LAND STEWARDSHIP PROJECT

LSP Myth Buster #47

An ongoing Land Stewardship Project series on ag myths and ways of deflating them.

Updated: June 2016

→ *Myth*: Cattle are a Climate Change Catastrophe

→ *Fact*:

Sometimes the rules of simple cause and effect don't apply. Take, for instance, the fact that cattle are ruminants, and like all ruminants they utilize a wonderfully complex digestive system to turn forages and grain into meat and milk. A major side effect of all that fermentation on four legs is the production of methane, which is a potent greenhouse gas.

So cattle are major villains in the global climate change crisis, right? Not necessarily. In fact, according to a major research editorial in the *Journal of Soil and Water Conservation*, ruminants could hold one of the keys to developing a food production system that reverses the impacts of releasing so many greenhouse gases into the atmosphere.

This is just the latest recognition that agriculture has a huge potential role in bringing greenhouse gasses—carbon dioxide, methane and nitrous oxide—under control. According to a paper published in the journal *Nature* in 2016, land use in general contributes about a quarter of total human-caused greenhouse gas emissions. Roughly 10 percent to 14 percent of emissions come directly from agricultural production and another 12 percent to 17 percent from land cover changes, including deforestation.

The good news is that soils can sequester a lot of greenhouse gases. For example, our soil holds three times the amount of carbon dioxide currently in the atmosphere, and 240 times the amount of gases emitted by fossil fuels annually. Increasing the amount of carbon stored in soil by just a few percent would produce massive positive benefits. And since farmers deal directly with the land, they could play a significant role in developing what authors of the *Nature* paper call "climate-smart soils."

The *Journal of Soil and Water Conservation* editorial was authored by researchers from the USDA, Iowa State University, Texas A & M, Ohio State University and Michigan State University, among other institutions. The team collected years of peer-reviewed research results and compared the relative contributions of greenhouse gas emissions from various agricultural practices, both conventional and conservation-based.

Their summary shows that it all comes down to how we treat the soil. When our land is plowed and becomes vulnerable to erosion, it is a net exporter of greenhouse gases. What goes on beneath the surface matters as well. Since tillage began, most agricultural soils have lost 30 percent to 75 percent of their soil organic carbon. That's a big deal when it comes to climate change—the more carbon that stays in our soils, the fewer greenhouse gases in the atmosphere.

As a result, any farming practice that can keep soil from blowing or washing away, as well as keep it healthy biologically, is going to have a major positive impact on our climate. That's why the authors of the *Soil and Water Conservation* editorial recommend a farming system that gets as much land as possible blanketed in continuous living cover 365-days-a-year. Their solution? Get livestock out on the land.

The key phrase here is, "out on the land." Producing beef and milk in intensive confinement, where feedstuffs are trucked in and liquid manure becomes a waste product that must be stored in massive quantities before eventually getting disposed of, is a major source of greenhouse gas emissions. In addition, such systems are reliant on monocultural production of corn, soybeans and other crops. This results in greenhouse gas emissions as a

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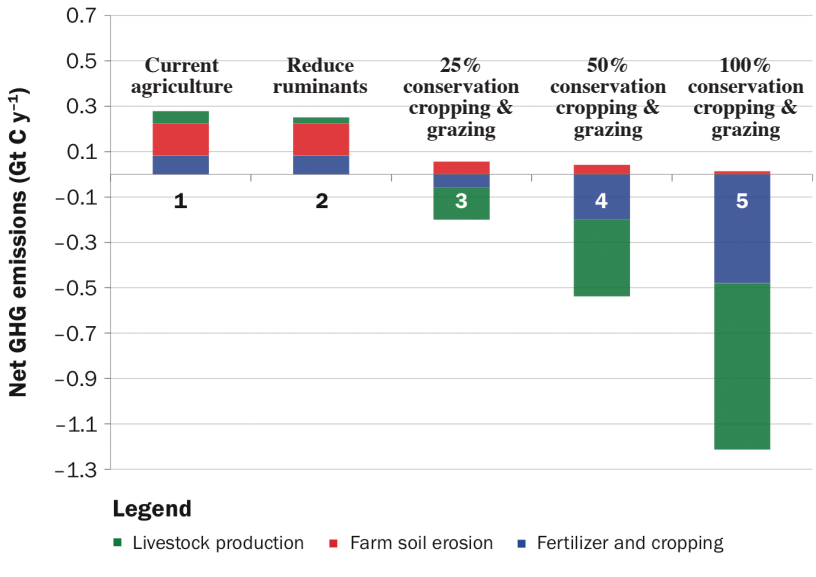
Figure 2

Hypothetical North American net greenhouse gas (GHG) emission scenarios for: (1) current agriculture; (2) current agriculture with 50% current ruminants; (3) 25% conservation cropping and adaptive multipaddock (AMP) grazing with current numbers of ruminants; (4) 50% conservation cropping and AMP grazing with current numbers of ruminants; and (5) 100% conservation cropping and AMP grazing with current numbers of ruminants.



Source: Teague, W.R., S. Apfelbaum, R. Lal, U.P. Kreuter, J. Rowntree, C.A. Davies, R. Conser, M. Rasmussen, J. Hatfield, T. Wang, and P. Byck, 2016. The role of ruminants in reducing agriculture's carbon footprint in North America. *Journal of Soil and Water Conservation* 71(2):156-164, doi: 10.2489/jswc. 71.2.156. Reprinted with permission of the *Journal of Soil and Water Conservation*.

This **Myth Buster** *is brought to you by the members and staff of the Land Stewardship Project, a private, nonprofit organization devoted to fostering an ethic of stewardship for farmland and to seeing more successful farmers on the land raising crops and livestock. For more information, call 612-722-6377 or visit www.landstewardshipproject.org.*

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result of tillage, as well as the petroleum based fertilizers, fuels and pesticides involved in crop production.

But when livestock are raised on grasslands and other forages, the soil can be a sink for greenhouse gases, both because it is not being eroded and exposed to the elements, and because the world beneath the surface is building up soil organic carbon. It's important to keep in mind that it matters how those animals are being grazed. Simply turning them out onto open pastures or rangelands and allowing them to roam at will creates its own problems. Overgrazing destroys plant communities and is a major source of erosion and compaction, not to mention water pollution.

Rather, rotating livestock through a series of paddocks, a system called managed rotational grazing, helps keep the grassland healthy above and below the surface by spreading nutrients sustainably and allowing plant life to rest and recover. The *Journal of Soil and Water Conservation* editorial cites several studies showing how this system—they call it "regenerative adaptive multipaddock conservation grazing" (there's a mouthful)—can actually sequester more greenhouse gases than are being emitted.

What's particularly exciting about the *Journal of Soil and Water Conservation* editorial is the emphasis the authors place on integrating livestock, pastures and crop production—a perfect mix of enterprises in the Midwest. They outline a working lands scenario where a carbon-trapping farm may have some permanent pasture that is broken up into rotational grazing paddocks. But it could also be producing corn and soybeans in a system where cover crops like cereal rye or tillage radish are used to blanket that row-cropped land with growing plants before and after the regular growing season. These cover crops could provide low-cost forage for cattle and other livestock, helping justify the cost of the cover crop establishment while protecting the soil from erosion and building its biology. Cover crops can also help cut a farm's reliance on chemical fertilizers, which are another source of greenhouse gases.

The paper outlines the greenhouse gas emissions potential of several farming scenarios in North America: from keeping our current industrialized system (an increasing amount of grassland plowed under to make way for row crops while keeping livestock confined in large CAFOs) to utilizing a combination of managed rotational grazing and conservation cropping systems that involve no-till, diverse rotations and cover crops.

As the graph on the reverse page shows, the differences are striking. Our current system of agriculture will continue to be a net producer of greenhouse gases, and things will only get worse as more of our world's soil is damaged or lost. But even if 25 percent of our farming system is converted to managed rotational grazing/conservation cropping, agriculture will trap much larger amounts of greenhouse gases than it produces. Given a chance, a bovine can more than make up for all that methane coming out the back end by how it consumes feed on the front end.

Under these scenarios, even reducing the number of ruminants in North America by half doesn't produce a system that sequesters more greenhouse gases than it produces, as long as we keep our current soil-destroying industrialized cropping systems. We need animals out there contributing to a nutrient cycle that builds and protects soil while giving farmers an economic incentive to keep the land covered all year-round.

This wouldn't necessarily require every farm to become a diversified crop/livestock operation. Let's face it: some corn-soybean farmers are committed to raising crops and nothing else, both for economic and quality-of-life reasons. But under a more integrated system, diversity could be adopted on a more community-wide basis. Even crop farmers who do not have livestock could utilize their neighbor's animals to add economic value to cover crops or that piece of pasture that hasn't fallen under the plow yet.

Re-integrating livestock and crop farming would bring back the kind of diversity the landscape needs to not only mitigate climate change, but to protect water from pollution. University of Minnesota Forever Green researcher Don Wyse recently gave a presentation on water quality that described how within a few decades the state's agricultural landscape went from a diverse mix of row crops, small grains and perennial grasses/forages to a duo-culture of corn and soybeans. What drove that change? Wyse had a direct answer to that question: "We moved animals off of the landscape."

Both the *Nature* and *Journal of Soil and Water Conservation* papers recognize that there are major barriers to integrating livestock grazing/row-cropping in a soil-friendly manner, not the least of which is government policy that promotes the production of a handful of commodity crops and penalizes diversity.

"Rather than reducing ruminants and encouraging destructive agricultural land use by providing price subsidies and other subsidies, rewarding regenerative agricultural practices that focus on increasing soil [carbon] and that lead to greater adoption by land managers is essential to creating a robust, resilient, and regenerative global food production system," conclude the authors of the *Soil and Water Conservation* editorial.

World leaders meeting in Paris during the 2015 U.N. Climate Change Conference recognized carbon farming's role in curbing greenhouse gas emissions. This is another example of how climate scientists and environmentalists are increasingly talking about how soil health is a linchpin in not only fighting climate change, but producing the kind of agricultural resiliency that can withstand the extreme weather events being produced by this phenomenon already.

Rural Resiliency

Integrating livestock and conservation-based crop production can also make rural communities more resilient—economically as well as environmentally. In west-central Minnesota's Chippewa River watershed, the Land Stewardship Project and its partners are working with farmers who are figuring out how to utilize innovative systems like mob grazing, cover cropping and no-till to not only build healthy soils utilizing continuous living cover, but fortify their economic bottom lines.

These farmers are proving that the managed rotational grazing/conservation cropping systems scenarios outlined in the *Journal of Soil and Water Conservation* editorial aren't just the stuff of computer models—real farmers are taking advantage of such synergies. And if the impressive turnouts at Land Stewardship Project workshops on soil-friendly farming are any indication, the interest is increasing.

These farmers may not be calling it "climate-smart" or "soil smart" agriculture. Just plain "smart" will do.

➔ More Information

• "The role of ruminants in reducing agriculture's carbon footprint in North America" is in the March/April 2016 issue of the *Journal of Soil and Water Conservation*, www.jswconline.org.

• "Climate-smart soils" is in the April 7, 2016, edition of the journal *Nature*, www.nature.com/nature.

➔ More Myth Busters

Other Myth Busters are at www.landstewardshipproject.org. For paper copies, contact Brian DeVore at 612-722-6377 or bdevore@landstewardshipproject.org.