



No Water Added

Closed-loop system sorts sand from manure

by [Jim Dickrell](#)
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When Vern Scherping was milking 54 cows on a 30-acre patch of ground, manure handling and daily haul wasn't an overly burdensome chore.

That was in 1985. Fast-forward 24 years and to a herd that now numbers some 800 Holsteins, and there isn't a lot of room to maneuver on that same space. Add in sand-bedded freestalls, and things get even tougher.

For a while, Scherping used a scrape, pile and haul system to remove manure from the two six-row freestall barns. Every six days, four men would run a skid steer and three spreaders to transport and apply sand-laden manure onto 1,400 acres of corn and alfalfa ground. Some of that ground is miles away.

Not only was Scherping running his crew ragged, he was also paying for up to 13 10-yd. loads of sand per week. The sand bill alone was approaching \$1,000 per week. Plus, he was having to replace the spreaders every three years because of the wear and tear of the heavy loads.

So in 2007, Scherping, his wife, Ginny, and sons Robert, Brian, Dan and Dean decided to look into alternatives. The farmstead, surrounded by roads and wetlands, did not allow for a sand lane. And since it is located near Little Falls, Minn., about 100 miles northwest of Minneapolis, sand lanes probably weren't an option for four months of the year anyway.

The answer was a closed-loop manure handling system that incorporates two sand separators and two aboveground storage tanks. The system went into operation in January 2009. "This is the first closed-loop system of its kind in the U.S.," says Genex Farm Systems' Matt Silbernack, who helped design and permit the system.

To begin, the Scherpings roofed over the space between the two end-to-end freestall barns. A 3'x3' cross box manure reception channel was dug into the floor beneath. Manure is scraped into this center section from both ends of the connected barn twice a day.

From there, it flows into a 10'-deep, 26,000-gal. reception pit housed in the sand-reclamation building and moved through a Parkson Sand Saver separator, which reclaims more than 90% of the sand. The building's in-floor heating helps dry the reclaimed sand, allowing for almost immediate rebedding. "The Scherpings have had no frozen sand after rebedding with the reclaimed material, even in the outside rows," Silbernack says.

The slurry is run through a Gritmeister separator, which removes almost all remaining sand particles. This fine sand is land-applied. "The Scherpings are reclaiming 99% of the sand and reusing 97%," Silbernack says.

The slurry is transferred to a 176'x28' Slurrystore, where the manure solids are allowed to settle out. Water from the top of the tank is transferred to a 90'x28' Slurrystore.

The tanks have a combined capacity of 6 million gallons.

From here, water is taken for reuse in the system. First it is run through a Parkson Rotostrainer to remove any remaining sand fines, manure solids and other insolubles. The system can use 60,000 gal. of recycled water per day.

In addition, 4,000 gal. of parlor wash water is added to the system daily. "Even roof runoff goes through the system," Vern Scherping says. Runoff from a 300'x400' paved feed pad, added this past spring, is collected in an earthen basin and is available for use in the system as well.



Sand reclaimed through the first phase can be used immediately for bedding. In-floor heating helps dry the sand quickly.

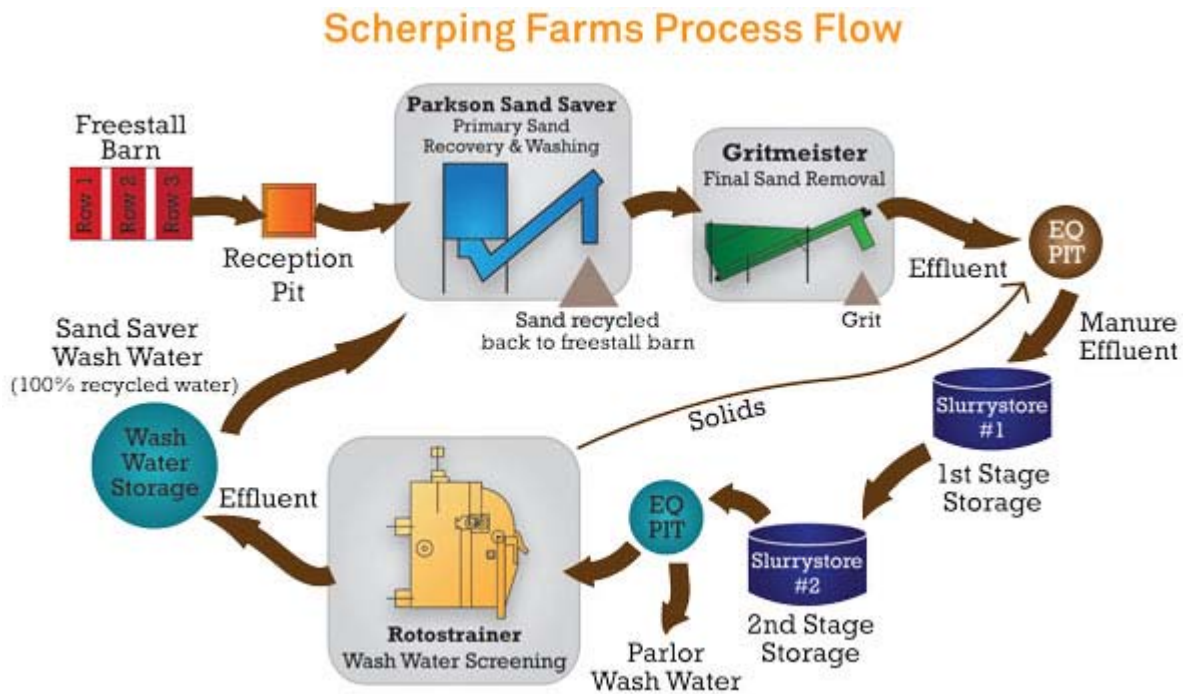
Maintenance is minimal, says Steve Oracz, market development specialist for Parkson. “No bearings are exposed to manure. The shaftless augers ride on wear pads. And the system only needs greasing once per week,” he says. Automated alarms notify the Scherpings via their cell phones if a pump fails to start or part of the system goes down.

The beauty of the enclosed system is that it works in any weather. “I was here in February when it was $-22^{\circ}\text{C}^{\circ}\text{F}$, and it was still separating sand,” Oracz says.

The system doesn’t come cheap. The price tag of \$1.5 million is close to \$2,000 per cow. Still, the Scherpings figure an eight- to 10-year payback:

- Sand savings alone could approach \$50,000 annually. The Scherpings had been bringing in 12 to 13 loads of sand per week, at \$75 per load. Now they purchase maybe 10 loads of new sand per year.
- Labor savings. The old load-and-haul manure system tied up four men every six days. Now the Scherpings can use a drag hose system to move and apply the liquid manure slurry.
- Fertilizer value. Nutrient analysis of the manure shows 20 lb. of nitrogen per 1,000 gal. of slurry, 12 lb. of P2O5 and 22 lb. of K2O. The Scherpings apply 10,000 gal. to 15,000 gal. per acre, depending on soil test. At 50¢/lb. for nitrogen and 70¢/lb. for phosphorus and potash, the value of the manure is \$26 per 1,000 gal. of injected or incorporated manure, or \$23 per 1,000 gal. of surface applied. “This year, we’ve added no commercial fertilizer,” Vern says.
- Herd health. The Scherpings use a coarse sand throughout the system. Finer beach sand didn’t filter as well, and somatic cell counts hovered at 220,000. With the coarse sand, SCC dropped to 120,000 and production climbed to 25,000 lb./cow. “The cows are just more comfortable on this reclaimed sand. Fresh cows really take off now,” Vern says.

The system is already plumbed for a methane digester, if the Scherpings decide to go that route. The Slurrystores can also be domed if odor becomes a problem. But both tanks form 6" to 8" crusts and odor has been minimal, even after agitation. There is room for a third tank if the Scherpings expand.



This diagram shows how manure flows through the system and water is recycled on the Scherpings’ farm.