Clouds of fine steam erupt around their muzzles as rhythmic hot breath meets the cool prairie air.

Hamilton turns to a loose knot of cowboys standing at the entrance to a red ironwork corral. "It's time to go out on safari," he says. "Let's see if we can catch us some buffs." The cowboys, buzzing from their morning coffee, lope toward a handful of white pickup trucks parked nearby. They hoot and holler and rev their engines, proving they don't need horses to have horsepower. Then they peel out onto the prairie, kicking up rocks and dirt.

The trucks careen over the rutted landscape in ragged formation and head straight for the herd. Roused by the noisy trucks, the bison stir from their grazing and begin to trot away, and then to stampede. In no time the trucks are fully surrounded by the animals, sandwiched between a mess of hide and hooves.

The cowboys react quickly, maneuvering their trucks to hem in the herd and to direct it toward the corral. The trucks fishtail, narrowly avoiding one another and the massive animals tearing across the prairie.

Bison can run at speeds of up to 35 mph, and at distances over a mile, they can outlast a racehorse. That's just one reason why the wranglers at Tallgrass use trucks: Horses may be synonymous with the Old West, but trucks put a protective layer of steel between the cowboys and their one-ton quarry.

Out of the chaos, the corral comes into the cowboys' view. Two trucks flank the herd, while two more trucks spur on the bison from behind.

When a few bison peel off from the group, Joe Bob Briggs, whose truck is outfitted with a glasspack muffler to give it the sound of a hot rod, makes a hard right and uses the growl of his engine to drive the errant bison back to the herd.

Goaded on by the cowboys, the bison charge through the open gates at ground-trembling speed.

"It ought to be illegal to have this much fun," howls Briggs, as he hops out of his truck and joins the other cowboys in flushing the last ornery bison into the corral on foot.

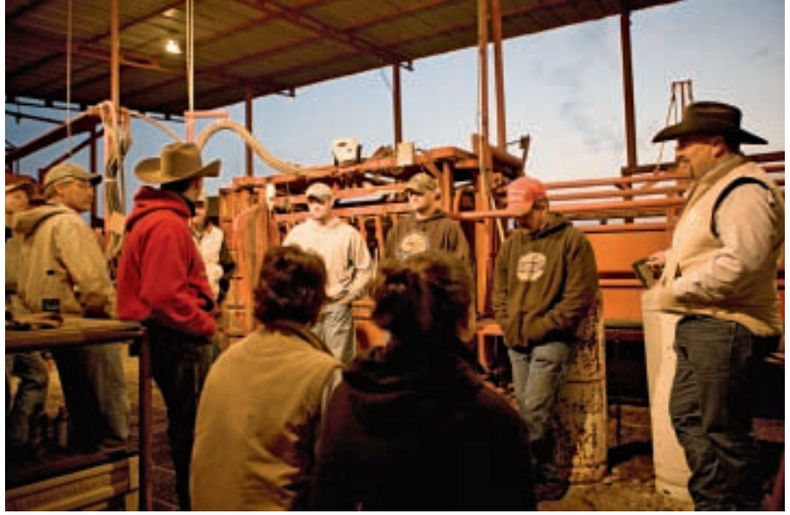
But this roundup isn't just for kicks. The bison at Tallgrass are a key component of an unparalleled restoration experiment. Each fall, the cowboys round up the bison from the preserve's open plains and funnel them into holding pens, where they wait for a turn in the squeeze chute—a barred hydraulic enclosure that immobilizes the bison for a quick medical exam.

It's clear that bison need grasslands to survive, but Hamilton suspects that the inverse is also true: These grasslands need bison to really thrive. While both cattle and bison can be used to effectively manage grasslands, Hamilton is working to substantiate just how bison—because of slight differences in diet and behavior—are a better fit for these native prairies.

"A few years ago ... millions upon millions of American bison ... roamed over the vast plains. ... Now they are so reduced in number that absolutely the last lingering spark of vitality is smouldering on the very verge of extinction."
— Charles Jesse "Buffalo" Jones, 1899

But he needs more evidence to build a rock-solid case for this theory. That's one reason he has brought back bison to their old stomping grounds at the preserve, which is home to the largest protected remnant of tallgrass prairie on the planet.

One problem remains, however. Hamilton isn't really certain that his bison are, in fact, pure bison. Like their prairie habitat, bison have grown less wild since the days before the West was won. Thanks to breeding efforts in the late 19th century, bison are not only treated like livestock; the majority of them may actually have cattle in their blood: Nearly 90 percent of herds sampled so far have at least one animal that has tested positive for cattle genes.



MORNING ROUNDUP: Cowboys at the Tallgrass Prairie Preserve prepare to bring a herd of bison into the corral. Bison play a key role in helping restore and maintain the preserve, the largest protected remnant of tallgrass prairie in the world.

So this year, when the bison are led through the squeeze chute at Tallgrass, their checkup will include more than branding, brucellosis vaccinations and electronic tagging. The wranglers will also harvest DNA samples that will help Hamilton find out whether his prairie experiment is testing out a herd of wild bison or its watered-down genetic cousin: beefalo.

1,091 Bison

Historians estimate that 30 million to 50 million bison roamed the Great Plains and montane grasslands before European settlers arrived on the continent. Bison dominated these prairies for nearly 10,000 years. Their migrations, grazing patterns and behaviors influenced fire cycles, created habitat, and provided food and nutrients for other species.

When Meriwether Lewis and William Clark explored the West 200 years ago, they were astonished by the size of the bison herds they encountered. In his *Journals*, Lewis recounts a scene at the White River in the Dakotas in 1806: "If it be not impossible to calculate the moving multitude, which darkened the whole plains, we are convinced that twenty thousand would be no exaggerated number."

But some 65 years later, the population of North American bison was in rapid decline. Railroad tracks cut across the country, dividing bison into northern and southern herds. The market value of a buffalo hide climbed to an all-time high of $3.50, and hunters targeted bison with Christian Sharp's newly developed .50 caliber rifle. The U.S. Army helped facilitate the hunt by providing bullets free of charge. While hunters and tourists slaughtered bison for fun and profit, the U.S. government exterminated whole herds in order to deprive Plains Indians of natural resources and force them onto reservations. The introduction of cattle and sheep to the plains also took a toll: Competition for grazing lands fragmented some bison herds; others succumbed to exotic livestock diseases imported from Europe and Africa.

By 1899, rancher and hunter Charles Jesse "Buffalo" Jones marveled in his autobiography at the bison's rapid demise. "A few years ago—scarcely a quarter of a century—millions upon millions of American bison ... roamed over the vast plains of the intracontinental region of North America," he wrote. "Now they are so reduced in number that absolutely the last lingering spark of vitality is smouldering on the very verge of extinction." By the close of the 19th century, zoologist and conservationist William Temple Hornaday found that only 1,091 bison remained in all of North America. And most were in captivity on ranches or in zoos.

The North American bison might have gone the way of the passenger pigeon, were it not for the foresight of a handful of individuals who, in the 1870s, began capturing the few remaining bison and raising them on private ranches. Most of the nearly 500,000 bison in existence today are descendants of the 500 bison in these private herds. (Two small wild herds also continued to thrive in Yellowstone National Park and Canada's Wood Buffalo National Park.)

While bison survived, the ranchers' efforts unknowingly set in motion a new threat to the species' future. In the late 1800s, the ranchers began experimentally breeding the bison

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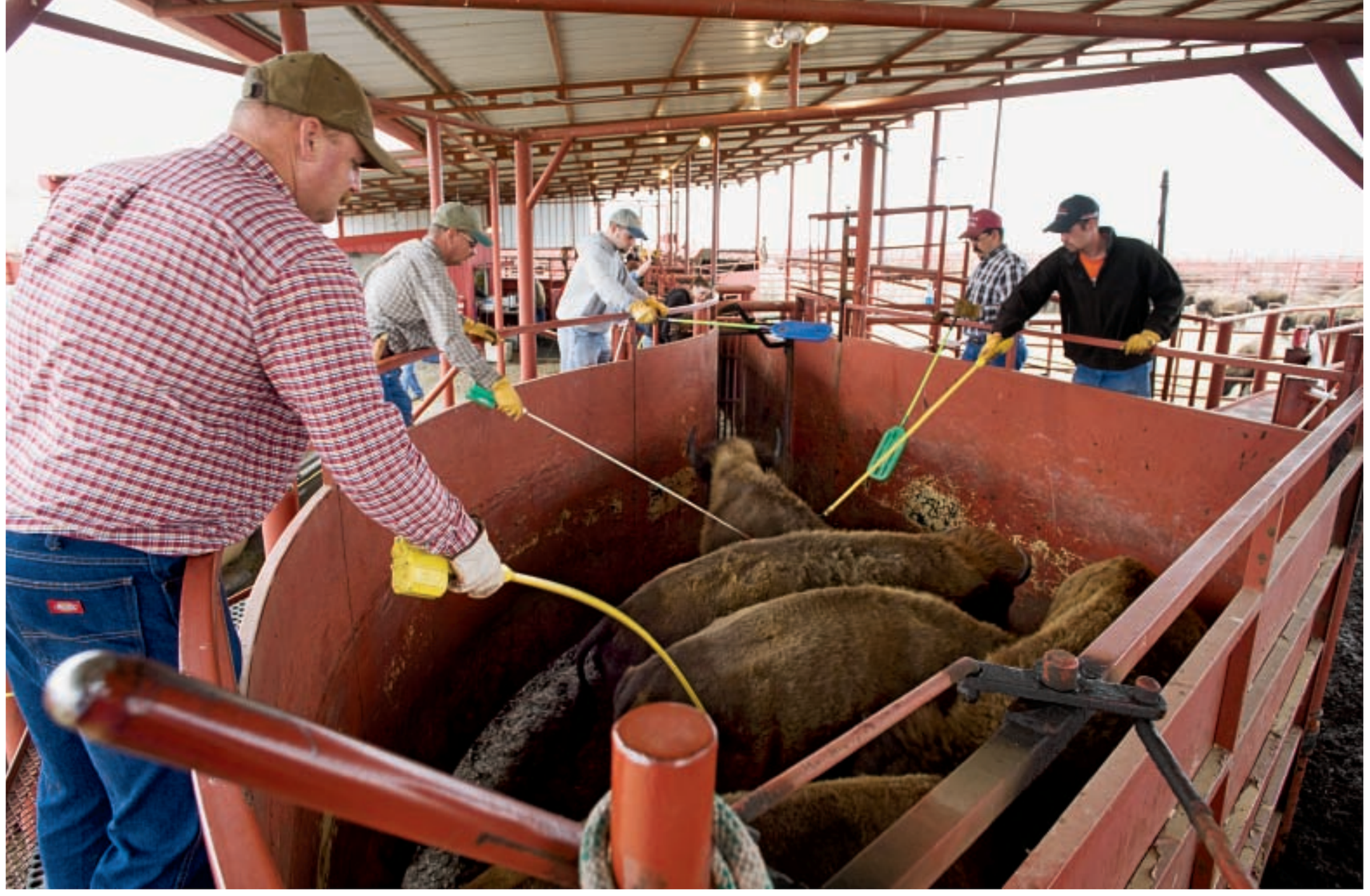

CONSERVATION COWBOYS: The Tallgrass crew directs bison into a squeeze chute for an exam, inoculations and DNA sampling. With more than 5,000 bison on nine preserves in seven states, the Conservancy is positioned to help save the species—as well as the prairies with which it evolved.

with cattle, with an eye toward engineering hardier livestock that could better withstand harsh winter weather, parasites and viral diseases.

The resulting animals, called beefalo or cattalo, possessed none of the hoped-for "hybrid vigor." First-generation hybrids in particular were more freakish than functional, with awkward bodies, peculiar coloring, and considerably more hump and less rump than cattle. Since the prime cuts of meat come from the ribs and back of an animal, these hybrids with their big brisket chests and petite posteriors—along with an ornery attitude, to boot—were of little value to the ranchers who bred them. Today, the descendents of these hybrids more closely resemble bison.

It has taken nearly a century for the consequences of this failed experiment to come to light. But the legacy of the ranchers' breeding strategies is revealed under the microscope: Cattle genes from hybrids have been passed down to nearly every bison herd in existence.

Cowboy Forensics

"The results are in," says James Derr, looking up from his laboratory bench, where a set of DNA samples from Tallgrass bison has been run through a molecular-testing device called a "gel." The results—bands of blue and black creeping across a white canvas—don't look like much. But to Derr, they read like the morning newspaper.

With his turquoise-studded belt buckle, black leather boots and easy Western drawl, Derr looks as though he belongs in a saloon, not in a sterile genetics lab. But this forensics cowboy is a professor of veterinary pathobiology at Texas A&M University.

He takes a swig of coffee and turns on the black light above the laboratory bench to take a closer look at the latest results. "This one," he says, pointing to two blue bands running in close parallel, "is a sure-enough cow."

Derr's colleague, Natalie Halbert, another pathobiology professor at A&M, looks at the fingers of color and nods in agreement. Over the past 10 years, this duo has analyzed DNA in hair and blood samples from more than 100 herds around the country, trying to distinguish and separate out the bison from the beefalo.

"Grasslands are missing the plant and animal diversity they originally had when bison were roaming the prairies. We want the whole bag of biodiversity here, and we're using what works best to get it."
— Tallgrass preserve director Bob Hamilton

What they've found is disconcerting. Many herds have yet to have their DNA checked out entirely, but so far only 10,000 of the half-million bison in North America have turned up free of cattle genes. Almost 90 percent of the private herds include animals that have tested positive. Public herds, such as those at Yellowstone, show more promise, as only 6 percent have turned up positive for cattle genes.

Herds owned for conservation purposes, such as at Tallgrass, remain largely untested—until now, that is. With funding from the Conservancy's Rodney Johnson-Katherine Ordway Stewardship Endowment, Derr's lab is examining hair and blood samples from 12 conservation herds—6,000 animals in all—including those run by the Conservancy, Kansas State University, the American Prairie Foundation and Parks Canada.

So far, there's no scientific evidence documenting how cattle genes affect bison, but Derr and Halbert suspect it isn't good. "It's assumed that bison with cattle mitochondrial DNA are less energy-efficient than their pure counterparts," says Derr, who notes that cattle have shorter lives and produce more offspring than longer-lived, less productive bison.

"Bison with cattle genes may also exhibit physiological characteristics of cattle that make them less desirable grazers for grasslands," says Derr. "But we're not 100 percent sure yet."

While Derr and Halbert are worried about the future of prairie restoration, their big concern is preventing the "genomic extinction" of the bison. They don't want to see the restoration of this native species lost to an unintentional watering down of the gene pool.

"We don't want to call anyone's kid ugly," says Derr,

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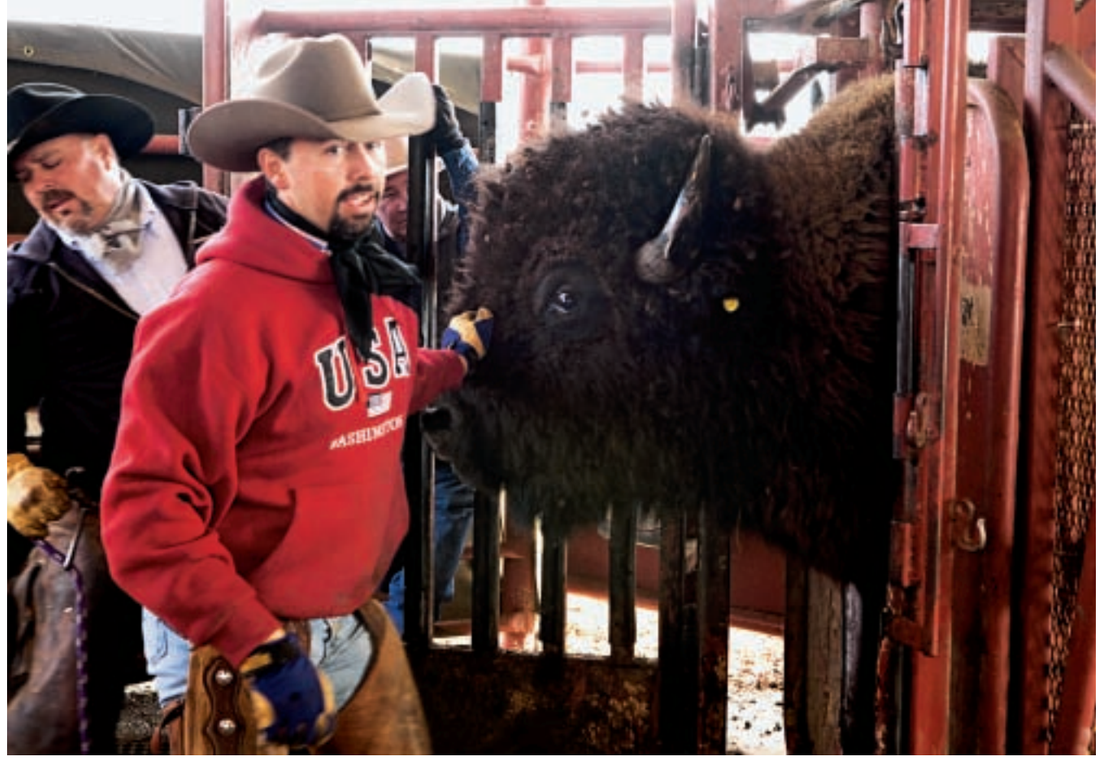


BULL-HEADED: Tallgrass wranglers Perry Collins (left) and J.B. Hurd hold a bison in the squeeze chute for a 50-second check-up. The animals look and act wild, but the presence of cattle genes may mean subtle but important behavioral differences.

who is quick to point out that it will be up to individual herd managers to decide what to do with the results from his tests. "But it's an absolute crime to take hybrids into a herd with no evidence of cattle genes."

Whatever the future of bison, determining which herds possess cattle genes is the first step toward protecting the species genome and propagating herds that are cattle free.

The second step will be building out larger populations of pure bison. Right now, only five conservation herds in North America number more than 1,000 animals. "We need that many individuals in each herd in order to achieve what scientists have termed 'sustainable,'" says Derr. He says that larger populations—and larger gene pools—are better equipped to avoid the negative effects of inbreeding, such as the loss of genetic diversity.

The Conservancy could have an important role to play in the genetic conservation of the species. With more than 5,000 bison on nine preserves in seven states, the Conservancy has the kind of acreage—and potentially the kind of bison—to establish satellite herds of eligible breeders.

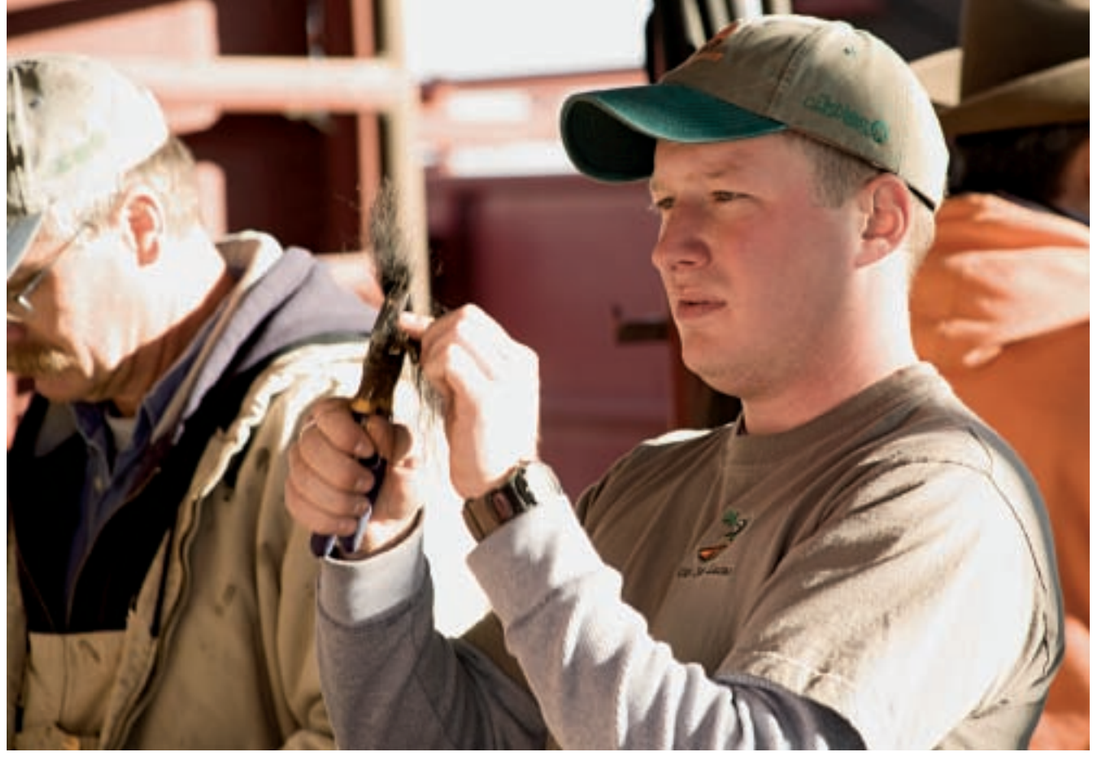
"The decisions herd managers make today are going to determine what genes are preserved—what animal is preserved," says Derr.

Buffalo Magic

Loud, guttural bellows and the reverberation of one-ton animals clashing against one another and the rails of the steel holding pen drown out the songs of meadowlark and killdeer on the prairie at Tallgrass. A wrangler patrols the corral on a catwalk high above the ruckus. He yells out with a twang, "Get off the gate! Get off the gate! Get off the gate!"

It is well before 9 a.m., and the corral is already cranking. The wranglers use rattle paddles and electric prods to sweep bison through a series of narrowing alleyways toward the squeeze chute that will hold each bison in place for its 50-second medical exam.

"This project is about filling in the final piece of a large puzzle," says Hamilton, as a massive bison leaps into the squeeze chute and is promptly embraced and immobilized by its iron bars. A cowboy administers an inoculation and calls out the animal's weight and sex ("912! Bull!"), while



TELLING TAIL: Matt Poole helps pluck hair samples from each animal's tail and sends them to the lab for genetic testing. Bison at Tallgrass that test positive for cattle genes will be separated from the others before they are old enough to breed.

Hamilton pulls a few hairs from the animal's tail using a pair of pliers. He holds the bundle of hairs up to the light to see if the follicles came, too.

"The root material is where the DNA is," says Hamilton. "That's the buffalo magic." He grabs a coin envelope and stuffs the coarse black hairs inside.

After Hamilton completes the "yank job," the squeeze chute opens and the bull bucks and gallops out of the corral toward the open prairie and the rest of the herd. He doesn't stop until there's a good football field or two between himself and his handlers.

"From a distance, bison resemble cattle; they look like docile grazers," says Hamilton as he watches the bull trot away. "But once a year, when the management takes place and you get them in the corral, you realize that they're wild animals, not domesticated at all."

Although bison (*Bison bison*) and cattle (*Bos taurus*) are taxonomically related—they are cousins, both members of the *Bovidae* family, which also includes gazelles, antelope, buffalo, sheep and goats—they have distinct diets and decidedly different behaviors.

Thanks to breeding efforts in the late 19th century, cattle genes from hybrids have been passed down to nearly every bison herd in existence.

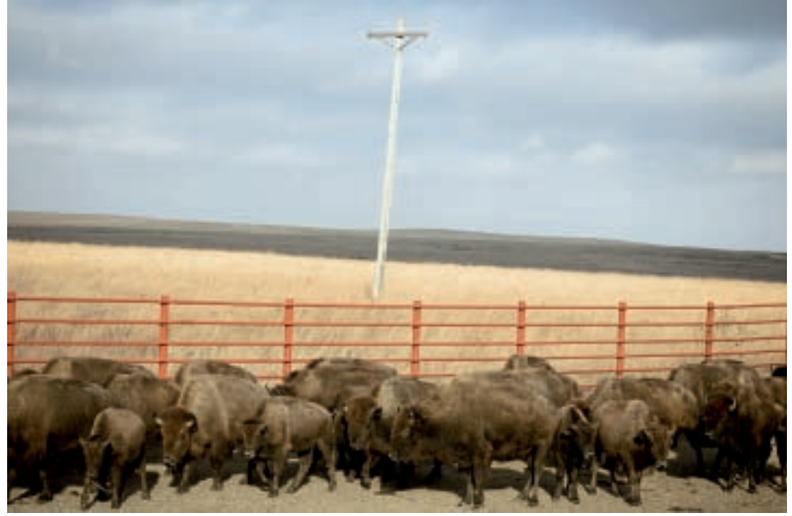
Bison eat mostly grass or sedge, with less than 2 percent of their diet coming from broadleaf forbs or flowering plants. About 30 percent of a cow's diet comes from these rare beauties among the tallgrass.

"Big, showy forbs, like the compass plant or maximillian sunflower, are ice-cream plants for domestic livestock," says Hamilton. "Cattle love them, and with unrestricted access they will simply drive them out."

This subtle difference in diet selectivity means that when it comes to grassland management, all ungulates are not created equal.

"Grasslands are missing the plant and animal diversity they originally had when bison were roaming the prairies," says Hamilton. "We want the whole bag of biodiversity here, and we're using what works best to get it."

Tallgrass is no buffalo ranch. Hamilton could use cattle to mow down the grasses. Others do, just beyond the fences



ROOM TO ROAM: Once outside the corral, bison are not as yoked to water sources as are cattle, preferring instead to roam far and wide. That means they are less likely than cattle to overgraze areas near water sources or destroy streamside habitat.

that mark the boundary of the preserve. But it just so happens that the way bison use the landscape makes that whole bag of biodiversity possible. Besides their diet, which allows a host of prairie plants to flourish, bison provide food, habitat and even water for other animals: When bison wallow in the dust to clean their hides, the saucer-sized depressions they make collect standing water in an otherwise dry landscape.

And this habitat, prairie habitat—which has already telescoped to 1 percent to 2 percent of its original range, and is still being overrun by cows and plows—is more than just an empty landscape. Keeping bison as bison is not just about nostalgia for an ecosystem lost; it's also about preserving the tool that makes prairies possible.

Prairie Possibilities

"662! Heifer!" shouts one of the wranglers. The animal is already in the chute, and this time Hamilton is waving a wand by its head to read a transponder tag dangling from the left ear. Each tag contains a unique code, which is used to identify the animal. The wand transmits the information to a portable computer housed in a shed nearby, which pulls up information unique to the animal, including sex, origin, age, weight and—for some bison—the results of Derr's DNA tests.

"Cattle mitoch," says a disembodied voice emanating from the computer, indicating that the bison in question has mitochondrial DNA from a cow.

"'05 model! She's a seller!" calls Hamilton as the young heifer makes a mad dash for a nearby pen. Tallgrass sells its 2-year-old females with mitochondrial DNA from cattle before they can breed and pass cattle genes on to the next generation. "There may be a biological price to pay for being part cattle," says Hamilton.

At Tallgrass, selling about as many bison as are born on the preserve each spring allows Hamilton to maintain a target population of 2,500 bison and work toward managing a herd of cattle-gene-free animals. If a bison is a "keeper!" it returns to the prairie; if it is a "seller!" it will be trucked to High Plains Bison, a range-raised, hormone and antibiotic-free bison processing plant.

For now, the odds for Conservancy bison look pretty good. Preliminary results from Derr's lab indicate that approximately 85 percent of the bison at Tallgrass could be free of cattle genes. And there is hope that some of the other Conservancy herds will be 100 percent bison.

"We call them land sharks out here," says Hamilton nodding toward the bison once again grazing in the distance. "When they're on the prairie, working their way through the tall grass, all you can see is their humps, gliding along."

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— Veterinary pathobiologist James Derr

In the twilight, the shaggy humps of Hamilton's land sharks are all that's visible among the prairie swells as a fingernail moon takes its place in the sky. No fence, no corral, no cowboy can be seen in the failing light. Only the "keepers" graze in the distance. It's one piece of this prairie puzzle that's back in place. ▪