

**Vendor:**

**DariTech, Inc**

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**Industry:**

DariTech is a “top to bottom” dairy equipment design, manufacturing, service and supply company worldwide.

**Project Type:**

DariTech’s BeddingMaster In-Vessel composter bedding recovery system processes manure on a 5,500-cow dairy to produce a unique high-comfort fiber bedding that increases hygiene and reduces costs.

**Project Goal:**

- Evaluate manure fiber bedding technology to replace chopped straw and sawdust bedding
- Increase cow comfort and hygiene
- Reduce cost and take control of bedding supplies

**Study Prepared by:**

Mark Stoermann, Newtrient Technology Advancement Team

**Date of Case Study:**

October 2018

## In-Vessel Rotary Drum Composter System Produces High-Quality, Pathogen Free, Affordable Bedding

Wiese Brothers Farm, Greenleaf, Wisconsin

### OVERVIEW

Wiese Brothers Farm is one of the largest dairy operations in Wisconsin, with about 5,500 cows in milk production. Jon and Dan Wiese are second generation owners of the 6,000-acre dairy just outside the town of Greenleaf. Manure management is one of the biggest challenges on the farm “We’ve researched how to remove water from the manure and dry it quicker.” The manure slurry is collected and stored in a reception tank. Then, the slurry is processed through the DariTech BeddingMaster system to produce high-quality cow bedding. Any remaining material is stored in lagoons and then spread on cropland.

### BACKGROUND

*“After evaluating numerous technologies for bedding recovery, we selected the BeddingMaster system and are very satisfied with its performance and reliability.” Jon Wiese, Wiese Brothers Farms*

Wiese Brothers Farms traditionally used chopped straw mixed with sawdust as the primary materials for cow bedding. Sawdust was plentiful in the area and available for a low price that included trucking it to the farm. But as the wood pellet industry began to develop in the area, competition grew for sawdust, significantly increasing the price delivered to the farm. In a search for bedding alternatives, the dairy investigated many options. Seeing the BeddingMaster In-Vessel composter process just made sense. The systems are well built to process large volume of manure and easy to control and monitor the process.

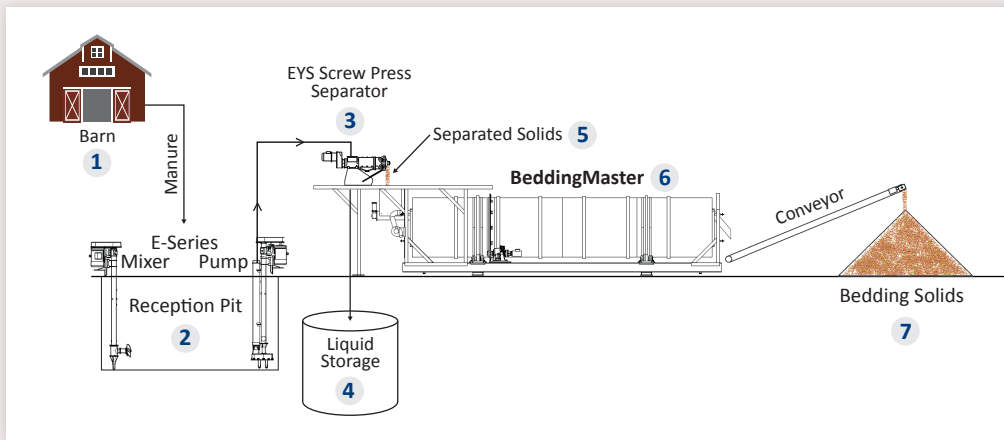
In 2009, Wiese Brothers Farm purchased the first 8x40 BeddingMaster machine for their existing 1,800 cow dairy. After building new facilities for 5,500 cows with deep bed stalls, adding two additional BeddingMaster units was an easy decision. As a result, the dairy can maintain great

cow comfort and low somatic cell count with their in-house supply of quality bedding. A bonus to the bottom line is they are not paying for trucking material in and out of the dairy in the form of purchased bedding that decreased the lagoon volume. The bedding produced by this system consistently meets design specifications with reliable performance, producing a very comfortable, pathogen free fiber bedding.



DariTech BeddingMaster – Model 8x40

## Wiese Brothers Dairy Manure to Bedding Recovery Flow Diagram



### BEHIND THE SCENES

- 1 Scraped manure, or dewatered flush manure from the barns is fed directly to a reception pit with an E-Series mixer and pump.
- 2 From the reception pit, the manure slurry, about 10% – 12% total solids (TS), is
- 3 pumped to the EYS 600HD Screw Press Separator. The EYS Separator easily separates solids from liquid portions of fibrous manure using PLC technology to optimize dryness and eliminate operator time spent adjusting the machine. Screen wear is also decreased, producing a more consistent product.
- 4 The liquids are pumped to a storage tank and
- 5 separated solids are fed into the
- 6 BeddingMaster by passing through the fixed opening in the entry end. DariTech’s stationary ends do not rotate with the drum and therefore increase the throughput by over 50%,
- 7 resulting in more bedding for less money.

The beauty of composting manure solids is that the aerobic bacteria which consume the organic matter are already in the solids, courtesy of the dairies’ cows. Once inside the BeddingMaster, the bugs proliferate as they finish the job begun in the cows’ stomachs. A blower pulls air through the drum, ensuring an ample air supply, which mixes with the solids that are tumbling from the rotation of the drum. Within just a few hours, the activity of the bacteria has brought the temperature to over 150°F where it stays as the material moves through the drum like a plug. Dewatered manure remains in the rotary drum for approximately 24 hours. Together, the screw press and rotary drum produce bedding that has a moisture content of about 40% total solids. The bedding is used as soon as it is produced, providing fresh bedding to the cows three times per week.

### Key Benefits & Results:

- Wiese Brothers dairy no longer relies on external sources to supply cow bedding. All the bedding is produced on-site saving the about \$50,000 in direct cost.
- 60% of the raw manure is processed on-site to supply all the dairy’s daily bedding needs. The excess unprocessed manure is land-applied as fertilizer and soil amendment to reduce fertilizer costs and improve the soil’s organic content and increase crop yields
- Dairy sustainability has improved by not relying on outside sources and truckers for bedding delivery because the dairy produces and supplies its own requirements. This reduces carbon emission from bedding production and trucking and methane emission from storage lagoons due to less volatile solids in the liquids.

### Wiese Brothers Dairy BeddingMaster



Photo’s clockwise from left: BeddingMaster Drum, EYS Screw Press, and Manure Reception Pit



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## KEY LEARNINGS

**Wiese Brothers Farms found a manure solids bedding solution with the desirable characteristics the dairy was looking for, to reduce costs and control their bedding supply.**

**Sustainable supply** – For years the dairy had been using chopped straw mixed with sawdust for bedding. As the price for sawdust climbed, bedding was used sparingly. Now, with the BeddingMaster, there is a supply of all the bedding needed, as often as needed. Only 60% of the raw manure is treated to supply all the dairy's bedding requirements. The remaining 40% is not treated and land-applied on the dairy and neighboring farms.

**Stall management** – The cows are comfortable and spend more time in the stalls. The bedding is cleaned three times per day and refreshed regularly. It spreads easily, and dries out further as it is used by the cows. It is warm, dry, and very clean.

**Cow health** – Because the bedding is produced on the farm, it has only the farm stock's bacteria in it; none are brought in from outside as can happen with sawdust.

**Manageable operations costs** – Operational costs are about \$40/day for the total electricity requirements to run the various pumps and electrical motors for three BeddingMaster systems. Each system includes 15 HP motor for the rotary drum motors, 7.5 HP for separator and 1 HP each for the auger and blower motors.

**Ensure vendor support, training and follow up** – Following the installation, the DariTech distributor, Foxland HarveStore has provided ongoing technical service support and training to ensure optimal operation and installed a second machine when the dairy expanded its herd.

**Simplicity of design and maintenance** – The BeddingMaster unit is assembled on-site having a 20' and 40' footprint. It is highly automated and easy to maintain. Jon Wiese said the unit is built well and requires very little maintenance except keeping the discharge chute clean, cleaning the screens every few weeks and keeping the unit greased.

## KEY BENEFITS

**Cost savings for bedding** – Wiese Brothers Dairy no longer buys sawdust bedding and are saving an estimated \$50,000/year. The dairy eliminated the need for 8 to 10 truckloads per day, in and out of purchased bedding material. This reduced handling

costs and increased the lagoon volume, which adds to the bottom line at the dairies.

**Pathogen control** – The goal is simply to kill the pathogens so there is no regrowth of bacteria. In this system, scraped manure from the dairy is fed directly into an EYS Separator specially designed to provide ideal bedding of 35% to 40% TS. The fiber comes out of the screw press and into the drum at ~60 degrees Fahrenheit. After about 18 hours residence time in the 40' long BeddingMaster drum, the fiber exits at ~150 degrees Fahrenheit with ~99% pathogen kill. All the heat in the drum is natural or biological heat generated from the process. The only energy required is for small electric motors that turn the drum.

**Animal health** – The BeddingMaster produces a drier and more consistent bedding for deep bed stalls that helps maintain great cow comfort. The dairy noticed low cell count with the in-house supply of quality bedding. They continue to use lime but have reduced the amount by 25%, it is spread on the bedding at the back part of stalls to balance the pH level and acts as a bactericide.

**Sanitary procedures** – Good manure fiber bedding practices require diligence. Bedding is turned in each stall multiple times per day to ensure solids don't pack down. Fiber tends to stick to cow's teats more than sand so careful cleaning is important.

**Improved sustainability** – The Wiese Brothers Dairy is reducing the carbon footprint of dairy production not only from reduced emissions from trucking bedding in and out, but from reduced methane emissions from the manure storage due to the solids being extracted prior to liquid storage where methane emissions occur.



Dried Bedding Material

## Organizations Involved:

### Farm or facility

Wiese Brothers Farm

### Distributor

Foxland HarveStore;  
Kaukauna, WI

## Equipment and Technology:

### Manure collection

Scraped manure

### Pre-processing

DariTech EYS 600HD  
Solids Separator

### Primary treatment

DariTech 8x40  
BeddingMaster In-Vessel  
Composter

### Secondary treatment

None, liquids and small  
solids to the lagoon  
for storage and field  
application



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## RESULTS

Jon Wiese is satisfied with the results after nearly seven years operation of the BeddingMaster. “Our results have been consistent maintaining high milk quality and udder health while creating a direct cost savings of ~\$50,000/year by avoiding bedding purchases from outside sources, providing all our bedding needs and reducing maintenance costs. We also save money on manure spreading since less hours are required to apply the manure due to reduced solids content, and more gallons per acre. The BeddingMaster has a six year payback based on cost and labor savings.”

## CONCLUSION

Wanting to ensure a future supply of quality bedding at competitive costs, the Wises Brother Dairy has successfully installed three DariTech BeddingMaster In-Vessel Composter and is using fiber bedding exclusively with excellent results. The systems are highly automated and reliable requiring very little maintenance and downtime.

## WIESE BROTHERS FARM PROJECT BY THE NUMBERS

<b>Location type</b>	Wiese Brothers Farm is a registered dairy operation located in Greenleaf, WI.
<b>Number of animals</b>	5,500 milking cows
<b>Type of bedding</b>	Manure separated fiber for deep bedding
<b>Manure collection</b>	Scraped manure from barns goes to a collection pit and pumped to EYS separator
<b>Daily flow</b>	Producing 120 cubic yards/day of manure fiber bedding
<b>System designed by</b>	DariTech, Inc., Lynden, WA
<b>Date operational</b>	First unit commissioned in 2009
<b>Energy produced/required</b>	Total electricity usage of approximately 250 kWh/day to produce 120 cubic yards/day of bedding
<b>Products produced</b>	45% dry solids fiber produced on the farm, eliminating off-farm bedding material purchases
<b>Residual materials</b>	Separated small solids and liquids pumped to lagoon storage
<b>Residual storage</b>	Lagoon storage with about 30 million gallons capacity
<b>Residual use</b>	Crop application that reduces commercial fertilizer purchases
<b>Ownership structure</b>	Farmer owned

## FINANCIAL INFORMATION

<b>Capital Investment</b>	Estimated list price of the BeddingMaster 8'x40' unit is priced at \$290,000, the 6'x32' at \$200,000 and the 6'x16' at \$150,000.
<b>Annual operating and maintenance cost</b>	\$3,600 per month for electricity \$10,000 per year for equipment maintenance
<b>Revenue</b>	Cost savings per year: \$50,000
<b>Payback period</b>	Six years due to direct cost savings and reduced manure management expenses and labor requirements.

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Newtrient’s mission is to help all dairy farmers reduce the environmental footprint of manure while enhancing their economic opportunities and their social license to operate. The information contained in this case study was developed with the cooperation of the organizations involved and Newtrient has endeavoured to make sure it is accurate and complete as possible.



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