

Mobile Device Extracts Phosphorus From Manure

Researchers from the USDA and Penn State University have developed a first-of-its-kind mobile processing system that extracts phosphorus from liquid dairy manure. It's a big step forward in dealing with phosphorus buildup in soil.

USDA researcher Clinton Church says the portable system, which is carried on 2 semi trailers, is a way for dairymen to "mine" valuable phosphorus from dairy slurry, and then use it for fertilizer separately or sell it as a value-added product. He says the portable system could serve 10 dairies with 100 to 200 cows on a 10-day rotation or one large dairy operating continuously. The machine can extract 99 percent of the phosphorus from 250 gal. of manure in 10 min.

Church says the auger press component of the machine removes 80 percent of the solids with 15 percent phosphorus. These low P solids would be ideal for reuse as bedding material. Further liquid processing in the centrifuge removes 10 percent of total solids with 45 percent phosphorus. These high P solids could be easily transported for use where needed as fertilizer. The liquid portion is then chemically treated to convert

dissolved phosphorus into a particle.

The final liquid and solid separation by the AutoVac® Filtration Unit removes the remaining 10 percent solids with nearly 40 percent of total phosphorus. "About 96 to 99 percent of the phosphorus is efficiently removed with the solids, which have about 70 percent moisture," Church says. "Most of the nitrogen is retained and the N-to-P ratio is 50:1. The pH remains unchanged by the process.

"A full scale system like this produces low phosphorus composted bedding for dairymen, high phosphorus solids for organic farmers, mushroom growers for retail sale, and feedstock for energy generation," says Church.

The initial costs to operate the unit for a 1,000-cow dairy were \$750 a day, or about \$180 per cow annually, but continued development in the past year has cut those costs in half. Church says "Many dairies already use some of the system components, so cost efficiency would be even better."

The research team is working with the Eisenmann Corporation for commercial production and plans to roll out some systems



Portable manure phosphorus extraction system is carried on 2 semi trailers. It allows dairymen to use phosphorus for fertilizer or sell it as a value-added product.

in 2018.

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Cow Manure Processed Into A Premium, Pelleted Fertilizer

Midwest BioAg turns plain old cow manure into a premium plant food. Unlike raw manure, which can vary in nutrient levels, every granule of TerraNu provides a uniform package of nutrients.

"TerraNu is 40 to 50 percent manure and yet local ag retailers can run it through standard fertilizer handling equipment," says Jim Krebsbach, vice president, Midwest BioAg. "It can be blended with urea or other fertilizers and precision-applied or broadcast. You can't do that with raw manure."

The manure that goes into TerraNu has had its water and fiber removed. Nitrogen, phosphorous and potassium, as well as micronutrients, are added to the manure and then it's granulated. The manure base is what sets TerraNu apart. It feeds the microbes that pull the nutrients into the soil biology for short and long-term availability, explains Krebsbach.

Initial sales of the product will be concentrated in the Midwest, close to the company's production center at Fair Oaks Dairy in northwest Indiana. Some targeted marketing will take place on the East Coast

and in Florida.

"We are exploring opportunities with partners and cropping systems," says Krebsbach.

That exploration includes other dairies for source material. However, not just any dairy will do. Like Fair Oaks, they have to produce enough manure to make it worthwhile for Midwest BioAg to build a processing facility.

"We need a dairy or combination of dairies with at least 13,000 to 15,000 cows before we can consider putting a plant in the area," says Krebsbach. "And the manure has to have gone through an anaerobic digester. It eliminates a lot of the odor."

Midwest BioAg is currently marketing several variations of their manure-based product. "We will be benchmarking our products against similar products. However, as a biological stimulant, TerraNu will be marketed at a premium over the cost of NPK," says Krebsbach.

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Midwest BioAg converts old cow manure into a premium pelleted fertilizer. Unlike raw manure, which can vary in nutrient levels, every granule of TerraNu provides a uniform package of nutrients.

Mower "Chain Guard" Replaces Discharge Chute

Al Robbins, Friendswood, Texas, got tired of the grass discharge chute on his riding mower getting in the way all the time, so he replaced it with a homemade "chain guard" that results in easier trimming and parking in tight areas.

It consists of a series of short galvanized steel chains mounted on a length of all-thread rod, with the chains free to swing back and forth.

"It stops stones from flying out but lets the grass clippings go through. I wouldn't want to cut grass without it," says Robbins. "Because there's no discharge chute I can mow around trees on either side."

Robbins has made 2 chain guards, one for a Deere ZTrak zero-turn riding mower and the other a Sears Craftsman GT 5000 riding mower.

He removes the discharge chute and bolts on a 12 to 16-in. length of angle iron in its place using existing holes. Both ends of the angle iron are bent to make "tabs" that accept a length of all-thread rod, to which the chains

are attached. Robbins slips the chains over the rod, mounting 1/2-in. wide rubber spacers between them to hold them in place.

"It works great. It doesn't clog up with grass any more than a conventional discharge chute," says Robbins. "If the grass is real thick and tall I just back up a bit, or raise the mower deck and start over. The hardest part is cutting the chains to just the right length and spacing. There has to be enough room between the chains for the grass clippings to go through, and the chains have to be short enough to avoid dragging and then hitting the blade tips. Most of the time I use 3 links per chain. The spacers help keep the chains from getting tangled. I made them by cutting up a reinforced rubber hose."

Robbins says he's willing to build chain guards for others if there's enough interest.

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"It results in easier trimming and parking in tight areas," says Al Robbins, who replaced the grass discharge chute on his riding mower with this homemade "chain guard".