

SCIENCE

RANCHING UNDERGROUND

Capturing carbon improves crop yields and adds profits

BY SCOTT McMILLION

PHOTOGRAPHY BY ALEXIS BONOPOFSKY



THERE'S A PRETTY STRONG CONNECTION between the earthworms in the field and the beefsteak on your plate.

You can learn a lot about a ranch by picking apart a cow turd.

And Montana ranchers can earn money by sucking carbon dioxide from the air and storing it underground.

These things are all connected, thanks to an innovative program that brings corporate money to Montana rangeland.

The Indreland Angus Ranch north of Big Timber is one of the first to sign up.

“We think we’re cattle people,” Roger Indreland said. “But we’ve got way more livestock below ground than we do above ground. You just can’t see it without a microscope.”

Roger Indreland, with his dog Lily, tests soil temperatures, which were 10 degrees warmer on the exposed road than in an ungrazed field. Cooler soils hold moisture better and keep plants green longer.





Roger Indreland uses a garlic press to squeeze the juice from blades of grass to measure how much sugar they contain. Sugar “fuels the system” of plants, animals and underground microorganisms.

Worms are a big part of that herd. But so are fungi (there can be 10 yards of fungal strands in a lump of soil the size of a man’s thumb!) and the billions of microbes that render the carbon storable underground. There’s a complex mix of water, sugar, carbon, minerals and life forms on a piece of rangeland. Learning about and nurturing all this biology can produce sizable rewards.

Indreland said he’s increased his stocking rate by at least 30 percent since he changed how he thinks about and manages his land. That means he and his wife Betsy have 30 percent more beef to sell, without buying any more land, an expensive commodity in a place that offers astounding views of the Crazy, Absaroka and Beartooth mountains.

Here’s how the program works: worried about global warming, corporations around the country are working to reduce their carbon footprint, maybe even become carbon neutral. That’s hard to do, maybe impossible in some cases. But those companies can buy carbon credits, which are ways to pay somebody else to store carbon in places where it can’t escape into the atmosphere. Carbon credits, or offsets, come in a variety of forms: wind energy, tree planting, and so on. There’s a list. Now the grasslands of Montana are part of the mix.

Healthy soils and plants foster both livestock and wildlife, including pollinators like these bees working on yellow clover.





Betsy Indreland stands in her ranch's seed shed and explains how 50 or more types of seeds are used to help bolster the ecosystem.

That's where the Western Sustainability Exchange (WSE), a Livingston-based nonprofit focused on sustainable agriculture, and Native Energy, a Vermont-based public benefit corporation, enter the picture. WSE has the connections with local ranchers and Native Energy has the connection with the corporations who want to reduce carbon in the atmosphere. They're working together to combine their connections so they can make a difference in the world.

"We're interested in projects that should be going forward and don't have the financing," Native Energy president Jeff Bernicke explained at a June gathering of ranchers, conservationists and representatives from about a dozen companies that ranged from Patagonia to Disney to Timberland Boots. They'd all gathered at the Indreland ranch to learn about storing carbon underground. That meant taking a close look at a deep trench, examining soil, hearing about ranch economics, and even picking apart a few cow patties to see how dung beetles help fertilize land. It's all part of the Montana Improved Grazing Project.

Grasslands are carbon sinks by nature. But overgrazing, plowing and other changes have reduced their efficiency over time. Natural soil functions often have been replaced by expensive chemical and mechanical treatments.

"Soils are not only asleep but kind of comatose on a lot of these rangelands," said Nicole Masters, an international consultant from New Zealand who specializes in restoring agricultural lands and works with the Indrelands and



Dung beetles made short work of this cow pie. This one is only a few days old and is nearly gone, with its nutrients transferred into the soil.

other ranchers. (Her U.S. work visa calls her "An Alien of Extraordinary Ability.")

The WSE-Native Energy program calls on ranchers to use intensive rest and rotation grazing methods, which emulates the way native ungulates used the land before the country got fenced in: bison and other animals



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would feed intensively on a piece of ground, then move on, perhaps staying away for years and giving the land a chance to recover.

In modern ranching, that pattern can be emulated by enclosing cattle in a few acres, then moving them often, sometimes daily. Grazing stimulates new growth in the plants, which allows them to absorb more carbon dioxide, which they transfer through their roots to the ground, where microbes and fungi go to work on it.

This transfer happens primarily by liquifying carbon in the form of sugars, which feeds microorganisms that fix the carbon in the soil and release nutrients for the plants. It's sort of like a mammalian gut, which can't convert food into muscle or expendable energy without helpful bacteria. In too many places, soil innards have quit functioning. But it doesn't take that much to enliven them, according to Masters.

Do it properly and your cattle can graze on green plants most of the year, even in semi-arid Montana. That reduces or eliminates the need for winter hay, cuts fuel and equipment costs, and helps soil hold water better, which can reduce the need for irrigation. So ranchers aren't just growing more beef. They're cutting costs, too.

The concepts aren't exactly new. Grazing systems called Holistic Resource Management, or the Savory Method, have been used on some ranches for decades. But they're expensive to implement. Confining a few dozen cattle to a handful of acres for short periods—and doing it properly—requires portable electric fencing, water developments, technical support,

and manpower. It all gets expensive.

Money from the carbon credits means "we'll be able to kick start a lot of the things we've been talking about," said Alex Blake, whose family ranches a few miles south of the Irelands.

So far, 34,000 acres on four Montana ranches have been enrolled. Payments to ranches can range from \$5,000 to \$60,000 annually, depending on factors like

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acreage, soil types and other factors, according to WSE Executive Director Lill Erickson. She said WSE hopes to have 150,000 acres enrolled by the end of 2020.

“We’re actively recruiting,” she said.

While several companies are interested, Xanterra Parks and Resorts, which feeds and rents rooms to millions of people in national parks around the country, is the first to sign up and is paying \$15 to \$20 a metric ton for stored carbon. The company’s goal is to reduce its carbon footprint by 50 percent by 2025.

“We’re in for a lot of reasons,” said Dylan Hoffman, the director of sustainability for Xanterra in Yellowstone National Park. He likes that the program helps make ranching environmentally and economically sustainable, which protects open space and biodiversity around the park; Native Energy has a viable system for verifying the carbon storage; and supporting nearby ranches makes it easier for Xanterra to find locally produced food. That’s a big job when you cook two million meals a day in Yellowstone alone.

ASKED A QUESTION AT THE INDRELANDS’ KITCHEN table, Nicole Masters nods and taps a calculator. Within a few seconds she’s calculated that the Indreland ranch grabs and stores as much carbon every year as 1,200 Americans release into the air by using cars and airplanes and electric lights, and by transporting what they eat and drink and wear and throw away.

And that’s just one ranch. The potential to do more is vast, especially since so much of the world’s croplands and rangelands have been overworked or overgrazed. Masters says there’s capacity for more carbon storage even on meticulously managed ranches such as the Indrelands’, and vast capacity on overgrazed properties.

Increasing the amount of carbon in soil by even a small percentage can make a big difference, she said.

But it will take money and toil. Distant corporations that see global warming as a threat have been putting their money into carbon credits for years. Now there’s a vehicle to direct some of it to Montana’s ag community, where it can be parlayed into greater profits.

“It’s a lot more than just carbon,” Erickson said. But helping ranchers store it underground also benefits their bottom line, and keeping ranching viable protects open space, wildlife and biodiversity, the things that make Montana appealing to so many.

“We’re trying to preserve the best of the West,” she said. “Farmers and ranchers are our firewall against losing this place.” 📌

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