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Dilution Solution

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A runoff system and daily recycling benefit a dairy and the environment

Bill Van Beek feeds almond hulls, carrot culls and other processing byproducts to his cows, and recycles twine and other debris.

The carrot culls that don't make it to market? Bill Van Beek will buy them. The almond hulls, citrus pulp and liquid whey that processors discard in their food-producing operations? He'll take those, too. Baling twine, plastic silage covering, agricultural bagging, cardboard, cans, bottles? None of those end up in Van Beek's trash bins either.

Bonus Content

Sustainable Conservation

Pioneering study finds small amounts of dairy antibiotics in groundwater

The "reduce, reuse, recycle" philosophy is second nature at Van Beek's Tipton, Calif., dairy, where he milks 2,700 cows in a sand-bedded freestall operation and farms 660 acres of corn, wheat, cotton and pistachios. It's all part of an effort to streamline operations while protecting the environment and benefiting the dairy. "The more efficient we are, the more competitive we can be," he says.

Food processing castoffs are plentiful in central California, which grows dozens of crops. Like most California dairy producers, Van Beek buys the discards to feed to his cows. Culled carrots, for example, are a nutritious addition to his herd's feed mix and an economical way to help manage his feed costs. Likewise, every day, a truck delivers 6,000 gal. of liquid whey, a byproduct from a nearby cheese processing plant. Van Beek mixes the high-protein addition into his cow's daily feed.

"Cows get such a bad rap, but if we didn't have cows, what would we do with the dried distillers' grains, cottonseed and all the other byproducts?" Van Beek asks. "Cows are the perfect solution for recycling."

Van Beek has a recycling bin on his dairy so that he and his 25 employees can deposit the twine, bagging and coverings that would otherwise end up in a landfill. Once a week, a recycling company picks up the bin and hauls it away. Van Beek gets nothing for these recycling efforts, but he's glad to see it all go.

Perhaps the biggest recycling effort on Van Beek's six-year-old dairy involves water. Two years ago, he undertook a pipeline project that allows him to mix and evenly disperse lagoon water and fresh well water over his fields.

Working with Sustainable Conservation, a nonprofit organization that helps dairies and other industries implement environmental solutions, Van Beek replaced his farm's aging concrete pipeline system. Today, five miles of 16" plastic pipe carries lagoon water underground to irrigate 660 acres of his crops. With the new system's monitoring abilities, Van Beek can dilute and apply liquid manure at proper levels.

"Since we put the pipeline in, we can disperse water to our entire ranch," Van Beek says. "It allows us to be more flexible. We can blend our well water and manure water much more easily."
That means Van Beek's corn and wheat crops no longer get too much of a good thing. Now he knows how much nitrogen is reaching crops, and he doesn't worry about groundwater contamination or overloading the root zone with too many nutrients.

"We're seeing yields of 15% to 20% higher," says Van Beek's son, Bill, Jr. "We don't have to guess how much nitrogen is in the soil or plant tissue. It's better for the environment, and we spend less money by not having to buy nitrogen if we don't need it."

The $80,000 tailwater return system was made possible by a $55,000 grant from Sustainable Conservation; Van Beek paid for the rest. He plans to install one more pipeline to cover a half-mile span of property.

A major lagoon-water system upgrade resulted in higher crop yields, fewer dollars spent on fertilizers and reduced chance of groundwater contamination, Bill Van Beek says.

Study Explores Groundwater Pollution

When Thomas Harter of the University of California, Davis, asked Bill Van Beek to participate in a study on the impact of dairies on nitrates in groundwater, the California dairy producer readily agreed.

Harter, a groundwater hydrologist, wanted to include dairies outside the monitoring-well network he established in California's Merced and Stanislaus Counties, farther north. Ground-water levels there are often as shallow as 10', compared to 100' depths in the Tulare area, where Van Beek's dairy is located.

The project, conducted from 2007 to 2009, involved eight dairies in the San Joaquin Valley and 80 monitoring wells. Harter will announce his findings in mid-2011. So far, he can point to three factors that control the amount of nitrates in groundwater:

1. Nutrient management, or the balance of manure application, land and crop uptake.

2. Soil type—sandy soil allows easier nitrate leaching into groundwater than heavier soils.

3. Denitrification, or the natural removal of nitrates. This can occur if a large layer of clay sits between a crop's root zone and groundwater—not a major factor in the San Joaquin Valley.

"That leaves good nutrient management as a key tool for preventing large amounts of nitrates from appearing in groundwater," Harter says.

Harter has also looked at the level of antibiotics from dairies in groundwater. His findings, released in August, reveal that the drugs routinely end up on the ground and in manure lagoons, but many are broken down before they reach groundwater.

Proper manure nutrient management and minimizing the prophylactic use of antibiotics, Harter says, are important for avoiding groundwater impacts from pharmaceuticals.

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