

Seaweed feed additive cuts livestock methane but poses questions

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Cows in the study at the Penn State dairy barns, to eat a sweet treat, put their heads in devices that measure methane they belch. The average dairy cow burps about 380 pounds of methane a year. Early studies show that supplementing their feed with seaweed could mitigate 80 percent of the potent greenhouse gas.

Credit: Hristov Research Group/Penn State

Supplementing cattle feed with seaweed could result in a significant reduction in methane belched by livestock, according to Penn State researchers, but they caution that the practice may not be a realistic strategy to battle climate change.

"*Asparagopsis taxiformis*—a red seaweed that grows in the tropics—in short-term studies in lactating [dairy cows](#) decreased methane emission by 80 percent and had no effect on feed intake or milk yield, when fed at up to 0.5 percent of feed dry-matter intake," said Alexander Hristov, distinguished professor of dairy nutrition. "It looks promising, and we are continuing research."

If seaweed feed supplement is a viable option to make a difference globally, the scale of production would have to be immense, Hristov noted. With nearly 1.5 billion head of cattle in the world, harvesting enough wild seaweed to add to their feed would be impossible. Even to provide it as a supplement to most of the United States' 94 million cattle is unrealistic.

"To be used as a feed additive on a large scale, the seaweed would have to be cultivated in aquaculture operations," he said. "Harvesting wild seaweed is not an option because soon we would deplete the oceans and cause an ecological problem."

Still, the capability of *Asparagopsis taxiformis* to mitigate enteric methane as a feed supplement demands attention, said Hannah Stefenoni, the graduate student working with Hristov on the [research project](#), who will present the research to members of the American Dairy Science Association June 23 at their annual meeting in Cincinnati, Ohio. The findings of their research were published recently online in the *Proceedings of the 2019 American Dairy Science Association Meeting*.



Asparagopsis taxiformis is shown here after it was harvested in the Azores. Active ingredients in the seaweed, called bromoforms, interfere with the ability of microbes in cows' rumens to make methane. Credit: Hristov Research Group/Penn State

"We know that it is effective in the short term; we don't know if it's effective in the long term," Hristov explained. "The microbes in cows' rumens can adapt to a lot of things. There is a long history of feed additives that the microbes adapt to and effectiveness disappears."

Whether it is with beef or dairy cows, long-term studies are needed to see if compounds in the seaweed continue to disrupt the microbes' ability to make methane."

There are also questions about the stability over time of the active ingredients—bromoforms—in the seaweed. These compounds are sensitive to heat and sunlight and may lose their methane-mitigating activity with processing and storage, Hristov warned.

Palatability is another question. It appears cows do not like the taste of seaweed—when *Asparagopsis* was included at 0.75 percent of the diet, researchers observed a drop in the [feed](#) intake by the animals.

Also, the long-term effects of seaweed on animal health and reproduction and its effects on milk and meat quality need to be determined. A panel judging milk taste is part of ongoing research, Hristov said.



A truck carrying 4 tons of bagged, frozen seaweed arrived at Penn State June 28, 2018 for the research, shipped from Portugal. To add the seaweed to dairy cows' feed, researchers freeze dried and ground the plant. Credit: Hristov Research Group/Penn State

Cows burping—often incorrectly characterized as cows farting—methane and contributing to climate change has been the subject of considerable derision within the U.S., conceded Hristov, who is recognized as an international leader in conducting research assessing [greenhouse gas emissions](#) from animal agriculture. It is taken seriously in other countries, he explained, because the average dairy cow belches 380 pounds of the potent greenhouse gas a year.

"But methane from animal agriculture is just 5 percent of the total greenhouse gases produced in the United States—much, much more comes from the energy and transportation sectors," Hristov said. "So, I think it's a fine line with the politics surrounding this subject. Do we want to look at this? I definitely think that we should, and if there is a way that we can reduce emissions without affecting profitability on the farm, we should pursue it."

And there may be a hidden benefit.

"It is pretty much a given that if enteric methane emissions are decreased, there likely will be an increase in the efficiency of animal production," said Hristov. Seaweed used in the Penn State research was harvested from the Atlantic Ocean in the Azores and shipped frozen from Portugal. It was freeze-dried and ground by the researchers. Freeze drying and grinding 4 tons of [seaweed](#) for the research was "a huge undertaking," Hristov said.

Provided by Pennsylvania State University

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