How to choose the best anaerobic digester

Doug VanOrnum for *Progressive Dairyman*

Most people assume that all anaerobic digesters – whether they are above-ground round tanks or towers, below-ground square, rectangular or octagonal vessels – are essentially doing the same thing in the same way. This is not the case. Digesters come in different shapes and design configurations (with names like complete mix, plug flow, UASB and others) for a good reason – to more effectively and efficiently process a specific waste stream and its unique characteristics.

In fact, there is no single digester design that is the "most suitable" for all waste streams. They each have their own strengths. However, it may be your experience, when you contact the providers of these systems, that they all say their anaerobic digester solution is "the best."

Indeed, many digester companies offer quite reasonable solutions that are appropriate for some waste streams (but not others). So how does a farmer determine which design and anaerobic digester system provider is the best for their own farm? Who is successfully solving problems for farmers?

Once you have decided to employ a digester, choosing your digester technology provider can be a daunting challenge. There are surprisingly few independent and unbiased resources a farmer can review on the subject. Some designs are more practical in some countries (where anaerobic digester systems enjoy high government subsidies), but not others. Online information, as we all know, can be out-of-date even if just a few years old or just plain incorrect.

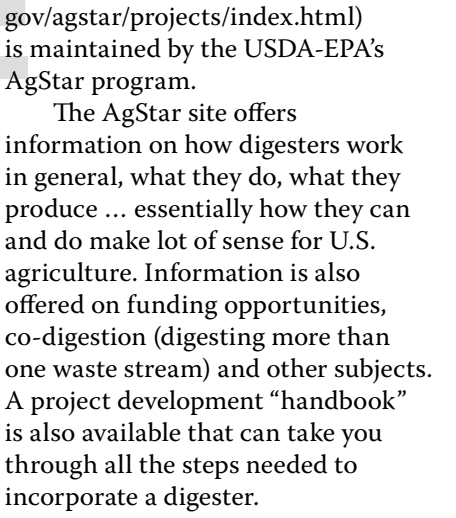
Because making the wrong choice can have lasting negative repercussions, it pays to persevere and spend a little time sifting through the resources that do exist, starting with anyone you know who already has a digester. Call them and ask if they will tell you their story. If their experience with an aerobic digester has been very positive, you will learn from them what works. And if they have had a less-than-positive experience – you will still learn what you probably want to avoid.

One free online educational resource for farmers interested in agricultural digesters (www.epa.gov/agstar/projects/index.html) is maintained by the USDA-EPA's AgStar program.

The AgStar site offers information on how digesters work in general, what they do, what they produce … essentially how they can and do make lot of sense for U.S. agriculture. Information is also offered on funding opportunities, co-digestion (digesting more than one waste stream) and other subjects. A project development "handbook" is also available that can take you through all the steps needed to incorporate a digester.

What AgStar will not tell you is which anaerobic digester system provider has the best system for your particular farm. Nor does it track the digesters that have ceased operation for any reason (a pity, as that would be a great indication of a company's track record over time). However, AgStar does provide some very useful starting points. The projects page, for example, contains a link to a listing of all the operating ag digesters in the U.S. for dairy, swine, poultry, beef and mixed. This is in an Excel spreadsheet format which allows you to sort by any column, including state, digester type, system designer, year operational, etc. You will also see farm sizes, how the biogas produced is used, emissions reductions, installed electrical production capacity and other important project variables. You may also see if some providers have repeat customers.

When selecting a digester, performance is a very important comparison criteria. Performance



Doug VanOrnum

Business Development/ R&D

DVO, Inc.

dougv@dvoinc.net

means for a given volume of manure, how thoroughly will the waste be processed, how much biogas is produced, what level of pathogen destruction and odor control you can expect, etc.

Because many farmers add additional substrates to their digester, determining actual performance on dairy waste alone (for example) can be difficult. The anaerobic digester system provider should be able to tell you how much biogas you will see per milking cow (or milking equivalent), and you will probably want to verify this by speaking with some of their customers (accurate third-party independent data can be hard to come by).

Digester performance also affects the animal bedding quality of the separated biosolids. Generally, waste that is more thoroughly digested (producing more biogas in the process) will also produce a superior biosolid as a result. Here are some useful design and performance criteria for making technology comparisons:

Requirements for a successful digester

- Guaranteed (or sufficient) retention time for the entire waste stream (for higher efficiency and pathogen destruction)
- No stratification of solids in-vessel
- Constant temperature is maintained
- Full dispersion of bacteria population
- Ability to handle multiple waste streams
- Ability to handle a wide range of waste streams and percent solids concentration

Digester selection criteria

- Farm-practical operation
- Low maintenance
- Cost per kilowatt produced
- Kilowatt produced per unit of waste
- Ability to accept different percent solids
- Number of systems in operation (experience and track record)
- System's parasitic load (percentage of kilowatt produced)
- Quality of separated solids and liquid effluent
- Third-party data or performance verification

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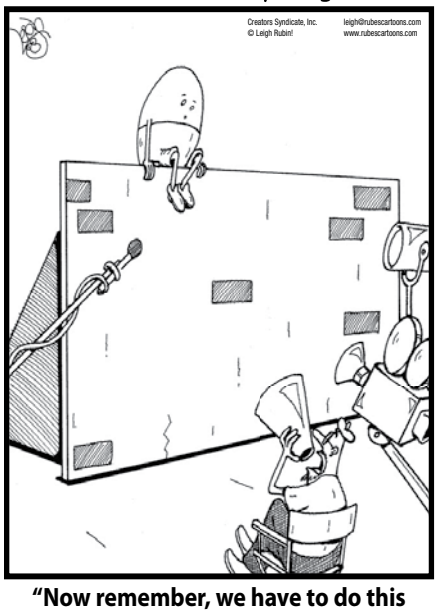

"Now remember, we have to do this scene in one take."

Published testimonials provided by digester system providers can also be helpful. However, be aware that the system designer will not pass along to you any negative feedback. There are digester companies with a nearly 100 percent track record of success – and others with a less-than-stellar track record. One indicator of the former is if third-party investors are willing to finance digesters for farmers. If a digester company has a poor track record, there will be few or none willing to invest in their system.

Here too, even if someone does offer to contract for your waste stream and finance a digester, you should still evaluate and consider their choice in digester technology, especially if you will be depending upon the biosolids and other products from it (like any other vital piece of farm equipment).

Most farmers will discover they enjoy this process of technology exploration and learning all about anaerobic digesters. They often will contact and meet with other farmers who already have digesters – hopefully more than a few – and from them will certainly learn more about what a digester can really do for their own farm (more so than from any digester system provider). **PD**