

The Challenges and Results of 25 years use of Digester Systems on Mason-Dixon Farms (MDF)

Richard C. (Dick) Waybright

The first digester was 90 feet long, 20 feet wide, 14 feet deep built in 1978.

Rather than describe all the learning steps to develop a working digester at MDF I will give our success formula principles for a working system.

1. The goal for dairy cattle manure is to scrape the manure and urine from alleys on a daily basis into the digester. If you are using a flush system or sand bedding in free stalls forget even trying. The economics of flush water manure is too diluted and sand-laden manure will require frequent sand removal from digester.
2. Build digester above the water table so that ground water doesn't rob heat from digester.
3. A round digester only has 60% of wall surface of a rectangular design. Also wall construction cost for rebar and cubic yards of concrete are reduced by a similar amount.
4. Install a divider wall through the center of the circle extending it to within six feet of the other side. From this wall install 3-inch black iron heating pipes at least 6 inches away from the wall attached to channel iron embedded in the divider wall. Remember to use stainless steel pipe nipples through the outside wall.
5. Concrete lid is poured on top of walls to carry the weight. For example, a 68 feet diameter tank by 14 feet will accommodate 800 cows.
6. Load tank three feet from top on one side of central wall and discharge from opposite side.
7. Mound ground over digester for insulation.
8. If possible locate digester so input slurry will enter by gravity.
9. A 1200-pound cow unit will produce about 2.2 kW per day.
10. We maintain 105 degrees F in digester.
11. We are now building our 4th digester to handle the manure from 2500 cows.
12. The digester system at MDF just completed 25 years of successful operation.
13. 17 % of energy sold to power grid at grid price, which is variable according to time of day or night price.
14. All manure solids are separated from spent slurry and composted to destroy weed seeds and pathogens before using for bedding and etc.
15. The liquid part is spread by center pivot irrigation by a four mile buried 8-inch PVC pipe to center pivots or for storage during winter months.
16. Be sure to design for low maintenance without a lot of bells and whistles, which reduce profitability