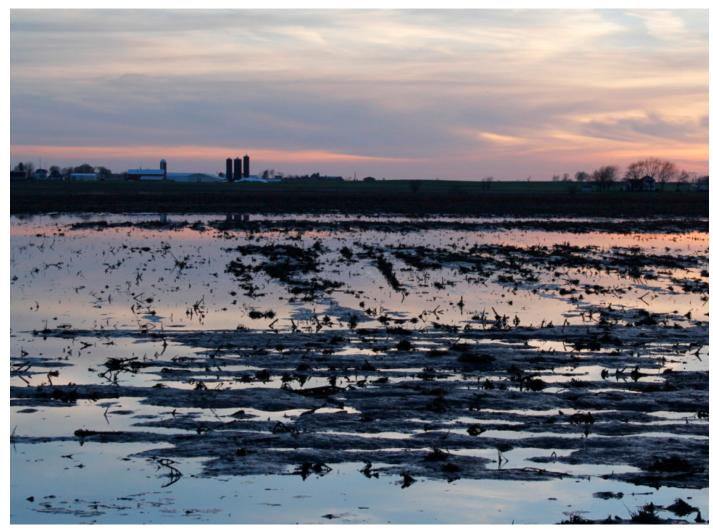
• WisconsinWatch.org (http://wisconsinwatch.org/2013/12/hormonal-wells-found-in-states-karst-region-dairy-farms-possible-source/)

ENDOCRINE DISRUPTORS

Hormonal wells found in state's karst region; dairy farms possible source

By: KATE GOLDEN



Flooded fields like this one from Calumet County, in May 2013, are innocuous when the ground below is clay, which protects the atthere are karst features like cracks or sinkholes, flooding means more risk that agricultural chemicals or manure will get into the g



http://u6efc47qb7f1g5v06kf0kfdcn.wpengine.netdna-cdn.com/wp-content/uploads/2013/12/Micklagrillo-with-mug1.jpg)

Kate Golden / Wisconsin Center for Investigative Journalism

TOWN OF LINCOLN, Kewaunee County — In one of the most intensively farmed parts of Am percent of the county's private wells test unsafe due to bacteria or nitrates, residents have a new water.

University of Wisconsin-Green Bay researchers cited manure as a possible source — though not endocrine-disrupting chemicals found in half of 40 wells in northeastern Wisconsin, chosen fo susceptibility to contamination.

"We don't know what the human health risks are," said Angela Bauer, lead author. "But what we exposure to estrogen in general can increase your risk to certain types of diseases, including ho So I think it's absolutely something that requires further attention."

Lincoln resident Mick Sagrillo had already stopped drinking his well water before he learned tha put it sarcastically, of being Kewaunee's most estrogenic — that is, tainted with the hormone estimated in The study (http://www.ncbi.nlm.nih.gov/pubmed/23697235) was published in April i Environment Research.

Lincoln resident Mick Sagrillo wasn't drinking his well water anyway when he learned that it had "the honor" of being the county's most estrogenic, in a research study. Sagrillo's well water has had high nitrates or bacteria for more than a decade; this spring, for the first time, a test found the fecal bacteria E. coli.

For more than a decade Sagrillo, an energy consultant, has kept a spreadsheet of his well's woes faces to annotate test results. The nitrate tests all show sad faces, while the coliform bacteria ar spring, for the first time, his well test identified the fecal bacteria E. coli.

To Sagrillo, the estrogenic water is just another reason to worry about Big Dairy's effects on thi Lincoln, 51 percent of the wells tested are unsafe — more than twice the statewide rate of about

But some dairy farmers felt the UW-Green Bay study unfairly blamed them, and it raised hackles

Association did not respond to emailed questions or calls about it.

REACTION: Read the Dairy Business Association's newsletter about this story. (http://archive.constantcontact.com/fsi42/1101490782895/archive/1115996643531.html)

Don Niles, a veterinarian and owner of the large Kewaunee County farm Dairy Dreams, noted that the researchers could not nail down what made the water estrogenecessary instruments, according to Bauer.

"I think that whole paper could have been done without tying it into a likely dairy issue," he said.



(http://u6efc47qb7fig5v06kfokfdcn.wpengine.netdna-cdn.com/wpcontent/uploads/2013/12/Winter-aerial-of-crevices.jpg)

Courtesy of Door County Soil and Water Conservation

Department

Crevices in this frozen Door County farm field illustrate the groundwater's vulnerability. Water travels so fast through cracks in the bedrock that it gets to the aquifers before any pollutants in it can be filtered.

Manure increases, cropland shrinks

Here in northeastern Wisconsin, including Door, Brown, Kewaunee, Manitowoc and Calumet c through deeply cracked karst bedrock so fast that it does not get filtered on its way to the aquife 2006 incident, manure flowed from people's taps.

At the same time, the area is home to some of the densest livestock farming in the state. Wisco waste spreading near karst features, but critics say they are not strong enough.

The trend is more cattle — meaning more manure — with less cropland to absorb it, according analyzed by the Wisconsin Center for Investigative Journalism.

Statewide, both cows and cropland have dropped. But in the northeastern karst region, from 199 grew by 12 percent, while cropland acreage shrank 4 percent.



(http://u6efc47qb7f1g5v06kf9kfdcn.wpengine.netdnacdn.com/wp-content/uploads/2013/12/Bill-Hafs.jpg)

"You have the worst-case scenario here," said Bill Hafs, a former Brown County conservationist. Kate Golden/Wisconsin Center for Investigative Journalism The U.S. Department of Agriculture uses the term "<u>m</u> (http://www.ers.usda.gov/topics/farm-practices-manager practices/manure-management.aspx#.UqICe2RDvrs)." to Brown County, where Green Bay's urban sprawl has e highest ratio, followed by other northeastern counties

"You have the worst-case scenario here," said Bill Haf conservationist who now directs the environmental p the Green Bay sewerage district. "The trends are unsu and water quality."

Gordon Stevenson, a retired former chief of the Wisc Natural Resources runoff management section, calcul million cows produce more waste than the people of 5 combined. He called land spreading of untreated man in a recent speech.

Niles and other large-dairy farmers said manure mana improved over the past half-century, allowing them to nutrients are spread on the land.

"Frankly, I would like to get ahold of (the researchers industry's support in putting a study together to help questions," Niles said. "We don't want to be in denia surely want to be sure that we have a problem if we're

Researcher Bauer, who recently left her UW-Green Ba High Point University in North Carolina, said she ho up.

"There are a lot of concerned landowners, and a lot of really responsible farmers who want to know if their agricultural practices need to be modified in some way,"



"A higher manure-to-cropland ratio has magnified the risk that manure nutrients (nitrogen, phosphorous, and potassium) a nathogens that might flow into ground and suctace water due to everapplication of manure of crops of leakage from many and the state of the most manure per acre of croplar the art of America's Dairyland produces the most manure per acre of croplar

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(http://u6efc47qb7f1g5v06kf0kfdcn.wpengine.netdna-cdn.com/wpcontent/uploads/2013/12/cell-line-closeup.jpg)

Bauer doused estrogen-sensitive breast cancer cells on trays like these with samples of water from private wells. When the water contained estrogenic chemicals, the cells multiplied. Kate Golden/Wisconsin Center for Investigative Journalism

What made the water hormonal?

Bauer and master's student Sarah Wingert tested for estrogenic chemicals using estrogen-sensitive bridoused with well water from Sagrillo and other residents, the cells multiplied.

The timing of the estrogenic samples pointed to manure as a possible source.

"There's much less land spreading occurring during the winter months — and estrogenic contaminations is said.

"Results from the study indicate that groundwater contamination with EDCs (endocrine-disrupting ch and nitrates is a common problem in karst areas of northeast Wisconsin," Bauer wrote in a report.

Whatever was in the water, there was not a lot of it. The concentrations were lower than the level that But a handful of samples approached that threshold.

Generally, "the amount of estrogen found in well water can affect fish, plants and soil flora and fauna, Laurence Shore, but he added, "They do not in any conceivable way affect human health since small ch times more of the same hormones in a glass of cow milk."

What troubles Bauer is the role contaminated water may play in people's <u>cumulative exposure</u> (http://media.jsonline.com/documents/phouseG2112507.pdf) to endocrine-disrupting chemicals through f and soaps, flame retardants and industrial chemicals. The chemicals can mimic or disrupt the action of

"I'm a little bit scared at how ubiquitous they are in my everyday life," Bauer said.

In 2010, Linda Birnbaum, director of the National Institute of Environmental Health Sciences at the National Institutes of Health, testified before Congress that h funding for research on endocrine disruptors, which are everywhere and "often at levels plausibly associated with biological effects."

She specifically identified drinking water as a "significant route of exposure."



(http://u6efc47qb7fig5v06kf0kfdcn.wpengine.netdna-cdn.com/wp-content/uploads/2013/12/Angela-Bauer-in-lab.jpg)

Biologist Angela Bauer found that half of 40 wells tested in northeastern Wisconsin were tainted with estrogen or something that mimic Golden/Wisconsin Center for Investigative Journalism

No health warnings, but keep testing

Right now, the pollution levels Bauer found "are not something where we would be issuing public health advisories," said Henry Anderson, the state's health officer

"But if the trend is the levels are going up," he said, "at some point we need to have a more intensive look at what kind of intervention needs to happen."

DNR groundwater chief Jill Jonas noted that most public water systems disinfect their water, which kills pathogens but does not remove many potential endocrine test for emerging contaminants like hormones, studies have shown they tend to turn up rarely and at low levels.

But in rural northeastern Wisconsin, where groundwater is often contaminated, many people rely on private well water, which is not required to be treated or regula

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://u6ejc47qb7j1g5v06kj9kjdcn.wpengme.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 lournalism

Bad water common

Bad wells have long plagued this part of Wisconsin, as Luxemburg resident Chuck Wagner demonstration

Standing at the roadside edge of his property, he scraped away a half-inch of dirt with his boot to revea 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 clearcut and serious consequences.

In March 2004, Kewaunee County resident Judy Treml's sixmonth-old daughter was <u>rushed to the emergency room</u> (http://host.madison.com/special-

section/factory_farms/managing_manure/tracking-a-rising-tide-ofwaste/article_df56a7f6-2255-11df-90a7-001cc4c03286.html) after

manure polluted their drinking water. The farm that spread the manure was fined \$50,000 and paid th

Hafs estimated two-thirds of the residents of the town of Morrison, in Brown County, now rely on bowells 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' effluer 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 the 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.

An Illinois graduate student last year found (https://www.ideals.illinois.edu/handle/2142/34261) evidence suggesting that "a large portion of karst groundwater system was co-contaminated with human and livestock feces."

An Illinois graduate student last year found (https://www.ideals.illinois.edu/handle/2142/34261) evidence suggesting that "a large portion of karst groundwater system was co-contaminated with human and livestock feces."

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

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.



http://u6efc47qb7f1g5v06kf0kfdcn.wpengine. mtent/unloads/2012/12/Chuck-Wagner-wat.

Yellow-brown well water fr Chuck Wagner's tap. Cour "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 a 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://u6efc47qb7f1g5v06kf0kfdcn.wpengine.netdna-cdn.com/wpcontent/uploads/2013/12/Manure-runoff-to-cave-Door-Ctv.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 (stimating 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 patl into streams, with most such releases going unreported.

Wisconsin researchers have found that hormones can <u>degrade quickly (http://toxics.usgs.gov/highlights/l</u>

But depending on the conditions, they may also persist. A University of Illinois researcher <u>found</u> (http://news.illinois.edu/news/12/o605estrogen_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 betwee groundwater," said Anderson, the state health officer.



 $\underline{(http://u6efc47qb7fig5vo6kf9kfdcn.wpengine.netdna-cdn.com/wp-content/uploads/2013/12/Manure-solids-pile.ipg)}$

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) drew sharp opposition from dairy farmers. A 2010 Democrat-backed bill that would ha spreading of waste in karst areas never made it to the Senate floor.



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

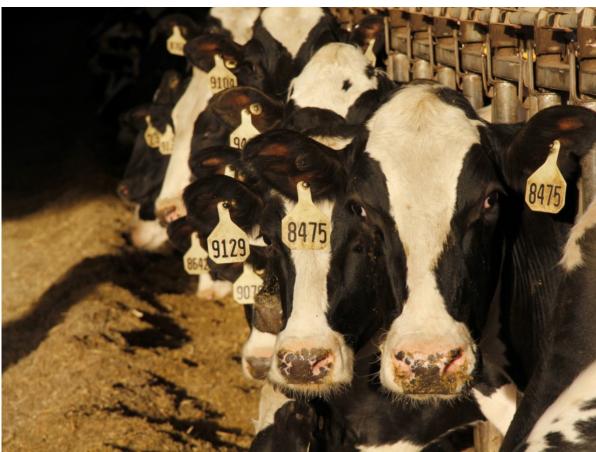
Presence does not mean harm

Nancy Shappell, a USDA researcher in South Dakota who has studied endocrine disruptors in runoff, cautioned against sensationalizing the mere presence of estrog "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.



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

No anti-CAFO weapon



http://u6efc47qb7f1g5v06kf9kfdcn.wpengine.netdna-cdn.com/wp-

content/uploads/2013/12/Mick-Sagrillo-2-in-yard.jpg)

Mario Koran / WCIJ

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 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 doin to be polluting the groundwater."

Wagner believes large farms have their place. "I don't — in any way, shape or form — want to see farm 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 <u>Fund for Environmental Journalism</u> and the <u>Fund for Investigative Journalism</u>. The nonprofit <u>Investigative Journalism</u> (<u>www.WisconsinWatch.org</u>) collaborates with Wisconsin Public Radio, Wisconsin Public Television, other news media and the UW-Mac and Mass Communication.

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