

Is the U.S. understating climate emissions from meat and dairy production?

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Methane emissions from North American livestock may be routinely

undercounted, a new analysis by researchers at New York University and Johns Hopkins University finds. The work also notes that in developing countries, where animal agriculture is becoming increasingly industrialized, methane emissions could rise more than expected.

These assessments are based on a review, appearing in the journal *Environmental Research Letters*, of eight existing studies.

Methane is a global warming gas even more powerful than CO₂. Its amount and lifetime in the atmosphere are smaller than CO₂, but quantities are still increasing. The United Nations has recently urged that reducing [methane emissions](#) is a highly effective way of rapidly reducing global warming.

The U.S. Environmental Protection Agency (EPA) reports these emissions in a national greenhouse gas inventory every year using complex models. But, the researchers write, existing methods that the EPA and other international agencies use to estimate [methane](#) emissions from [animals](#) are not corroborated by measuring concentrations of the gas in the air.

This omission is significant.

Some previous studies have monitored methane directly in the air using tall towers, airplanes, and satellites, collected above and downwind of animal production facilities. The recent *Environmental Research Letters* analysis compiled and reviewed several of these atmospheric studies over North America through the last decade. These studies consistently found more methane than the EPA and other agencies expected coming from livestock, in amounts ranging from 39 percent to 90 percent higher than previously estimated.

"Back in 2013, we found that atmospheric methane emissions were

higher from livestock and oil and gas producing regions than the EPA was reporting," says Scot Miller, an assistant professor at Johns Hopkins University and coauthor of the Environmental Research Letters paper. "Since then, the models and atmospheric measurements don't appear much closer to coming into agreement. It's increasingly likely that methane emissions from farmed animals could be higher in North America than is often being reported."

Methane comes from cows' and sheep's digestion, as well as from stockpiles of manure from all farmed animals. In the U.S. and Canada, animal production is nearly entirely divorced from other farming practices like crop production. Pigs and chickens are raised in crowded sheds and their manure is stored in large stockpiles. Dairy cows are crowded into milking parlors and produce more manure than some small cities.

These industrialized changes to rearing animals allow producers to use less feed like hay, corn, and soybeans, translating to fewer resources needed on farms. It was long assumed by the scientific community that this also translates into lower greenhouse gas emissions, too.

"North American meat and dairy producers often tout improvements in their efficiency, claiming that concentrated feeds and confinement have reduced greenhouse gas emissions greatly over the past few decades," observes Matthew Hayek, an assistant professor in NYU's Environmental Studies Department and a co-author of the paper. "Our findings throw those claims into doubt. Individual cows may be belching and emitting less, but that doesn't necessarily translate to entire herds and warehouses of confined animals, and their stockpiles of manure, emitting less."

These assessments have international importance as well, the authors note. Since re-entering the Paris Agreement in 2021, the U.S. is

preparing to reduce emissions from all greenhouse gases, including those from [animal agriculture](#).

"This research indicates a need to reexamine or improve reporting methods for methane, which are critical to tracking progress over time," Hayek says.

Other countries may have cause for concern in the future, too. For instance, throughout Asia, meat and dairy consumption is on the rise, and this production is becoming increasingly industrialized. The United Nations Food and Agriculture Organization previously predicted that East and Southeast Asia's animal emissions will peak around 2030 because U.S.-style technological efficiency in Asia could reduce emissions afterward.

The findings reported in *Environmental Research Letters*, however, indicate that emissions could actually continue to rise through the year 2050.

"This would further undermine international goals to limit global warming, surpassing 1.5° or 2° Celsius even more quickly than expected," Miller says.

The authors highlight the role of international agencies, development banks, and corporations in hastening the transition toward industrial animal agriculture production.

"This evidence suggests that the banks and government agencies who are funding intensive animal facilities' expansion might be accepting more climate risk than they realize," says Hayek. "Policymakers should consider methane emissions along with a gamut of other major environmental issues stemming from concentrated meat and dairy production, including water pollution and infectious animal-borne

disease breakouts, to inform policies that guide food systems toward a better direction."

More information: Zichong Chen et al, Five years of variability in the global carbon cycle: comparing an estimate from the Orbiting Carbon Observatory-2 and process-based models, *Environmental Research Letters* (2021). [DOI: 10.1088/1748-9326/abfac1](https://doi.org/10.1088/1748-9326/abfac1)

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