

## Getting creative to cut methane from cows

### Less-burpy bovines means fewer greenhouse gases

By

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**GREENER COWS** These cows at the Ellinbank Dairy Research Centre in Victoria, Australia, wear backpacks that measure their methane output.

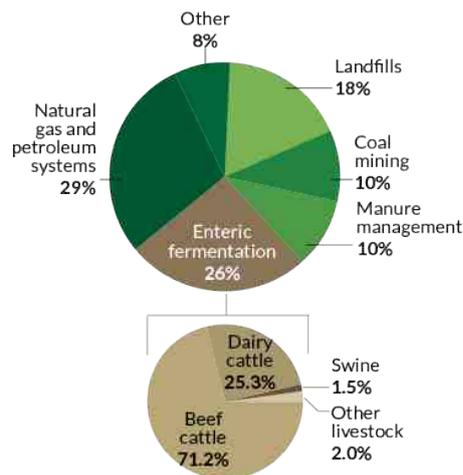
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In a pasture outside Edmonton, Canada, you'll find a few dozen cows doing what cows do: mostly eating. The average animal spends eight-plus hours a day filling its belly, or as is the case with cows, bellies. Along with that enormous appetite, cows are born with the ability to digest almost any plant they can chew, thanks to a multichambered stomach and a helpful army of gut microbes that break down food that most mammals cannot.

The system is an evolutionary bonanza for cattle, but it's not so easy on the environment — which is why the animals at the Lacombe Research Centre are no ordinary grazers. Through a transponder clipped to the ear of each cow, scientists record when a cow sticks her head into a bin of tasty feed pellets. As she eats, a solar-powered fume hood above captures her exhalations. Laser beams surround the pasture, reading gases in the atmosphere.

### On the farm

Livestock is a major source of methane emissions from human activity in the United States. The gas is produced as part of the digestive process of cattle and other ruminants and from microorganisms that grow in manure (numbers in chart at top are rounded).



Source: *Inventories of U.S. greenhouse gas emissions and sinks: 1990–2013*/EPA 2015

All this fuss is over bovine burps. While cattle and other ruminants like sheep and goats have been gassy for around 50 million years, scientists have only recently begun to pay keen attention to their exhaust as concern grows over climate change. The belches contain methane, an odorless compound that is the main component of natural gas. In the atmosphere, methane warms the Earth.

It isn't the most abundant greenhouse gas created by human activity (that prize goes to carbon dioxide), but methane is one of the most powerful at trapping heat. In a "pound for pound" comparison, over a century, methane has an impact on climate change that is 25 times as great as CO<sub>2</sub>, according to the U.S. Environmental Protection Agency.

Citing methane's impact, a recent CNN story referred to beef as "[the new SUV](#)." But the old SUVs, along with the rest of the oil and gas industry, [are a larger source](#) of atmospheric methane in the United States, EPA data indicate, contributing 29 percent of U.S. methane emissions. Livestock is responsible for 26 percent, the agency estimates. Yet while that's the official number, a paper last year in the *Journal of Geophysical Research: Atmospheres* [raised the possibility](#) that the EPA's measurements are off, and that the biggest source of methane from human activity may in fact be ruminants — more than 90 percent of them cows raised for beef and dairy production.

While methane emissions from the energy sector [declined](#) between 1990 and 2013, the contribution from agriculture [rose by 11 percent](#), according to the EPA. (Though in later years cattle populations fell and so did livestock-related methane.) The World Bank estimates that overall global methane emissions [rose 17 percent](#) between 1990 and 2010. In 2014, the U.S. government announced a goal to reduce methane output from dairy cattle [by 25 percent](#) by 2020.

That's why scientists worldwide are looking for ways to produce a less noxious cow. Experiments target the animal inside and out, testing variations in feed, antimethane additives and experimental vaccines. The Canadian project goes deeper, using genetics to develop and breed animals that are naturally less burpy.

All approaches are promising, but no single one has hit the sweet spot: reducing methane dramatically while not harming the cow or dampening production of farms and ranches. Any solution can't be too impractical or too expensive, either.

The good news is that this is one issue where the interests of the [\\$44 billion beef industry](#) and environmentalists may converge — cattle that pollute less might live longer or get by with less feed, improving the profit margins of farms and ranches.

"We've been selling the greenhouse gas story as a win-win to farmers," says Conrad Ferris, head of dairy research at the Agri-Food and Biosciences Institute in Hillsborough, Northern Ireland.