

Farm-Sized Pellet Machine Lets You Make Your Own Fuel

By Jim Ruen, Contributing Editor

"The sky's the limit!" That's what Dan Hier says when asked what raw materials can be used to make pellets in his Pellet Pro pelletizer. The only requirement, he says, is that whatever you use be able to pass through a 1/4-in. screen. Larger materials need to be run through a hammer mill first to granularize it.

"My partner Paul Lamb and I both have Woodmaster Plus corn/wood pellet furnaces. When corn hits \$4, we'd rather sell it than burn it," says Hier. "We began looking at pellet mills, but they started at half a million dollars and went up from there. We looked for something more affordable and found a company in Asia that makes smaller, farm-sized systems."

Lamb, Hier and Hier's wife Tracy started importing the pellet-making equipment. They have since sold mills in a variety of sizes along with hammer mills, dryers, coolers, baggers and complete systems. They also sell a briquette machine that produces a charcoal log from a variety of biomass materials such as sawdust, corncobs and stalks.

"The mills range in output from 65 lbs. an hour for a \$2,400 mill to a turnkey, 2-ton per hour system with dryer/cooler and bagger for \$27,000," says Hier. "In the middle is a portable mill that will do about 650 lbs. an hour

and costs \$3,700."

Pellets produced by Pellet Pro's mills vary in density from 44 to 70 lbs./cu. ft., depending on the source material. The Pellet Fuels Institute has an industry guideline of 40 lbs./cu. ft.

The mills use replaceable mold and die sets. Hier suggests they'll last from 160 to 200 hours, again depending on the material they're used with.

He reports a lot of interest in switchgrass as well as distillers dried grain with solubles. "We've tried a 50/50 mix of distiller's grain and kiln dried sawdust, and it work great," he says.

Small saw mills and cabinet shops have shown a lot of interest, he adds, as well as entrepreneurs interested in getting into the commercial pellet business. He points out that federal and state grants available for alternative energy production can reduce the cost of a system significantly. The USDA in northern New York has bought a portable mill with plans to demonstrate it from farm to farm.

Regardless of what size mill or material used, Hier says the key to getting good pellets is to have the correct moisture content. He notes that distiller's grains typically come out of ethanol plants at 12.5 percent moisture and need moisture added to make good



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pellets. Other materials may be too wet and need to be mixed with drier material.

A second key to pellet making for fuel is cooling and drying. "Pellets come out of the mill at temperatures of 120 to 180 degrees, depending on the material they are made of," he says. "Small quantities can be air dried but large quantities need to be run through a

dryer/cooler. As they cool, they get harder."

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Overwintered Switchgrass Makes Superior Pellet Fuel

Forget about making ethanol from switchgrass, says Roger Samson. He says a better use would be pellets made from spring-harvested switchgrass that's cut in the fall and left in windrows.

"Building a plant to process 100,000 tons of switchgrass into ethanol would cost \$300 million," says Samson of Quebec-based Resource Efficient Agricultural Production Canada (REAP-Canada). "A plant to process the same quantity into pellets would cost just \$7 million and would yield twice as much energy."

The one problem with burning switchgrass is that it can be corrosive to stoves. REAP-Canada thinks it has the answer to this problem, too.

Cutting the grass in the fall and letting it overwinter leaches potassium and other chemicals back into the soil without significantly reducing the mass. This leaves grass for pellets that will burn clean similar to wood pellets and can be burned in any wood or coal-fired boiler.

"We lose 95 percent of the potassium and have plant material that's 12 to 14 percent moisture," says Samson. "It's difficult to get it under 18 percent in the late fall."

Samson estimates production of four tons per acre on marginal crop ground. However, production of various switchgrass varieties is still being evaluated. He says the market for switchgrass pellets is growing quickly in eastern Canada, but he sees an even bigger market for exporting the pellets to Europe. In Ontario, greenhouses and other energy users are converting to the fuel as it becomes available. Samson works closely with Ontario producers to help them establish the crop and then finds markets for the pellets. One of those uses is home heat. Samson heats his home with switchgrass pellets, and it costs him \$1,200 compared to \$1,400 for natural gas or \$1,925 for fuel oil.

While neither the U.S. nor Canada is supporting switchgrass energy production like they do ethanol, a cross border partnership is developing. "We are using American cubing and pelleting equipment and Canadian boiler technology," explains Samson.

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Roger Samson says there's a lot of potential in making pellets from switchgrass. The one problem with burning switchgrass is that it can be corrosive to stoves. But cutting the grass in the fall and letting it overwinter leaches chemicals back into the soil, leaving grass for pellets that will burn clean similar to wood pellets.



"Poor Man's" Bale Loader

"I built what I call a 'poor man's hay spear' using a Tommy-Lift tailgate lift off an old 2-ton truck. It mounts on front of my Allis Chalmers 170 tractor. Works great for loading and hauling round bales," says Jay Bernauer, Florence, Alabama.

The bale spear is equipped with two hydraulic cylinders that operate off the tractor's auxiliary hydraulics. One cylinder is used to raise and lower the spear, and the other to tilt it up and down.

Bernauer bought the lift mechanism at a junkyard for \$200. It was originally operated

by a 12-volt hydraulic pump and was used to load cargo into the back of the truck. Bernauer used just the unit's lift arms, using 4-in. sq. tubing to build a frame. The frame bolts onto the front and sides of the tractor.

"I do all my bale handling with it. It'll lift a 6 by 5 bale weighing 1,300 lbs. with no problem," says Bernauer. "I have a 3-pt. mounted bale spear on back of the tractor so I can haul two bales at a time. The front lifts high enough to stack bales two high."

"The spear is built from 2-in. cold rolled steel that slides inside a short length of 2-in.

dia. pipe and is held on by a pin. Two shorter spears also mount the same way and can be replaced with a pair of forks that I built to handle 55-gal. barrels of shelled corn.

"I also use the forks to handle lumber and small logs while operating my Woodmizer bandsaw mill."

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Jay Bernauer used a Tommy-Lift tailgate lift off an old truck to build his bale loader.