U.S. Dairy Sustainability Awards

Innovation Center for U.S. Dairy®

2013 Awards Recipients

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U.S. Dairy Sustainability Awards
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Petersen Dairy Farm

Appleton, Wis.
Winner: Outstanding Dairy Farm Sustainability

Petersens Form Bond With Urban Neighbors Through Compost

Petersen Dairy Farm, overseen by brothers Mark and Steve with their father, Lawrence, has been in the family since 1934. Today, it is home to 50 Holstein dairy cows and 60 head of young stock, producing more than 31,000 pounds of milk annually.

The city of Appleton and its suburbs have grown significantly in recent years, prompting the Petersens to re-evaluate some aspects of their farming operation. Most notably, public image, water quality and manure odors needed to be addressed.

With the desire to show Appleton, Wis., that cows can be good neighbors, sustainability and environmental responsibility have taken center stage at Petersen Dairy Farm. Their herd has been bedded exclusively with recycled, shredded newspaper since 1988, manure from dairy has been composted since 1995 and new methods of tilling have reduced soil loss while improving the cropping operation.

Best Practices

1 Manure Management System

Summary

The Petersens recognized the potential benefits of composting and began the process in 1995. Before investing in their own equipment, the Petersens partnered with the Oneida Nation (a local Native American tribe) to rent their compost turner. They found that composting helped to dramatically reduce odors, while keeping tractors, manure spreaders and mud off local roads (which results in less road wear and improved safety). Nutrients are stabilized and manure is ultimately turned into a value-added product for neighbors, with more than 99 percent of the dairy's manure being used by local gardeners and homeowners.

Key benefits

Located on the urban fringe, the Petersens are able to market their compost as home garden fertilizer, compost tea and raised bed mix. This has become a significant revenue generator and opportunity for the family to connect with the community. In addition, the Petersens have found savings in composting. The cost to produce compost is about half of the cost to apply manure to the fields. As part of their commitment to the composting process, the Petersens engaged the University of Wisconsin Extension to conduct research on their compost site rotation. This ongoing analysis helps minimize the potential ground water impacts.

2 Zone Till Conversion

Summary

In part to address noise, dust and road travel issues, the Petersens implemented a zone tilling method. This has helped to reduce soil waste, while improving the overall cropping operation. The Petersens hoped to reduce fuel usage and labor needed to produce dairy feed without impacting profitability. The family leveraged the expertise of a crop consultant to modify their planting and transition to no till and zone till. The Petersens also work with the local Fox Valley Technical College to research the impact of zone till methods on corn.

Key benefits

The elimination of tillage has saved the Petersens impressive amounts of time and money with no negative impact on profitability. Prior to the conversion, the Petersens were losing eight times the amount of soil to erosion as they are now. Soil compaction has essentially been eliminated, and soil temperatures have been consistently five to seven degrees warmer in the strips. This is valuable for seed germination and allows for earlier planting.

Throughout the years, the Petersens have taken a closer look at the way their business affects the environment and community. Practices such as composting and zone tilling have improved profitability, while protecting the environment and respecting the lifestyle of Appleton-area neighbors.

The composting project has helped turn a potential challenge into a positive. Manure is now used to improve relationships in the community. Composting also has allowed the family to reduce their environmental impact while gaining an additional income source. The Petersens hope to serve as a model for other farms on the urban fringe by exemplifying the ability to coexist with neighbors while also creating mutually beneficial relationships.

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Prairieland Dairy

Firth, Neb.
Winner: Outstanding Dairy Farm Sustainability

Dairy Focuses on Environment, Ushers in Next Generation

Founded in 1998, Prairieland Dairy, located in Firth, Neb., has adopted a multipronged approach that includes understanding and embracing social, economic and environmental impacts. The family farm operation has created a model with sustainability at its core – a farm that will thrive for generations to come.

Made up of four smaller family farms, Prairieland houses a total of 1,600 cows and produces 12,000 gallons of milk daily. Prairieland's cows produce meat, manure and milk, and they have two business extensions: Prairieland Foods, which delivers local-source-verified farm-direct milk and dairy products from Prairieland Dairy; and Prairieland Gold, the farm's composting operation, which utilizes by-products and biodegradable waste to create soil amendments sold regionally. These businesses ensure quality, source-verified products from a farm that prioritizes animal care, environmental stewardship, economic growth, social responsibility and community involvement.

Best Practices

1 Composting Efforts

Summary

Composting at Prairieland Gold began with a desire to create enduring value and profit from waste, resulting in an odor-neutral enterprise that protects the environment and benefits the community. A lagoon with a multitiered screening process naturally separates sand, liquid and solid waste. Sand is recycled using a settling lane. The remaining acids are removed with an incline screen. Liquids move through the three settling basins to capture more nutrients, which are used as fertilizer. Solids are moved to the composting site and mixed with biodegradable community waste products to make various soil amendment profiles for commercial sale.

Key benefits

Composting decreases trucking by 75 percent and removes 5,000 tons of food waste from the community, and 8,000 tons of yard waste is diverted from the landfill annually. The operation's composting efforts also allow greenhouses, landscapers and the retail market to take advantage of the 20,000 tons of composted manure. All of the farm's waste solids are composted, amended and sold back into local and regional markets. The addition of Prairieland Gold created two full-time jobs and $100,000 of income.

2 Facility Design/Utilization of Gravity and Water

Summary

Prairieland sought to design and build efficient, low-impact facilities and systems to amplify cow comfort and health, while minimizing energy use. All facilities are focused on conserving and renewing natural resources and energy, and capturing and controlling overhead and variable costs.

Milk is cooled immediately to below 35 F, then loaded into milk tankers, eliminating the energy required for cleaning and agitating bulk tanks. Ground water, averaging 60 F passes over the first plate cooler, chilling the milk quickly. When it hits the second plate cooler, two-thirds less energy has been used. A geothermal heating/air-conditioning system also helps to heat and cool the dairy offices.

Using gravity, Prairieland operates an entire cleaning and manure management system on only three wells and pumps where only one pump operates at a time, reducing costs and additional equipment. The freestall barns also slope away from the center of the building, and one barn is positioned at a higher elevation to create additional slope.

Key benefits

Prairieland's sustainable design and operation allowed the management team to avoid the challenges associated with excess energy and water use. By automating the cooling, waste management and pest control systems, utilizing gravity, the geothermal properties of well water and the area's natural wind, they estimate savings of more than $200,000 in energy, water and equipment repair.

Striving to continuously learn from others, Prairieland has looked to other dairy farmers, the community, consumers and regulation to create a long-term model for sustainability. The farm leaders consult with other dairy producers, meeting quarterly to discuss management ideas. Industry leadership also shares profit and loss statements to compare their work with other dairy farms.

Future plans include expanding Prairieland's recycling program and continuing the pilot programs with schools, hospitals and grocery stores to recycle more food waste. As the next generation steps up, Prairieland expects opportunities around agri-entertainment to expand. Prairieland leaders say much of their success can be credited to turning their thinking around to the preferences of their consumers and striving to be transparent with their operations.

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Skyridge Farms

Sunnyside, Wash.
Winner: Outstanding Dairy Farm Sustainability Award

Focus on Cow Comfort Delivers

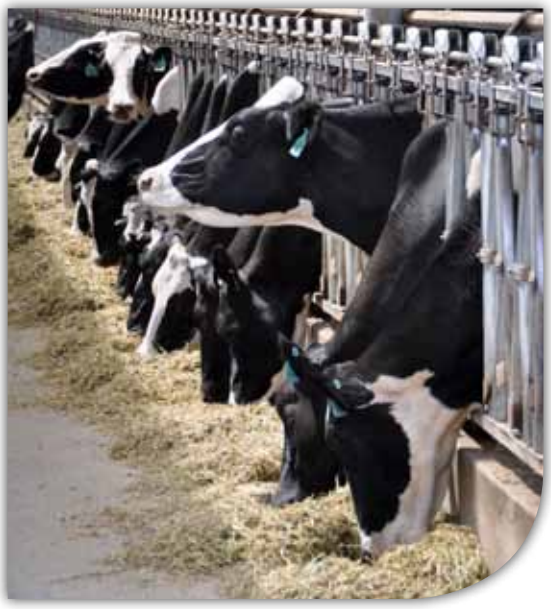
Skyridge Farms, located in Sunnyside, Wash., was founded in 1997 by Dan DeGroot. In 2003, DeGroot recognized that if he wanted to continue to be successful in the future, he had to fundamentally remake his farm into a leading example of sustainability. His goal was to create a holistic, integrated environment that developed employees, increased cow comfort and restored the environment. DeGroot systematically analyzed the full range of systems and processes required to create a truly sustainable dairy and made well-researched changes to meet those goals.

His efforts have solved critical environmental and community challenges, including efficient use of water, energy, fuel, chemical fertilizer, pesticides and herbicides. He also improved tilling practices, restored soil health and increased recycling.

Today, the dairy employs 35 people and is home to 3,200 cows, 400 acres of corn, 160 acres of alfalfa, 30 acres of apples and 30 acres of cherries.

Best Practices

1 Technology Upgrades



Summary

Skyridge improved its technology base, including upgrades to controls, lighting, motors, fans, sensors and pumps, which aided in water and energy conservation. DeGroot also added a stationary feed mixer, which significantly decreased fuel usage and improves nutrition and cow comfort.

Key benefits

Significant savings in energy and water were seen after implementing energy efficient technologies:

- Programmable Logic Controllers (PLCs) were added to lighting, the soaker system used for cooling cows in freestall barns and fans in the parlor and holding pen – resulting in varying degrees of water and energy savings.
- Variable-speed drive (VSD) motors were used in ventilation fans, well pumps, vacuum pumps, milk pumps and in the deck flush and wash down pump – resulting in varying degrees of energy savings.
- Lighting was retrofitted in many of the barns and in the shop. T12HO fixtures were switched to T8s, 400-watt metal halide fixtures were swapped out for T5HO and 400-watt metal halide

(continued)

(Key benefits – continued)

fixtures were replaced with 40-watt T5 florescent. The dairy also replaced 400-watt metal halide fixtures with 40-watt T5 florescent bulbs. All of these changes resulted in energy savings between 50 percent and 75 percent.

- 16 occupancy sensors were installed, saving 30 percent in energy usage.
- The dairy installed 20-horsepower VSD Dual Splash lubrication vacuum pumps, which allowed the parlor expansion to take place with a 50 percent smaller pump size increase than previously required.
- A stationary electric drive feed mixer replaced the diesel engine feed truck previously used, reducing fuel costs by 80 percent.
- Energy efficient, high-volume, low-speed fans were 92 percent less expensive to run than the previous high-speed, low-volume fans.

Aside from saving energy and water, technology improvements also have reduced maintenance costs and time.

2 Recycling Programs

Summary

Virtually all manure at Skyridge is recycled on the farm. Manure solids are composted with used straw bedding from the dry lot areas and reused as bedding in the freestall barns. Approximately 12,000 to 13,000 yards of compost is sold to Organix for use in city landscaping. Lagoon water is reused multiple times, eventually fertilizing crops and enhancing soil health. DeGroot also implemented a self-sustaining recycling program for plastic from ag-bags, twine from hay bales, and other plastic and corrugated packaging.

Key benefits

Recycling manure into valuable compost reduced manure volume by 50 percent and will create additional revenue when sold to nurseries. Composting also saves on fuel and energy previously used to import straw bedding and decreases the number of truckloads previously required to move manure off the farm by more than 600 annually. Bacteria that live in lagoon water loosen the clay and loam soil, improving water penetration and soil health. Dan's aggressive land and manure management program enabled him to convert from deep plowing to low-till minimal impact plowing – saving labor, fuel, energy and money. Crop rotation and diversity improved soil health and reduced the need for chemical fertilizer, herbicides and insecticides – all of which cause damage to the environment.

DeGroot's motto for these sustainability projects has been, "You can't get new results with old thinking." He also asked questions of trusted experts, explored different angles and always kept cow comfort top of mind.

DeGroot's vision, leadership and results make Skyridge Farms a sustainable dairy model that other producers can replicate. In fact, since implementing the composting system, 25 other dairies in Washington have established composting programs. After installing the initial PLC unit at Skyridge, the electric company installed 20 additional units in the Northwest. The successes of Skyridge are fine examples of how a strong commitment to sustainability can result in a variety of economic, social and environmental benefits.

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Unilever

Henderson, Nev., Ice Cream Plant

Winner: Outstanding Dairy Processing & Manufacturing Sustainability

Plants Put Sustainable Living Plan Into Action

At Unilever, sustainability is a corporatewide way of doing business. In 2010, Unilever unveiled its Sustainable Living Plan, with goals to reduce three outputs by 50 percent by 2020: greenhouse gas (GHG) emissions, water use associated with consumer use of their products and waste associated with disposal of their products.

The plan has inspired Unilever plants worldwide, including the Unilever Ice Cream Plant in Henderson, Nev. The plant manufactures ice cream products under brand names including Ben & Jerry's®, Breyers®, Good Humor®, Klondike® and Popsicle® for distribution throughout North America. It has more than 450 employees and has been in operation for 30-plus years.

Plant managers followed a measured approach: Allocate resources, identify potential projects, follow through on implementation and conduct post-installation verification of results. The return on investment went beyond economic and environmental impacts to improving quality of work for employees.

Through the implementation of technology, the Henderson plant has reduced electricity use by 13 percent, natural gas use by 16 percent and water consumption by more than 1.1 million gallons per year. It is just one example of Unilever's corporate commitment in action.

Best Practices

1 Systems Upgrades

Summary

The plant enlisted energy experts to review the facility's major energy users in order to develop specific projects to reduce energy. The plant implemented new, automated sequencing for its refrigeration and compressed air systems, and addressed opportunities to improve energy use for water heating systems.

Key benefits

The systems upgrades implemented by Unilever have increased refrigeration system efficiency by 13.5 percent, reduced compressed air system energy use by more than 20 percent and recovered heat equal to one-sixth of the facility's 2009 natural gas use rate. These upgrades reduced electricity usage by 13 percent and natural gas use by 16 percent.

2 Waste Water System Improvements

Summary

Unilever used a combination of waste water system improvements, including removing waste before it enters the water system.

Key benefits

The plant's water system improvements have reduced water consumption by more than 1.1 million gallons per year, reduced the strain on local water resources, improved the quality of waste water returned to the municipal water treatment facility and provided solid wastes for animal feed. They also resulted in improved air quality around the plant's waste water pond and in the nearby residential neighborhood.

3 Utility Monitoring

Summary

Unilever installed a utility monitoring system for electric, gas, water and production, which provides the capability to track key performance indicators for future project identification and further improvements.

Key benefits

A utility monitoring system tracked how new practices directly impacted energy use in specific areas. That information was then used to track additional benefits, such as reductions in maintenance costs. The monitoring system could pinpoint detailed variations in energy and water use so that each improvement practice could be evaluated.

With its focus on energy efficiency and water conservation, the Unilever Ice Cream Plant in Henderson has emerged as a model to other plants around the country.

The team at the Unilever Henderson plant learned several key lessons during these projects:

- Energy savings provide a positive return for the company when implemented successfully.
- Energy-saving projects involve many areas of the plant and are most successful with high-level support and a company champion who overcomes hurdles as they arise.
- Sustainability efforts have the best success when concrete measurements are taken and compared with relevant benchmarks.

These key lessons have been documented and shared with other dairy industry businesses through public programs, internal best practice communications and third-party contractors. The plant has future plans to maintain, improve and build on its commitment to suitability in order to reach its 2020 goals.

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Ballard Family Dairy & Cheese

Gooding, Idaho
Winner: Outstanding Achievement in Energy Efficiency

Energy Efficient Upgrades Benefit Dairy and the Environment

In 1995, Steve and Stacie Ballard started their 35-acre dairy in Gooding, Idaho, with their son Travis. In 2004, the family added a cheese facility adjacent to their barn to take advantage of the milk from their Jersey herd. Ballard Family Dairy & Cheese has grown to 110 milking and dry cows and 80 young stock that produce 1,320,000 pounds of milk annually.

The Ballards recognized that in order to stay competitive, they would need to aggressively manage their expenses – specifically, energy costs and consumption. Like many rural farmers, they relied on propane, an expensive and price-volatile fuel. The family aimed to eliminate their propane dependence and reduce their overhead by 10 percent.

To achieve their goals, the Ballards explored energy efficiency upgrades and infrastructure changes. They worked with a cross-functional team, including engineers and contractors, dairy associations, the USDA, the U.S. Department of the Treasury, the Idaho Power Company and their local bank, to develop a custom efficiency project for their dairy.

The project included power phase conversion, automation and controls, improved ventilation, installation of VFD vacuum pumps and high-efficiency modulation electric boilers, in addition to the best practices detailed below.

Best Practices

1 Hot Water System

Summary

Ballard Family Dairy & Cheese originally used a propane-fired steam boiler system, which was operating at 33 percent efficiency and consumed approximately 664 MMBTU per year. The family decided to replace the boiler system with an evacuated tube collector solar thermal supply, heat pump and high-efficiency electric boiler. In making these upgrades, the dairy was able to switch from propane to all-electric, which resulted in a 50 percent reduction in fossil fuel use (due to the electric provider's energy mix).

Key benefits

The new system has helped the Ballards achieve a 67 percent energy savings. Solar thermal now supplies approximately 50 percent of their heating load. Designed to meet the needs of the dairy as it expands, the hot water system has already resulted in $15,000 in savings and a carbon dioxide reduction of 89,500 pounds.

2 LED Lighting

Summary

The dairy originally used a combination of incandescent, T-12 tube, halogen and high-intensity discharge lights. After evaluating the results of their energy audit, the Ballards upgraded all of their lighting to energy efficient LED. They also added automatic lighting controls to help capture additional savings.

Key benefits

Proof that small upgrades can make a big difference, the switch to LED lighting has resulted in an annual energy savings of 35,000 kilowat hours (kWh) and a cost savings of $2,500. And it's good for the environment – the Ballards estimate that their dairy has reduced its carbon dioxide output by 5,500 pounds through this update.

3 Milk Cooling

Summary

The milk cooling system at Ballard Family Dairy & Cheese originally carried fresh milk at 100 F through a heat exchanger that used 60 F ground water to cool the milk. The milk left the heat exchanger at 80 F and was further cooled to 40 F in a chiller. The new system uses residual 40 F cold water from the heat pump system. This pre-cools the milk to 60 F and results in the chiller cooling the milk from 60 to 40 F. The Ballards also added a more efficient plate heat exchanger.

Key benefits

By making a change to the milk cooling system, the Ballards identified an opportunity to reduce water use and save money. The upgrades save an estimated 1,000 gallons daily and provide relief to the depleted local aquifer. The family also has achieved significant annual savings including cost savings of $2,000, energy savings of 27,000 kWh and carbon dioxide savings of 11,500 pounds.

The total project cost for Ballard Family Dairy & Cheese was $130,000 with a 5.5-year payback period and a simple ROI of 18 percent. The total annual savings from the energy reduction upgrades is $23,700 – more than 10 percent of the dairy's overhead. The project also virtually eliminated the dairy's need for propane, which saves approximately $15,000 annually.

The Ballards anticipate that the actual payback will be sooner than originally forecasted. As their operation expands, they require less overall energy than they would have with their previous system. The Ballards believe that every farm has some aspect of energy management that can be improved, and – with proper direction and support – all dairies can improve their environmental impact and bottom line.

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Green Valley Dairy

Krakow, Wis.
Winner: Outstanding Achievement in Renewable Energy

Dairy's Natural Ecosystem the Key to Conservation

Brothers John and Mark Jacobs, first-generation dairy farmers, established Green Valley Dairy in Krakow, Wis., in 2000 with 1,500 cows. In their first year of operation, the team quickly expanded their herd to 2,500. The dairy was again looking to expand in 2005 but first wanted to improve its manure management program. The dairy's goal was to reduce its carbon footprint while adhering to sound business practices. To achieve this objective, the Jacobs integrated sustainable practices into every aspect of the dairy, while converting to anaerobic digesters and implementing underground piping for nutrient handling and application.

Today, the farm is home to 3,500 cows, 3,500 off-site young stock and 8,300 acres of cropland. Three manure digesters contain odors from the dairy, produce electricity, provide biosolids used for cow bedding and liquid by-products that fertilize crops through underground transmission pipes. During this growth and innovation, the Jacobs welcomed their sons and business partner Ken Peters to the operation, which has 35 employees.

Best Practices

1 Manage Manure

Summary

Before expanding the herd, the farm wanted to be sure it was using the most effective manure management practices available. Green Valley Dairy completed extensive research on all available technologies available to manage manure, assembled a team of experts and eventually chose to build the first of three anaerobic methane digesters. Today, the farm is home to three digesters.

Key benefits

The digester project benefits climate change strategies by reducing the amount of greenhouse gas produced by the dairy. The digester project also has allowed the farm to substitute fossil-fuel-based electricity and heating with clean, renewable electricity and waste heat from electric generators. Odor reduction and containment are additional benefits that have helped Green Valley Dairy remain a good neighbor and steward of air quality.

2 Repurpose Manure

Summary

The anaerobic digesters at Green Valley Dairy allow manure to be recycled into 98 percent pathogen-free animal bedding. The alternative bedding product goes through a second composting phase that helps to create the best possible bedding product. The liquid portion of the manure also is recycled as natural fertilizer on Green Valley's fields.

Key benefits

Biosolid bedding produced by the digester has eliminated $245,000 in sand bedding costs annually, decreased odors and reduced emissions previously created from hauling bedding to and from the dairy. In addition, Green Valley provided cost savings to nearby dairies and landscaping companies by selling them recycled bedding for significantly less than the cost of alternatives. The liquid manure applied to fields also returns much-needed natural nutrients to the soil.

3 Reclaim and Sell Energy

Summary

Via the digester, Green Valley generates electricity in the form of biogas that can be sold to the local utility power grid, as well as reclaimed as heat for use in various areas of the dairy. The system at Green Valley is a Biogas Nord digester system that operates the three tanks in parallel to accommodate the waste stream of 3,500 dairy cows. Green energy is created for use on the farm and in the community through cogeneration.

Key benefits

The system maintains the capacity to produce 1,200 kWh utilizing two CAT 3512 cogeneration engines. The average amount of electricity a dairy of Green Valley's size would be worth is approximately $190,050 in Wisconsin. The farm generates significant more energy than it consumes, with the majority of production going onto the local grid.

4 Recycle Water

Summary

During the digestion process, essentially all water is reclaimed and returned within the dairy's ecological system in a "reuse it, return it" approach. Inside the dairy, second- and third-use water is recycled and used in the milking parlor for cleaning and washing, and is used to irrigate crops. The dairy has 6 miles of underground piping that transports low solid nutrients to an irrigation system.

Key benefits

Due to water recycling efforts, Green Valley Dairy is pulling less from the community's water table. The piping system eliminates additional hauling and transportation emissions and also places nutrients and water back into the soil.

As one of approximately 150 dairy digesters in the United States, this project faced early market and technology barriers. Green Valley Dairy attributes much of its success to alignment of management strengths, boardroom-style initiatives and sound business decisions.

The partners are proud of the commitment the dairy made to be a good steward of the environment and adhere to their philosophy of responsible and sustainable farming. The dairy's willingness to share their experiences and knowledge with others also serves as a component of their environmental stewardship. The partners openly share research and information with the dairy industry and other operations that are seeking guidance or ideas as they venture down the path of green dairy expansions.

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