

The Bauer study was “another reminder that people with private wells need to be testing, and making sure that their septic systems are maintained properly,” Jonas be closer attention on karst features, as far as agricultural producers using manure and septage for fertilizer.”

Bauer’s research touched a nerve in northeast Wisconsin. Sixty people from four counties, including residents and farmers, attended Bauer’s research presentation

Lynn Utesch, a Kewaunee County water quality activist and beef farmer, said he came away convinced of the need for more research on the link between agriculture contamination: “It needs to be addressed at the state level by some of these agencies that are supposed to be protecting our groundwater.”

The state funded Bauer’s work, but is not planning to conduct or fund follow-ups, according to the DNR.



<http://u66c47qbr7h5v06k6f6kfdcn.wpenet.netdna-cdn.com/wp-content/uploads/2013/12/Chuck-Wagner-1-composite.jpg>

Luxemburg resident Chuck Wagner scrapes away a thin layer of soil to reveal cracked bedrock. Kate Golden/Wisconsin Center for Investigative Journalism

Bad water common

Bad wells have long plagued this part of Wisconsin, as Luxemburg resident Chuck Wagner demonstrated. Standing at the roadside edge of his property, he scraped away a half-inch of dirt with his boot to reveal a thin layer of soil has little hope of soaking up any pollution in whatever runoff comes its way.

Over the past decade, Sometimes Wagner’s well water has come out of the tap brown. When that happened, his family would not even bathe in it. A family photograph shows his granddaughters in front of a bathtub full of yellow-brown water.

He has seen manure streaming off a nearby field into a sinkhole in a ditch.

Wagner, all too aware of the land’s vulnerability, rents some of his land to a nearby dairy farmer who spreads less than the maximum manure allowed.

Some cases of manure contamination in the region have had clear-cut and serious consequences.

In March 2004, Kewaunee County resident Judy Trembl’s six-month-old daughter was [rushed to the emergency room](http://host.madison.com/special-section/factory_farms/managing_manure/tracking-a-rising-tide-of-waste/article_d56a7f6-2255-11df-90a7-001cc4c03286.html) after manure polluted their drinking water. The farm that spread the manure was fined \$50,000 and paid th



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Yellow-brown well water from Chuck Wagner’s tap. Cour

Hafs estimated two-thirds of the residents of the town of Morrison, in Brown County, now rely on boreholes were polluted in 2006 after animal, industrial, municipal and septic wastes were spread on frozen

Testing is rare

State and local officials said many residents avoid testing their wells. Some do not care what is in it, so the test, and some fear the results could devalue their homes.

In a small University of Wisconsin study, just 11 percent of well owners said they had tested their well. private water supply chief Steve Ales said the real proportion may be even lower.

“When the water runs brown, they just don’t drink it,” said Davina Bonness, Kewaunee County water been crusading for homeowners to test their wells.

Wagner participated in Bauer’s estrogen study, but she could not tell whether his water was estrogenic killed the cancer cells.

Hafs has seen plenty of scientists come to study the area’s water systems and observed, “They always bring bottled water.”

Chemical’s source a mystery

One of the estrogenic culprits may be local residents themselves.

Human waste can have natural and synthetic estrogens, detergents, pharmaceuticals and other potential endocrine disruptors. Wastewater treatment plants’ effluent chemicals in them, and in this rural area, leaky septic systems are a potential source.

The man-made estrogen in the birth control pill known as ethinylestradiol is particularly potent, and may be “the major pharmaceutical compound of concern” in tl said. He has traced it [60 miles downriver](http://www.sciencedirect.com/science/article/pii/S0301479705001507) from a sewage treatment plant in Israel.

The Bauer study raised the possibility that industrial or treated municipal sewage sludge, spread on fields, also could be a source.

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Some pesticides have been found to feminize birds, fish and other animals. They are known to get into wells: The state estimates that [one-fifth](http://datcp.wi.gov/uploads/Environment/pdf/ARMPub180.pdf) of the private drinking wells statewide contain a breakdown product of the potential endocrine disruptor [metolachlor](http://endocrinedisruption.org/popup-chemical-details?chemid=364).

Then there is the large amount of estrogen produced by dairy cows. The 250 milligrams of estrogen a single cow produces daily is as potent as the hormones taken women, Shore estimated.

And Kewaunee County has 42,000 dairy cows, twice the human population. Each cow produces 18 times as much waste as a person.

“Nobody is not guilty here,” said Sagrillo, who recently had his own old well plugged. “But even if the numbers are off by an order of magnitude, it’s still like, wait : enormous impact.”

EPA studying hormones’ impact

Nationwide, numerous studies have found hormones from animal waste in surface waters and groundwater near CAFOs, or concentrated animal feeding operations: Protection Agency spokesperson said in an email.



<http://u66fc7qbr7f85v06k6kfdkn.wpengine.netdna-cdn.com/wp-content/uploads/2013/12/Manure-runoff-to-cave-Door-County.jpg>

Manure runoff heads from a barnyard and stored manure east of Sturgeon Bay into a cave. Runoff control and long-term manure storage were installed to fix the problem, according to Brian Forest of the Door County Soil and Water Conservation Department. Courtesy of Door County Soil and Water Conservation Department

The EPA cites a [study \(http://www.ncbi.nlm.nih.gov/pubmed/17144275\)](http://www.ncbi.nlm.nih.gov/pubmed/17144275) estimating that more than 90 per United States comes from CAFOs. Dairy CAFOs have 700 or more cows.

U.S. Geological Survey researchers found low levels of hormones in 15 of 19 basins they sampled across in sediments and runoff, according to provisional data.

Lead author Dana Kolpin said unintentional manure runoff is an “important but underappreciated path into streams, with most such releases going unreported.

Wisconsin researchers have found that hormones can [degrade quickly \(http://toxics.usgs.gov/highlights/\)](http://toxics.usgs.gov/highlights/) the environment.

But depending on the conditions, they may also persist. A University of Illinois researcher [found \(http://news.illinois.edu/news/12/0605estrogen_WeiZheng.html\)](http://news.illinois.edu/news/12/0605estrogen_WeiZheng.html) hormones stuck around in dairy wastewa

“What happens is that if you concentrate a huge amount of them,” Shore said, “the environment can’t

And private wells in karst regions are particularly vulnerable “because of the many direct routes between groundwater,” said Anderson, the state health officer.



<http://u66fc7qbr7f85v06k6kfdkn.wpengine.netdna-cdn.com/wp-content/uploads/2013/12/Manure-solids-pile.jpg>

Manure solids, dried fluffy and no longer smelly, are used as bedding for cows at Holsum Dairies, or they become mulch for local gardeners. An ancillary benefit of manure digesters is that hormones excreted by cows may be broken down in them, Israeli physiologist Laurence Shore said. Kate Golden/Wisconsin Center for Investigative Journalism

No changes to manure management

DNR’s Andrew Craig, a nutrient management specialist who works with farmers on their manure plans, said he was not surprised to hear something estrogenic had well water, given the geology.

Although research supports the tie between such chemicals and their effects on human and animal health, it is not conclusive.

“If we’re going to make rules, we have to have very clear scientific evidence,” Craig said. “But absent that information, we can’t make a legal argument to do that.”

Six years ago, a task force of scientists, dairymen, residents and others convened to identify ways to better protect the karst landscape in northeastern Wisconsin.

But its [recommendations \(http://learningstore.uwex.edu/Assets/pdfs/G3836.pdf\)](http://learningstore.uwex.edu/Assets/pdfs/G3836.pdf) drew sharp opposition from dairy farmers. A 2010 Democrat-backed bill that would have spreading of waste in karst areas never made it to the Senate floor.



<http://u66ef47qbr7fjcsvo6k6f6kfdcn.wpengine.netdna-cdn.com/wp-content/uploads/2013/12/Flooded-field.jpg>

Flooded fields like this one from Calumet County, in May 2013, are innocuous when the ground below is clay, which protects the aquifers below. But if there are karst features like cracks or sinkholes, flooding means more risk that agricultural chemicals or manure will get into the groundwater below. Kate Golden/Wisconsin Center for Investigative Journalism

Presence does not mean harm

Nancy Shappell, a USDA researcher in South Dakota who has studied endocrine disruptors in runoff, cautioned against sensationalizing the mere presence of estrogen. “Everybody’s going around screaming, ‘The sky is falling,’ ” Shappell said. “We really need some context.”

Some in this new field have emphasized detections of vanishingly small amounts without showing what effects they are having on wildlife or people at those levels, and while the scientific methods in this area are evolving, she said, they’ve often been messy and error-prone.

A complicating factor is that some of these chemicals have been shown to exert environmental effects, such as feminizing male fish, at amounts almost too low to low parts per trillion. That’s equivalent to a few drops in fifty Olympic-sized swimming pools.

“This is actually the biggest problem in conducting this research,” the EPA said.



<http://u66ef47qbr7fjcsvo6k6f6kfdcn.wpengine.netdna-cdn.com/wp-content/uploads/2013/12/CAFO-cows.jpg>

Cows at a large farm in Calumet County. The U.S. Environmental Protection Agency cites research showing that hormones from large livestock account for more than 90 percent of the estrogen in the environment. Kate Golden/Wisconsin Center for Investigative Journalism

No anti-CAFO weapon



<http://u6efc47qbrfjgsv06kfo8fiden.wpengine.netdna-cdn.com/wp-content/uploads/2013/12/Mick-Sagrillo-2-in-yard.jpg>

Mario Koran / WCJ

Mick Sagrillo at his homestead. In Lincoln, 51 percent of the wells have tested unsafe for bacteria or nitrates. Kate Golden/Wisconsin Center for Investigative Journalism

Some residents fighting large farms in the area contacted Bauer for data, hoping to use it against them.

“Obviously, at this point in time, I’m not able to do that,” Bauer said.

But Sagrillo said he suspects manure spread on nearby fields polluted his water.

“These guys are just trying to earn a living like everybody else,” Sagrillo said. “I just think they’re doing to be polluting the groundwater.”

Wagner believes large farms have their place. “I don’t — in any way, shape or form — want to see farms see it flourish. But I want to see it flourish in a way that’s environmentally responsible.”

For now, he is giving up on his well, after more than a decade of bad test results.

This year, Wagner had a new well drilled down 304 feet to a lower aquifer, at a cost of nearly \$8,000.

This project, part of Water Watch Wisconsin, was supported by the [Fund for Environmental Journalism](#) and the [Fund for Investigative Journalism](#). The nonprofit, [Investigative Journalism \(www.WisconsinWatch.org\)](http://www.WisconsinWatch.org) collaborates with Wisconsin Public Radio, Wisconsin Public Television, other news media and the UW-Madison Center for Mass Communication.

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