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American Dairymen™

Manure Management: IEC, Inc.

industrial & environmental concepts, inc.

Managing Manure

Across the Country, Innovative Producers are Covering Their Bio-Solids from Top to Bottom

By Steve Weisman

On any dairy farm, handling waste products is an important part of the producer's farm management plan. Managing manure and other by-products is definitely a complex issue. Managing dairy wastes means protecting the quality of surface and ground water, finding ways to utilize the waste product and being "neighbor" friendly when it comes to potential odors emitted from these waste by-products. As environmental stewards, producers must deal with a number of variables ranging from animal concentration, to weather, to terrain and soils of the land. Answers to these issues have become more technical and complicated as requirements increase along with changes that have occurred in the framework set by the Environmental Agency's (EPA) 2008 Concentrated Animal Feeding Operations Rule.

The good news is, producers are not alone. To help producers deal with these issues, technical service providers work with the NRCS to provide design services, obtain permits and help design a facility that addresses manure containment, storage and application to the land. It's not a one-size-fits-all, so a lot goes into developing these plans. Industrial & Environmental Concepts, Inc., (IEC), has been part of the waste management world for over 20 years and has established itself as an industry leader in designing and installing a wide range of floating covers and liners for ponds, tanks and lagoons that hold waste products.

Dave Anderson, head of technical sales for IEC, says, "We are a turn-key company, we provide design, fabrication and installation services. Our engineers and staff work very closely with the owner, their technical service provider and the NRCS throughout the entire process. We work hard to insure the owner achieves his management goals and design requirements. We provide plans along with budget and installation estimates to make their project a success. We are proud to be among the best in the industry, guaranteeing our work."

Facing the Challenges

Dairy producers throughout the United States and abroad are facing similar challenges, despite their geographical differences. Farms that were once isolated and rural are facing continued housing expansion and encroachment on the rural landscape. The increased pressure on the farming community to control odors from bio-solids — in conjunction with added regulatory controls and threats of lawsuit — make odor abatement a key management requirement for every producer. Increased energy costs and carbon footprint concerns have become a topic that was once reserved for Fortune 500 manufacturers, are now at the forefront of many family farms.

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Regardless of herd size, every producer is faced with several primary obstacles if he wants to expand:

- Increased Manure Storage
- Odor Control
- Rainwater Mitigation
- Bio-gas Collection

Experts Make a Difference

So, where does a producer start? So many options are out there. Which is the right one? First, of course, it begins with research. What specialized experts are available and can truly help when it comes to a waste management plan? IEC owners Mike Morgan and Sean Gallant have built a company that has stood the test of time for over 20 years with a patented system of covers and liners for ponds, tanks and concrete reservoirs for the manure waste industry. IEC's products are not limited to being only a part of the total waste management plans. Rather an entire wastewater treatment process has been developed solely around IEC's patented insulated modular cover design.

As a matter of fact, that insulated covered process was included in the Latest EPA August 2011 publication, *Principles of Design and Operations of Wastewater Treatment Pond Systems for Plant Operators, Engineers, and Managers.* The family run business has literally hundreds of successful agricultural/municipal/industrial installations to their credit. Their successful track record of installations includes 48 states in the United States and countries that include Canada, Mexico, Mongolia, Chile, Poland, Afghanistan, and England. They were recently awarded a contract for covering a 3-pond system to protect irrigation water for fig plantations in Saudi Arabia's agricultural region.

Success Stories

All of this is fine, but producers want to see the facts. They want to know fellow producers that have realized success. At this moment, five producers in four states — Colorado, Minnesota, Wisconsin and North Carolina — are at different stages of installing IEC cover and liner systems to achieve their specific waste management goals. Each is a little different, each with a slightly different challenge, but all with the same common denominator: successfully using IEC products. Below are stories of two different situations.

INCREASED MANURE STORAGE
Ulrich Farms, Dresser, WI

A successful third generation family dairy operation in Northern Wisconsin doubled their milking herd in the last five years to 1000 head. Justin Ulrich says, "We hated to spend money on a waste lagoon, but the wet spring of 2012 was problematic, we knew it was crucial for future expansion." Justin, along with his partners Jake and Corey Ulrich, decided to be proactive and build a new lagoon because they wouldn't be able to expand the herd with their current Lagoon. Ulrich's worked closely with the DNR and their Technical Service Provider. IEC worked with the Ulrich's and installed their liner in addition to a gas-venting system placed under the HDPE liner. Anderson notes, "IEC highly recommends the venting system which allows gases generated from anaerobic decomposition under the liner to be expelled up the side slope and out specialized vents, thus eliminating any possibility of ballooning. "

BIO-GAS COLLECTION AND RE-USE
MilkSource, Kaukauna, WI

MilkSource is owned by three progressive farmers: Jim Ostrom, John Vosters and Todd Willer. Their dairy roots go back to 1965 with 30 dairy cows. They now manage the two largest dairies in the state of Wisconsin: New Chester Dairy in Adams County and Rosendale Farm in Fond du Lac County. Rosendale Farm currently houses 8,500 head of dairy cows, the same number at New Chester Dairy following a recent expansion. With facilities this size, waste product management is a huge responsibility. Here is how each farm is working to be a "green" environmental leader.

Rosendale Farm

For this large-scale dairy farm, part of the waste management plan includes the development of a digester system that is scheduled to begin operation by the end of the year. It means a $7 million capital investment by the University

Installation crew meeting the challenge of a steep side slope dairy basin.

of Wisconsin-Oshkosh Foundation, which is building the digester. Preliminary data shows the system is expected to produce 1.4 megawatts of electric power, or enough energy to power 1,200 homes. Sale of the energy back to the grid will create significant carbon credits for UWO in its quest to be a truly "green" environmental leader. The digester is built next to Rosendale Dairy with shared pipelines running between the two. Once the digester is fully operational, the farm's waste products will generate energy to further enhance the sustainability of the farm.

The basin is unique in the fact that it has a concrete floor and side slopes. However, the finish is rough, so the MilkSource team decided to line the basin with a 16-ounce fabric to protect the gas cover from damage during low liquid pond levels, which will occur during field application periods.

The bio-gas collection system is also IEC's. It incorporates strategically placed gas laterals on the underside of the membrane and a rainwater collection system on top. The laterals effectively channel the gas to the lagoon perimeter where it is collected and pulled to a bio-gas handling system. One of the points MilkSource likes about this design is that it operates under negative pressure, which means the cover lays flat on the water surface making it more wind resistant thus enabling the bio-gas handling system to operate continually, without mechanical start and

stoppage. In addition, the life of the cover is maximized because it does not inflate and oscillate in the wind, which can cause fatigue failure. The rainwater is collected and pumped to minimize waste disposal costs. In dry years, MilkSource has the option to pump the rainwater into the basin, where they can apply it with their digested waste.

Reflecting on the system, Ostrom sees the digester system providing many sustainability options. He notes that historically, dairy farming is one of the best forms of recycling and sustainability around, and points to the reuse of water. "It is used several times on dairy farms before much of it returns to the ground in the spreading process as irrigation – nutrients included. The added ability to use manure to create green

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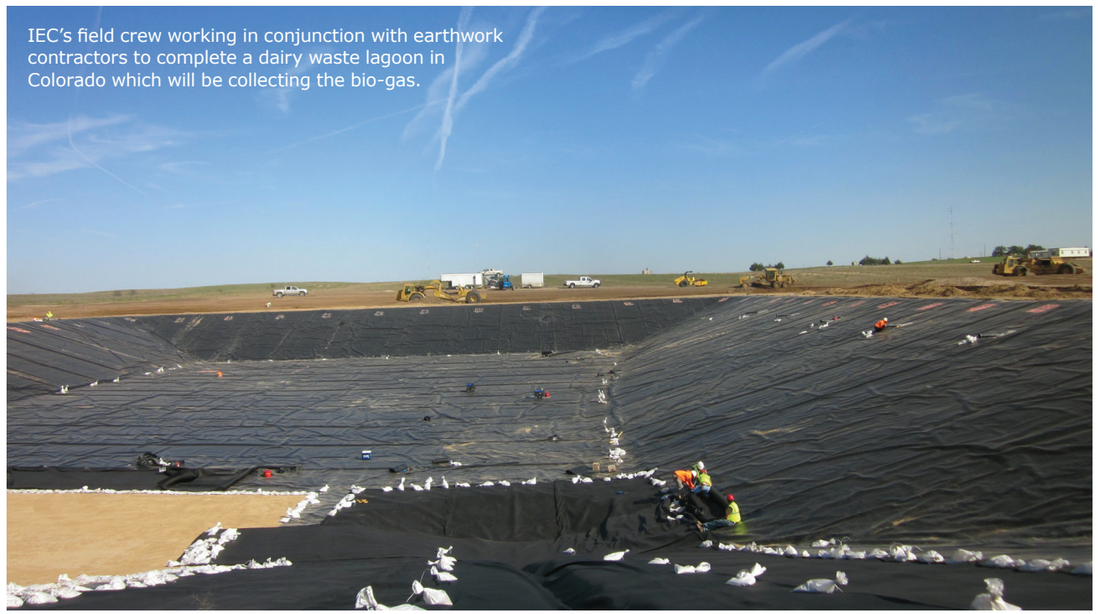

IEC's field crew working in conjunction with earthwork contractors to complete a dairy waste lagoon in Colorado which will be collecting the bio-gas.

Completed anaerobic bio-gas collection cover. The wastewater flows into the basin under the air-tight cover. (For scale; note the worker in the upper left hand corner of basin.)

energy before it is returned to the soil is another major benefit." Anaerobic digestion is a very effective method of breaking down dairy waste to its simplest forms where nutrients can be readily assimilated by agricultural crops. MilkSource's closed-loop system uses everything, making it an environmental and financially wise decision.

In developing their waste management lagoons, Rosendale Dairy is working closely with IEC to design and install their specialized covers with the first installation commencing in mid-October. According to Bill Harke of MilkSource, "The lagoon covers will cover the second stage lagoons with a major benefit being the impact of lessening any potential odors." At Rosendale, IEC had to create two completely different shaped covers because of the different shapes and sizes of the lagoons. Obviously, this is extremely important.

ODOR CONTROL
New Chester Dairy

In April, Clean Energy North America, the owner, builder and operator of the future digester at New Chester Dairy embarked on a plan with other businesses in Adams and Marquette counties to be part of a $25 million anaerobic digester project. When the New Chester Dairy project is completed, it will be the largest in the Upper Midwest and the 10th largest in the country. Murray Simm, a partner in Clean Energy North America, said one of the concerns of dairying is the production of hydrogen sulfide odor. Their anaerobic digestion process will significantly reduce those odors.

In developing their waste lagoons, New Chester Dairy worked with IEC to design the specially made covers. Bill Harke says, "At New Chester Dairy, even though the two covers are exactly the same size, IEC tailored each specifically for those two lagoons."

Why IEC?

Harke notes, "We were able to see IEC covers being used in Minnesota and saw that they were able to work with lagoons of varying sizes and shapes. Dairies that had the covers were pleased with the performances and the vendor."

At the same time, the process has been very smooth. "Because of the constant activity on a dairy farm, being on time and staying out of the way during construction are important keys. The installers stayed right on schedule. In addition, any minor issues that have come up since the installation have been addressed quickly and satisfactorily. Response has been excellent."

The IEC covers have fit in well with the overall plan of the digester system. "The key for us and our covers is in mitigating and minimizing odors, but the covers also have to fit in well with the requirements of the digester and the flow of material back and forth."

Harke says the system has met with their expectations. "We are pleased with the covers. If we had not been more than satisfied with IEC's work at New Chester Dairy, they would not have been asked to do the lagoon covers at Rosendale Dairy."

WANTED: Alternative to Digesters & Odor Control Scrubbers

Most farms don't have enough hours in the day to complete all of the chores or have manpower to oversee a digester. So how can a farmer control odors and digest their waste efficiently? The answer may be less complicated than you know. IEC manufactures an insulated floating cover for this purpose; it floats on 100 percent of the water surface. The air to water interface is eliminated, therefore significantly reducing odors. Both the cover and biological layer that form directly underneath, contain and tend to keep sulfides in water, where they belong. An added benefit of the insulation is it retains water temperature, promoting essential microbial growth for digestion. This cover design does not require bio-gas handling or rainwater equipment. It's maintenance free, floats up and down with variable water levels, giving the farmer more time to dedicate to his livestock and crops. ■

IEC PRODUCT OPTIONS
Bio-Gas Collection Covers
Odor Control Covers
Tank Covers
Heat Retention Covers
Liners

IEC COVER AND LINER SERVICES
Engineering and Design
Factory Manufacturing
Project Supervision & Installation
Project Management
Final Inspection
Emergency Field Repairs & Service

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