

Water hub

From Guardian Sustainable Business

SUPPORTED BY



Water tech startup aims to green manure at factory farms

Manure from livestock farms can be environmentally damaging. A new treatment system could clean up its impact, but will that just hide deeper problems in an unsustainable industry?

This is the first article in a series of five focusing on water technology

Erica Gies

theguardian.com, Wednesday 5 February 2014 19:39 GMT



A 2,000-cow dairy produces the same amount of waste as a city with 400,000 people. Photograph: Gehl Company/Corbis

It was one of the largest environmental spills in US history, and it wasn't oil or coal ash, but something straight off the farm: hog manure. An eight-acre pool of the stuff burst in North Carolina in 1995, spilling 25m gallons into the New River. The incident killed 10 million fish, closed 364,000 acres of shellfishing grounds, and caused health problems for humans via a boom in Pfiesteria piscidia.

Such accidents have become increasingly common as giant farms sprout around the world, housing thousands of cows, pigs or chickens. But a solution may be at hand, from a Canadian company selling a sewage treatment system tuned for manure. Ross Thurston, president of Calgary-based Livestock Water Recycling, says his business is booming by making farmers happy. "Manure is no fun; it's smelly," said Thurston. "This solution lets farmers clean up their farms. They're pretty excited."

The innovation could help to clean up the image of large livestock farms known as concentrated animal feeding operations (CAFOs).

CAFOs have come under fire for a variety of issues, including animal welfare, food safety

and environmental pollution. The last is caused primarily by the animals' waste.

"A 2,000-cow dairy produces the same amount of waste as a city with 400,000 people," said Thurston. "Until 10 years ago, a big dairy was 600 cows. Now it's 5,000 cows."

CAFOs typically collect animal waste in large pools that operators euphemistically call lagoons. Manure sits in these anaerobic lagoons for eight to 12 months while solids settle out, and the liquid left behind is then sprayed onto nearby crop fields as fertilizer. However, ammonia evaporation from the lagoons squanders much of the manure's fertilizer value, and the odor tends to upset neighbors. The other toxic gases that lagoons emit, including hydrogen sulfide, methane and carbon dioxide, can also cause deleterious environment and health impacts.

How does the new system work?

Livestock [Water Recycling](#)'s system resembles a small-scale municipal sewage plant. It treats the manure by first sifting out phosphorous-rich solids, which make good fertilizer, and then passes the liquids through stages of filtration to remove pathogens, such as Salmonella, E coli, Cryptosporidium, and fecal coliform.

Ammonia is then concentrated for easier use as fertilizer, and remaining liquid is water clean enough to be reused as drinking water for the cows or for crop irrigation.

Concentrating the fertilizer allows farmers to store and use as needed for crops, rather than applying it continuously – even when plants wouldn't absorb it. Unnecessary spraying sends fertilizer-rich runoff into nearby waterways, and is a major cause of [algae blooms like the giant Dead Zone](#) in the Gulf of Mexico.

"I definitely think it's an improvement over the lagoon system," said Paige Tomaselli, an attorney with the Washington DC-based nonprofit organization Center for Food Safety. "You're actually treating the waste more like you would in a city, not just putting it straight into the ground."

The innovative system won Livestock Water Recycling a place as a finalist in this year's [Imagine H2O](#) global competition for water technology startups.

"Given the growing regulatory environment for this agricultural waste water, there's tremendous opportunity for a technology like this," said Scott Bryan, chief operating officer at Imagine H2O. Farmers also gain the ability to save and sell excess fertilizer, creating an additional revenue source, he added.

A long-term investment

Tighter environmental regulations and community concerns were part of the motivation for Phil Dickson to install a Livestock Water Recycling facility, said the third-generation dairy farmer and president of Leo Dickson Sons, his dairy farm in Bath, New York. "We have quite a few concerned citizens that watch us very closely," said Dickson.

After a few installations in Canada, Dickson's farm was Livestock Water Recycling's first in the US when it installed the system a year ago. Since then it has treated the 22m gallons of manure from the dairy's 1,100 cows.

Dickson said the waste treatment system cost about \$500,000, and he spent another \$500,000 on a building to house it. And he pays \$1,000 a month for electricity to operate the facility.

He expects it will pay off in about 10 years – longer than the two to five years estimated

by Thurston. The primary benefit, said Dickson, is that he is shrinking the dairy's lagoons to make way for more cows. The new 6,000 sq ft system covers one-thirtieth the area of the old method, and has capacity to spare. "We'll be growing here," said Dickson. "We have a design plan for a 2,500-cow dairy within three to five years."

Unhealthy side-effects

Larger CAFOs is not an outcome celebrated by Tomaselli, an attorney for the Center for Food Safety. "I don't think it's progress to expand these industrial animal operations," she said.

Aside from environmental pollution, the Center for Food Safety is also concerned about animal welfare and food safety. At many CAFOs, she said, animals cannot turn around, tend to their young, or engage in natural behaviors. And while better treatment of animal waste is positive, "it doesn't solve problem of animals living in their own waste, which contains harmful bacteria that can get into the food system."

She also questioned whether the treatment removed some contaminants, such as antibiotics, pharmaceuticals, and pesticides used on the animals. "I'm wondering if those additives are still in the nutrients being spread on fields," she said.

Livestock Water Recycling's filtration steps do remove pathogens and growth hormones, said Thurston. "We have independent lab analysis of all the work we do, and the water is constantly measured and tested within the system," he said.

Dickson said about 10 farmers have visited in the last year to see his new manure treatment system, including a group from Russia and a farmer from Wisconsin who has 30,000 cows.

While such big farms might not be everyone's idea of sustainable agriculture, acknowledged Bryan, Livestock Water Recycling is "tackling an issue that is a very serious one".

Erica Gies is an independent reporter who covers water and energy for The New York Times, The Economist, Scientific American and other publications.



© 2014 Guardian News and Media Limited or its affiliated companies. All rights reserved.