Continuous-Flow "Biochar" Reactor Built From Scrap

Bruce Saunders turns wood chips and sawdust into biochar with his homemade, continuous flow biochar machine. For anyone who's not familiar with it, biochar is basically charcoal, made from organic material, that's used as a soil amendment and feed additive.

He used scrap pipe, an old feed mixer, and an old belt conveyor to put it together this winter. Now he is experimenting, feeding the end product to his cattle and using it on crops.

"I lucked out when I found a 60-in. length of 1/2-in. wall, 5-ft. diameter steel pipe at the local scrap yard," says Saunders. "I mounted the pipe on an old New Holland 352 mixer/mill frame and fabricated up from there."

The pipe was ideal for his concept. He divided it into 3 levels or floors. Each floor is actually a removable tray with a hole offset from the one above or below and a rake arm attached to a center shaft.

The shaft extends through all 3 floors and is powered by a 1/2 hp. variable speed motor at the bottom of the machine. A repurposed AC blower pushes air through the hollow shaft to cool it.

At the top of the chamber, Saunders installed a rotary valve to accept the raw wood as it is delivered by belt. The 18-in. wide, 22-ft. long belt conveyer is powered by a 1 hp. DC motor with variable speed control. When not accepting wood, the rotary valve keeps air out of the machine.

To start the burn, Saunders adds some feedstock to the top level, lights it with a propane torch and closes up the chamber. The burning material uses up oxygen as it reaches a pyrolysis temperature of 450°F, a process that takes about 20 min. At that point, cellular bonds break, which produces more heat. Saunders shuts off the torch and starts feeding in fresh wood chips or sawdust. As new material enters, the old material is swept down to the next level and then to the third level. The arms and the conveyor are synchronized so the wood spends the same amount of time on each level.

At each level the decomposition continues as volatiles are pulled off to combust and the temperature reaches its target of 1,292 °F.

"By the time the arm comes around on the third level to sweep it out, the process is finished, and only charcoal is left behind," says Saunders.

The time needed can vary depending on the size of material and moisture levels. The speed can be adjusted accordingly.

"The important thing in making biochar is the consistency of the material in its size and moisture levels," says Saunders. "We could run crop residue through it if it was consistent."

If he has the process down for making the biochar, Saunders is still proving out its value.

"Research in Australia and elsewhere shows that cattle fed biochar as a supplement belch less, and take in more nutrients," says Saunders. "Feeding biochar to cattle on feed could shave a month off from start to finish in the feedlot."

He is also intrigued by the use of biochar in crop production. "It holds up to 5 times its weight in water. One gram of biochar has the surface area of a tennis court. Blend it with manure or compost to innoculate it with bacteria, and you've created a slow release fertilizer.

"I am open to any number of options, including helping to build other machines under an agreement on sale of the biochar," he says. "Right now I am ramping up production. This machine will have a throughput of more than half a ton per day."

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Scrap pipe, an old feed mixer, and a belt conveyor were used to build this continuous-flow biochar machine. Photo at right shows fresh wood chips alongside biochar.

Todd Pieper converted a used pickup stock rack into a handy calf catcher that he moves around with his skid loader.

Calf Catcher Made From Old Truck Rack

South Dakota rancher Todd Pieper was tagging calves the old fashioned way, wrangling them by hand. "That's when a mama cow decided she didn't like having me around and gave me a helluva head butt. I ended up with a couple broken ribs and decided right then I needed a better way to work those calves," he says.

Pieper found it when a friend of his bought an old pickup that had a well-used stock rack in the bed that he didn't want. Pieper bought the rack for $50 and figured out a way he could carry it with his skid steer.

"The rack was really flimsy when I got it out of the truck, so I bolted angle irons into all 4 corners to stabilize it," Pieper says. "I also extended the sides down to the ground where the rack had lapped over the pickup wheel well. I bolted an old tool box from a silage cutter on one side to carry the supplies I need and when I was done, the rack was a fairly rigid 6-ft. wide by 8-ft. long rectangle with the gate at one end."

Pieper bolted a universal skid steer mounting plate to the gated end of the rack so he could easily lift and maneuver it. "During calving time I drive out in the pasture with the rack early in the morning and look for new calves. I can lower the rack over the calf without creating much commotion because the cows are used to me hauling bales with the skid steer. Once I've got a calf corralled I just pop out of the seat, over the gate and into the rack so I can vaccinate, tag and band the calf without interference from the Momma. Usually she's right outside the rack, so I even know what number to put on the calf's tag."

After he's back in the skid steer he raises the rack and Pieper says "the calf walks away like nothing happened. I get the work done without getting bumped, bruised or beat up. It's a cheap and simple outfit that cost me about $150 and I built it in one afternoon. I use it a lot because I've got 200 stock cows that calve every spring."

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Portable aeration fan is powered by a Vanguard V-Twin gas engine, allowing use in remote locations without electricity.

Portable Fan Aerates Remote Bins

Venlaw has a solution for aerating in remote location bins without electrical hookups. Their 16 hp. engine-powered fan is equivalent to a 10 hp. electric fan.

"It is powered by a Vanguard V-Twin gas engine," says Aron Friesen, Venlaw Manufacturing. "It can handle any bin from 2,000 to 33,000 bushels for at least 55 hrs. before refueling, depending on static pressure and engine load. On smaller bins, it'll run for 3 to 4 days."

The initial idea for a portable aeration fan was to use it on grain bags. However, once farmers saw it, they wanted it for their bins.

"We didn't even realize there were so many people without power at the bin," says Friesen. "We think there is still potential to use them with coarse grains, soybeans, peas and corn in bags. We haven't tested the fans on small grains as yet."

Friesen describes the process of developing the fan as a lot of trial and error, making changes where needed.

"We discovered a coupler isn't as strong as needed," says Friesen. "We have replaced it on new fans and are doing free upgrades with all our customers. We also added an oil shutoff for the engine."

The portable aeration fans are priced at $8,900 (Canadian). Venlaw is also introducing a full line of electric fans with 3 to 15 hp. motors in single and triple phase.

Fan can handle bins from 2,000 to 33,000 bu. for at least 55 hrs. before refueling, depending on static pressure and engine load.

The fans are available at a variety of Canadian farm supply outlets. They are looking for dealers in the U.S. Venlaw Manufacturing can be found on Facebook and on Twitter.

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