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Farmers harness manure's gases to generate power

By Scott Canon

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DODGE, Neb. - Where others see simply manure, Danny Kluthe smells money.

Long before President Barack Obama promised the country that "we will harness the sun and the winds and the soil," Kluthe already had yoked the power of pig poop.

Manure from his hogs drains as a slurry into a giant vat. It is stirred and warmed. A virtually odorless liquid - ideal for fertilizing surrounding fields that, in turn, feed more pigs - emerges from the giant digester.

The real beauty, though, comes in the methane fumes that rise off the muck. They are funneled to a tractor engine and used to power a generator. Suddenly his electrical utility is writing checks to him.

"There will be a day when there will not be a hog facility or a dairy built without one of these things," Kluthe said. "This," he said with the glee of someone who has figured out how to spin straw into gold, "just makes too much sense."

What helps save the farm could help save the planet.

Because Kluthe doesn't let the methane from hog waste waft away, his sewage lagoons pack one-twentieth the climate-changing punch they would otherwise.

In fact, his dung-to-dollars system is but one way agriculture can put food on your plate without dumping so much greenhouse gas into Earth's atmosphere.

Other fixes can be made earlier in the process: improving grassland diversity, spreading fertilizer more precisely and tweaking animal food.

While agriculture accounts for just 6 percent of greenhouse gases in the United States, it is responsible for more than half the methane and nitrous oxide emissions. In Missouri and Kansas, those two climate-changers come almost entirely from farming.

Molecule for molecule, methane has about 21 times the impact as a greenhouse gas as carbon dioxide. Nitrous oxide is 300 times as powerful.

They may be some of the easiest to cut back, however.

"There's a lot of opportunity for agriculture to get this low-hanging fruit," said Evan Branosky, a research analyst at the World Resources Institute, an environmental think tank. "You can do some simple practices that are going to result in large reductions."

Better farming practices are part of the Regional Greenhouse Gas Initiative, a new carbon-trading market among 10 Northeastern states that requires power plants to offset their carbon dioxide emissions.

Those sorts of carbon credits - where a polluter in one part of the economy balances out their damage by paying someone else to cut back on their greenhouse gases - could provide an incentive to pay for greener farms.

Ranchers and feedlots already have plenty of enticement to fatten cattle as quickly as possible, but the ideal feed isn't always the most economical. And low-impact tilling and chemical treatments don't always fill the most bushels at harvest.

Likewise, anaerobic digesters such as the one Kluthe runs to transform effluent into energy don't get built unless a government grant is involved.

Indeed, even as analysts see great hope for cutting back on greenhouse gases from farming, they also stress that there are no universal fixes.

"It's important not to make blanket statements," said Karin Wittenberg of Canada's National Center for Livestock and the Environment. "There are a lot of factors to weigh."

Cud-chewers have roamed the planet for millennia, but not in the concentrations seen since our meat- and dairy-loving civilizations figured out how to raise them on a massive scale.

Going vegetarian would be the quickest route to eliminating that impact, but history has shown that those who can afford to eat higher on the food chain are sure to do so.

So why not give livestock the farm equivalent of Beano?

Take, for instance, Bessie's diet. A dairy cow eating high-protein feed makes more efficient use of her meals than a bovine eating low-quality hay.

That means bacteria in her rumen, the fermentation chamber that serves as her first stomach, will produce less of the methane that makes her belch and fart. The better her feed, the better for her farmer, the better for her planet.

But it's not always that simple. For starters, a pregnant cow might be fed low-quality forage if that is the only economical food available through the winter after a poor harvest. Costlier cow chow could mean no profitability for a marginal rancher.

Secondly, growing that heartier feed of corn, soybeans or alfalfa might burn more equipment fuel or consume more nitrogen fertilizer - quickly negating any gains made by nurturing a not-so-gassy animal.

While the Midwest is awash in grain, livestock raised elsewhere don't have such easy access to that kind of feed.

Still, gains can be made at the margins of even large-scale commercial agriculture, changes that make both farmer and climate scientists rest easier:

-Diversify plants in a pasture. That way everything doesn't bloom at once and then, even during dry stretches in the summer grazing, cattle can find more than the dregs of dried grasses for dinner. As cheap and simple as it seems, even that would require that ranchers pay attention to something they might ordinarily leave to nature.

-Chemistry. Some scientists think there might be hope in a vaccine or inoculation that eliminates or reduces the methanogens - the bacteria responsible for the enteric fermentation and its methane waste.

-Breeding. By raising animals that make the most of a meal, costs of production stay low without manufacturing so much methane in a cow's stomach.

-Raising something adapted to a region. Perennial plants require far less energy, don't demand the plowing that release carbon dioxide from the soil and use less fertilizer to grow a crop. Researchers are looking for more plants that might fit the bill, and the promise is strongest for livestock feed.

Or consider kangaroo steak. A University of New South Wales study found that using kangaroos instead of sheep and cattle - both grazing ruminants with those gassy bacteria in their stomachs - could produce the same tonnage of meat and lower Australia's greenhouse gas output by 11 percent.

-Precision. More care taken to apply fertilizer on narrow seed rows - rather than broadcast across a field - can dramatically lessen nitrous oxide released.

"Some of these things are being done already," said Gene Takle, a professor of atmospheric science at Iowa State University. "More things we might be able to do pretty easily in the future."

Consider the potential of biogas electricity. The manure an average hog produces in a day could light a 40-watt bulb eight hours. A typical dairy cow's droppings could power the same bulb 95 hours.

Put another way, the hogs and dairy cows in Missouri and Kansas combined could provide electricity for more than 77,000 households.

Still, the potential sale of that electricity doesn't yet cover the cost of installing the manure processing system at Kluthe's farm.

"We think it's going to take some government incentives," said A.L. Goldberg of Iowa's Department of Natural Resources. "The startup costs are just too high now."

The federal government and some states have handed out grants to build more than 100, including Kluthe's, across the country - although none in Kansas and Missouri.

In fact, they're less attractive to Midwestern farmers, who typically pay less for energy than in other U.S. regions.

"It so much comes down to what energy policies exist in a state of whether it makes sense to put on the grid," said Chris Voell, the director of the U.S. Environmental Protection Agency's AgStar program.

Many states require that some of a power company's energy come from renewable sources.

Missouri currently requires that less than 1 percent come from renewable sources, but that figure is scheduled to rise to 15 percent by 2021. Kansas has set a target of 20 percent by 2020. Without such requirements, however, utilities are reluctant to buy energy that costs them more than, say, burning coal.

"What we need to do is figure the value of the other benefits," said Kluthe, who said the checks he gets more than offset his farm's utility bills. "What's the cost of getting rid of that odor and being a good neighbor? Or about helping the environment? You put everything together, and it starts to make sense."