

Study details new method for extracting useful nutrients from manure

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Farmers may be able to reduce emissions and chemical runoff while boosting revenues by using a new method for extracting useful nutrients from manure, according to a recent UW-Madison study.

Scientists in Madison have developed a new technique for pulling ammonia and potassium out of livestock manure, which can be used to make fertilizer and other products, the university announced. It was detailed in a paper published Dec. 8 in the journal *Nature Sustainability*.

The method involves the use of a specialized nickel-based electrode, similar to those used in batteries. By placing the electrode into manure wastewater, ammonium and potassium ions are “selectively driven into and captured” by the electrode.

From there, it’s placed into a device that releases those nutrients for use in fertilizers while also making other chemical products such as hydrogen fuel or hydrogen peroxide, according to the release. UW-Madison says the method is still in the proof-of-concept stage and needs to be scaled up further, but notes it could help farmers reduce their air and water pollution while getting valuable byproducts in the process.

Initial research using small amounts of manure recovered more than half of the ammonia in one cycle, and about 85% after a second cycle.

The study was led by Song Jin, a professor of chemistry, alongside doctoral candidate Rui Wang and civil and environmental engineering Prof. Mohan Qin.

“It looks indeed to be promising,” Qin said in a statement. “There’s a pathway to see how this might really help in the real world.”

Meanwhile, an environmental analysis from Prof. Rebecca Larson of the Nelson Institute for Environmental Studies found a dairy farm with 1,000 animals could cut ammonia emissions by half using the new method while “significantly reducing the amount of nitrate” going into nearby waters.

And a separate analysis, conducted by Prof. Fikile Brushett at the Massachusetts Institute of Technology, found a model dairy farm using the new method could expect resulting revenue to exceed its operating costs “so long as electricity prices aren’t exorbitant.”

Further efforts will focus on how well the method works for systems that are more similar to actual livestock operations, the release shows. Jin tells the university he’s optimistic its “benefits will continue to outweigh potential costs” at larger scales.

The Wisconsin Alumni Research Foundation has filed a provisional patent on the new technology.

See the full study: <https://www.nature.com/articles/s41893-023-01252-z>

See the release:

<https://www.wisbusiness.com/2023/uw-madison-fertilizer-production-technique/>

-By Alex Moe