Giant "Hay Robot" Harvests And Also Feeds Cows

Lely's prototype "hay robot" is designed to harvest fresh grass and store it in a holding tank, then haul it to the barn and feed it to cattle.

Lely's giant new hay robot harvests grass, carries it to the barn, and feeds it to cattle. No human labor is required, and the fresh grass is 10 to 20 percent higher in nutritional value than if the grass was fed later as silage. The experimental system is currently under development by Lely in Europe.

"The first prototypes of the Exos system are operational on test farms," says Niels Borneman, Lely. "As much information as possible about the autonomous harvesting of fresh grass will be generated by daily practice."

The Exos is a fully electric system. Details and specifications have yet to be shared by the company, although images suggest a box on wheels, perhaps 9 ft. wide and 15 ft. long.

Korstiaan Blokland, Lely head of innovations, describes the Exos as a breakthrough in use of grassland. Test farm research suggests that a dairy farm can meet half of its roughage requirements with fresh grass from early spring to late autumn.

To be effective at maximizing that potential, the Exos will need to be in constant use. Blokland describes it as providing fresh grass day and night. This improves the taste and intake of fresh grass. Manually feeding cows in the barn with fresh grass is based on the same principle, but the options are limited and it's very labor-intensive. This system operates 24 hours a day, so it's not limited by manpower or time.

This means operating in all types of weather conditions. Avoiding compaction of wet soils will be a key priority. A company video shows extra wide tires and semi opaque sides. The company describes the harvester as low weight and soil-friendly technology.

The bulk of the vehicle is devoted to a holding tank for harvested grass. A conveyor belt for dispensing the fresh grass to the cattle is positioned at the corner of one side. The company video suggests the Exos operates in one direction when mowing and collecting and in the other direction when in transit and dispensing.

Borneman cautions that changes can occur, as field testing continues and no pricing has been revealed. Likewise, no date has been set for introduction in Europe or North America.

"Our goal is to further develop the system during a couple of grass growing seasons for it to be sold commercially," he says. "We are convinced the system will have an added value for the North American market."

In addition to harvesting and dispensing grass, the robot will also collect data. The Exos will constantly monitor the percentage of fresh grass in the dairy ration and share that information with the Lely Vector automatic feeding system for a complete ration. It will also collect data on grass supply for planning and response.

A next step for Lely is investigating using the system for precise fertilizer applications. The concept incorporates fertilizer collected from the dairy herd by the newly introduced Lely Sphere system.

"With Exos, Lely is introducing an innovation that is fully compatible with the transition to sustainable and circular dairy farming," says Blokland.

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Robotic apple harvester comes with a computer-vision sorting system that matches the picking speed of 6 workers. Two workers pick at ground level, and 4 from platforms on harvester's sides.

Robotic Sorter Helps Harvest In Orchard

A new robotic apple harvester sorts apples in the field as they are picked. The harvester was designed by Michigan State University researchers and built by Precise Manufacturing with funding from the USDA and the Michigan Apple Committee. The in-field sorting harvester is just the first step in a fully robotic apple harvester/sorter.

"We built our first prototype in 2016 and our final improved version for use in 2020," says Renfu Lu, agricultural engineer, Michigan State University. "The entire machine was designed to work with the sorting system. Our next goal is to incorporate multiple robotic arms to pick the apples, too."

The current self-propelled harvester has room for 6 workers, 2 picking at ground level and 4 from adjustable height platforms on the harvester's sides. As they pick, workers place apples on conveyor belts. In the case of ground level workers, conveyer arms controlled by the harvester operator follow them through the orchard. Conveyer access is designed for minimal body and hand movements.

The apples are carried to a computer-vision sorting system. Select apples are dropped into one bin, while lower quality apples are deposited in a second bin. Foam cushioned rollers catch and place individual apples, preventing them from bumping into other apples.

Working at a speed of up to 12 apples per second, the sorter is designed to match the picking speed of 6 workers. Sorting in the field, and eventual robotic picking, could significantly reduce apple grower costs. About half of grower production costs are tied up in picking and handling.

Mario VanDyke, Precise Manufacturing, worked with Lu to build the main chassis, steering and hydraulic systems. He notes that the harvester as it is now designed will not compete economically.

"A typical orchard would need to bring in multiple machines to get the apples harvested fast enough," he says. "Currently, they can bring in 200 to 300 pickers at a time to get the job done."

He sees the real potential for the harvester coming with the addition of robotic picking arms. Lu agrees.

"This is still an early stage," says Lu. "In the next 3 to 5 years, we will have incorporated robotic picking."

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Harrison's 3kW portable generator can be used in the field to power any corded tool normally used in the shop, such as grinders, welders and saws.

Generator Powered By Tractor Hydraulics

"Our portable generator is there when you need it, and out of the way when you don't," says Paul Newton, Harrison Hydraulic Solutions. "It is 50 percent smaller, lighter and less expensive than gas-powered generators. It is more portable, reliable and starts in cold weather. It's also maintenance free, theft proof and has a longer life cycle."

Harrison offers customers systems for 3 scenarios. A standard system uses an on-board system with the company's hydraulic motor-driven generator. Modular systems include any missing components needed, in addition to the generator. A complete system, powered by the motive power drive train, includes the hydraulic pump and reservoir in addition to the hydraulic motor, powered generator.

"Our 3kW generator is made to be grabbed and used in the field for any corded tool normally used in the shop, like grinders, welders and saws," says Newton. "It only needs 6 to 8 gal. per min. flow, but it does need a static throttle and 1,500 psi. Generators can't adapt to changes in the flow rate."

One way to overcome that problem is to use the tractor pto to power a hydraulic pump, which in turn powers the generator. "We use a variable replacement pump, which adjusts for engine speed and maintains a constant flow for the hydraulic motor on the generator," explains Newton. "We've done a number of things with tractors for our customers. We are only limited by the capability of the tractor and what the customer is willing to spend."

Suggested retail price for the 3kW generator is $1,020. The company also makes hydraulic-powered generators up to 50 kW in output. Units larger than the 3kW generator are mounted on trailers. They tend to be used with heavy-duty welders or other high power demand uses.

Newton emphasizes the common features of hydraulic generators, large and small. "Running them off a tractor engine eliminates the need for a second engine with its own fuel needs," he says. "Gas-powered generators often fail when not regularly maintained and used. A typical hydraulic-powered generator can exceed 20 years use versus 3 to 4 years with a gas-powered generator."

Integrated hydraulic technology is an area the company specializes in. It utilizes the on-board drive train to power a hydraulic pump, which in turn can power an array of hydraulic motors. The company's demo service truck is equipped with rescue tools, water pumps, air compressors, work tools, winches and hydraulic cranes. "They are all on slide-outs," says Newton. "We can sell the entire package or individual applications."

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