

Methane Reduction Strategies on California Dairies

Gillian's Dairy, Sonoma County

Description of Operation:

Gillian's Dairy has been operating for 20 years and has always been pasture-based, achieving organic certification in 2006. They now have a herd of 220 head on 280 acres at the dairy, and they rent another 700 acres nearby for hay, sheep and young dairy stock.

Manure Management Approach:

Like many on the North Coast, the dairy was located many years ago near a creek. When the Mahrts started their operation, all of the manure ran into one pond that had insufficient capacity for an all-liquid system and would have caused water quality issues. Instead, they started composting the manure inside the cow barns during the winter when the cows were not on pasture, a system called "compost pack barns," more common on midwestern dairies. Research in the Netherlands suggests that this approach may lower methane emissions (see: <http://dx.doi.org/10.18174/393409>).

In the fall, the barn is prepared by laying down one to two feet of rice hulls or sawdust. With a rototiller, the bedding is turned daily and sawdust or rice hulls are added as needed (once or twice weekly) to maintain an aerobic environment and to provide a carbon source. In spring when the cows are on pasture fulltime, the composting manure is emptied and left for another year, and it is then spread on pastures and hay fields.

Benefits to Producer:

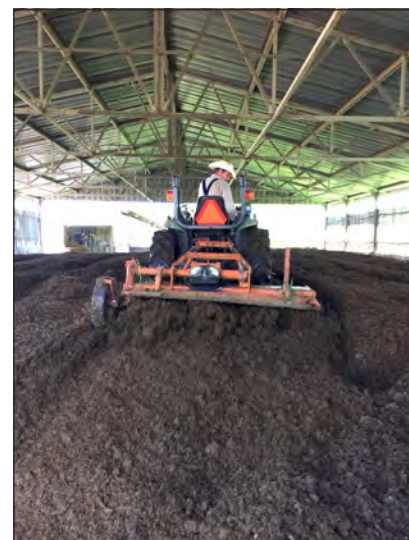
- Composting in the barns keeps the compost covered and dry and prevents it from becoming anaerobic and hard to manage
- Compost serves as a valuable soil amendment for hay crop and pastures (it contains more nitrogen than waste from a manure lagoon)
- Keeps the dairy in compliance with water quality regulations; minimal ammonia emissions
- Bedding material under cows improves hoof and leg health and may lead to longer-lived stock

Challenges, Barriers, and Desired Improvements:

- Turning the piles daily is labor-intensive; during wet winters, more management is needed since cows are indoors more of the time
- Rice hulls as bedding, though inexpensive, contain a lot of silica and take time to break down; finding an affordable alternative is challenging
- Would like to retrofit barn with a forced air system that vacuums air from underneath the bedding. This would mean less labor and fuel to turn the piles, and he could install a moisture trap and air quality monitoring equipment to manage the system

Cost Estimate for System = \$910 per cow

The forced air retrofit would cost approximately \$100,000. To build a new barn with air circulation would cost about \$200,000.



Garry aerating composting manure after animals have been moved out to pasture



Bedding and composting manure is 1-2 feet deep

"When talking about liquid slurry systems, my dad used to say 'You take one gallon of manure, add nine gallons of water, and you get 10 gallons of shit.'"

— Garry Mahrt



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