Farmer Group Builds Tools For Small Acreages

By Lorn Manthey, Contributing Editor

A farm group in Quebec get together to design and build equipment for smaller farms. They recently put together this 3-pt. mounted tillage tool called an oblique disk cultivator. It's similar to ones used in Europe.

Reid Allaway is a member of a unique farm group in Quebec who get together to design and build farm equipment for smaller farms. "We figure out the design, source materials, and then organize build days to put the tools together in a central location," says Allaway.

Last February the group put together a 3-pt. mounted tillage tool that Allaway calls an oblique disk cultivator. It's similar to disk cultivators used in Europe.

The group field-tested a prototype in the fall of 2016, then 3D modeled parts for the final machines. They also hired laser cutting of certain parts and CNC turning of hub spindles and shells. Allaway says the cost for those services was negligible compared to cutting and finishing their own parts with a plasma, torch or other methods. Still, the project was quite complex.

"The implements use 22-in. dia. disks, each mounted on an independent hub to allow a compound angle of attack, about 20 degrees oblique from direction of travel and about 12 degrees from vertical," Allaway says. "This design allows material to be pulled upward from the bottom of the worked zone, reducing the chance of smearing and compaction."

The main frame is made of 4-in. tubing with 4 by 2-in. tubing on the sides. Diagonal bracing is made of 2-in. flat stock. The roller basket is 16 in. dia., built around 4 laser-cut plates 1/4 in. thick. A 1-in. solid shaft serves as the axle. The 13 cage tubes are 1-in. steel waterline pipe. The group used a simple assembly jig to "de-phase" the pipe by one position (30 percent) to make a slight spiral that rolls more smoothly.

"We built 15 of these disks in 5 days with help from a group of professors at the EPSH tech school in St.-Hyacinthe. It was amazing to see a big pile of steel evolve into such a phenomenal and complex implement in just a few days."

The design is open-source and is Creative Commons licensed for replication by others.

"Each farmer built his machine to suit his farm's needs, in the size he wanted, and with or without the spring-steel non-stop blades, which cost an additional $100 each," says Allaway. "The frame widths ranged from 4 to 6 ft. with working widths of 40 to 60 in., depending on the configuration. Ultimately, we built tools that would cost about $15,000 each from a commercial company for about $4,000 each. Even more satisfying is that equipment like this isn't really available with the features or sizes we wanted.

"We typically get 15 to 20 farmers involved in a collaborative build," says Allaway. "By pooling our buying power we can get better pricing on raw materials and parts. Participants go home having learned new skills and owning a new tool which they can readily troubleshoot or duplicate if needed."

Co-operative farmers who've used the disk think it's a very aggressive tool for incorporating residues, trash sizing, destroying perennials, and perhaps even replacing the moldboard plow as a primary tillage tool.

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Robotic Chicken Coop Moves Automatically

Daniel Badiou can leave for a week at a time knowing his broiler chickens are safe, fed, watered and getting fresh pasture 4 or more times a day. His robotic chicken coop - called Rova - carries a week's worth of feed and water. Badiou can check on the chickens or control Rova from his smartphone from anywhere.

"Rova is 100 percent solar-powered, providing energy for the drive wheels, computer and other electronics," says Badiou, Ukkö Robotics. "If it is cloudy, it can operate for up to 5 days on battery power alone. Because it is fully automated, I spend only 5 to 10 min. a day checking on the chickens in person or on smartphone."

Solar-powered robotic chicken coop moves automatically and carries a week's worth of feed and water. It can be controlled from a smartphone. "Because it's fully automated, I spend only 5 to 10 min. a day checking on my chickens," says Daniel Badiou.

The goal of Badiou and Katrina Jean-Laflamme, mechanical engineers and partners in Ukko, is to simplify livestock production with automation, starting with pastured chickens.

They have loaded the self-propelled coop with GPS, wireless sensors and even a camera. He reports that there are redundancies on everything. The sensors track temperature, wind speed and direction and barometric pressure.

Side awnings raise to provide shade and air flow when it is hot or lower to protect against wind and rain. When it is cold, they close up to retain heat. A driving rain on one side closes slats there, while slats on the other sides remain open. A poly skirt with an electric fence wire protects against predators.

"Rova can move forward, backward or 90 degrees to either side," he says. "When it gets to the end of one programmed swath, it can move to the side and travel back on the new swath."

Badiou can control all aspects of the system from a smartphone or other device. It even warns him when it's low on feed or water. He can view the birds to check on them. If the wireless fails, there is a control panel on the side of the coop.

Everything with the automated system is designed to maximize chicken comfort and safety. All they have to do is eat, sleep and grow. Badiou says the chickens quickly grasp what is going on with their robotic shelter.

For safety sake, the unit signals a move by beeping to the side of the move. Badiou reports that the chickens quickly learn what the sound means.

"The chickens all run toward the beeping wall, anticipating the move to fresh grass and bugs," he says.

Badiou has been building and operating the robotic units on the family dairy farm for the past 3 years. He started with a wood unit for 100 birds and then built one mostly out of metal the following year. Last year, he built a smaller version for 15 to 20 birds.

"We just finished building a 12 by 24-ft. unit that will handle 200 birds with roughly 1 1/2 ft. of space per bird," says Badiou.

The robotic chicken tractors are not cheap, but he expects the larger unit to pay for itself in 3 years. He plans to raise 1,000 chickens in the robot coops this year. He expects to price the smallest unit at about $10,000 and the largest unit at about $40,000.

Much of the electronic infrastructure in terms of computer, sensors, drive system and solar energy supply system are size neutral. The big difference in cost is steel. The 12 by 24 weighs 5 tons when filled with chickens, feed, water for a week and components. Weight may be the limiting factor for a larger structure.

Although designed for raising broilers, Badiou is developing a model for laying hens. Meanwhile he is testing out his various prototypes and preparing to move to the next stage.

"Next year we will be putting a number of Rova units on farms to see if more improvements are needed," says Badiou. "We want to ensure all the systems are reliable and work just right before going into full production in 2019."

When he is satisfied with his invention, Badiou won't have to worry about customers. After displaying the prototype at a regional farm show, he came home with 50 advance orders.

"We had a phenomenal response," says Badiou. "We've even heard from municipalities that want to put them in their city parks to show people how chickens are raised."

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