

Mason-Dixon

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Manure entering the pit contains about 12-percent solids. In its two week long journey through the pit, the manure loses 20 percent of its weight, much of its acidity and comes out at the other end bearing nine percent solids.

Engineering for the system, which was installed in September, was done by the firm of Sheaffer and Roland, with offices in Washington, D.C., and Chicago.

Many of the construction techniques are still Sheaffer and Roland secrets, but the basic idea is simple, according to Jack Sheaffer, a Lancaster County native from the village of Bird-in-Hand.

Sheaffer holds a PhD in engineering, lives in Chicago and is president of Sheaffer and Roland. S&R, he said, has been working on methane electrical generation for a number of years, but that this is their first really successful venture.

"This is an economic unit," Sheaffer said.

"We didn't need a government grant to build it. There are lots of digesters around the country, but this one works. It should pay for itself in anywhere from three to five years, and it takes a minimum of labor to operate.

"It can be readily linked to a still for the production of alcohol, and it can help solve the dairyman's pollution control problems."

Sheaffer said the Waybright system cost \$150,000 and that with all the engineering work done, and the experimental bugs worked out, they could not reproduce a similar system in anywhere from three to four weeks.

One drawback to the system is the number of cows needed to make it economically feasible.

Sheaffer feels 400 cows would be needed to make the system pay for itself with electrical power savings.

But that doesn't take into account the pollution control, the value of the alcohol that could be generated with a still using waste heat from the generator, or the value of

the reclaimed bedding that Waybright is getting from his system.

At Mason Dixon, they've got more than enough cows to power the system. In fact, they're only using part of their cow power.

A freestall barn housing 700 cows is flushed twice a day, with water recycled from previous flushings and from the milk parlor.

Some of the manure laden water goes into the pit below the bag.

In order to work, the pit must be kept at least at 95-degrees F., although it is running five-to-eight degrees above that.

Heat to keep the pit warm comes from a heat exchanger on the generator. Water warmed by the generator circulates through pipes in the pit.

Biogas production has been going so well that Met Ed is seriously interested in hooking the farm onto their power grid as an electrical supplier.

If the figures developed by Sheaffer and Roland are borne out by a year or so of practical experience on the Mason Dixon Farm, the likelihood that other utilities would hook up to other farms seems almost certain.

Waybright's construction cost per kilowatt of generating capacity was \$350. That compares to \$1200 for a nuclear plant, and

about \$1500 for a coal generating facility.

Waybright expects to be using a 300 kw generator to supply Met Ed, and he thinks he might be able to run it off the same manure pit now supplying his 100 kw generator. There is a possibility, though, that they'll have to build another pit.

With the excess heat from the generators, a 200-gallon per day gasohol still will be put into operation.

The still would use nearly half the farm's corn crop of 65,000 bushels per year.

Going into the still, the corn would be seven to nine percent protein. It will come out as distillers grains at about 30 percent protein, which the farm would use for dairy feed.

If the still were to operate 300 days a year at 200 gallons a day, Waybright feels they would be able to replace all or a major part of the 25,000 gallons of diesel fuel and 15,000 gallons of liquid propane they now buy annually to run tractors, to heat water and to dry their hay and grain.

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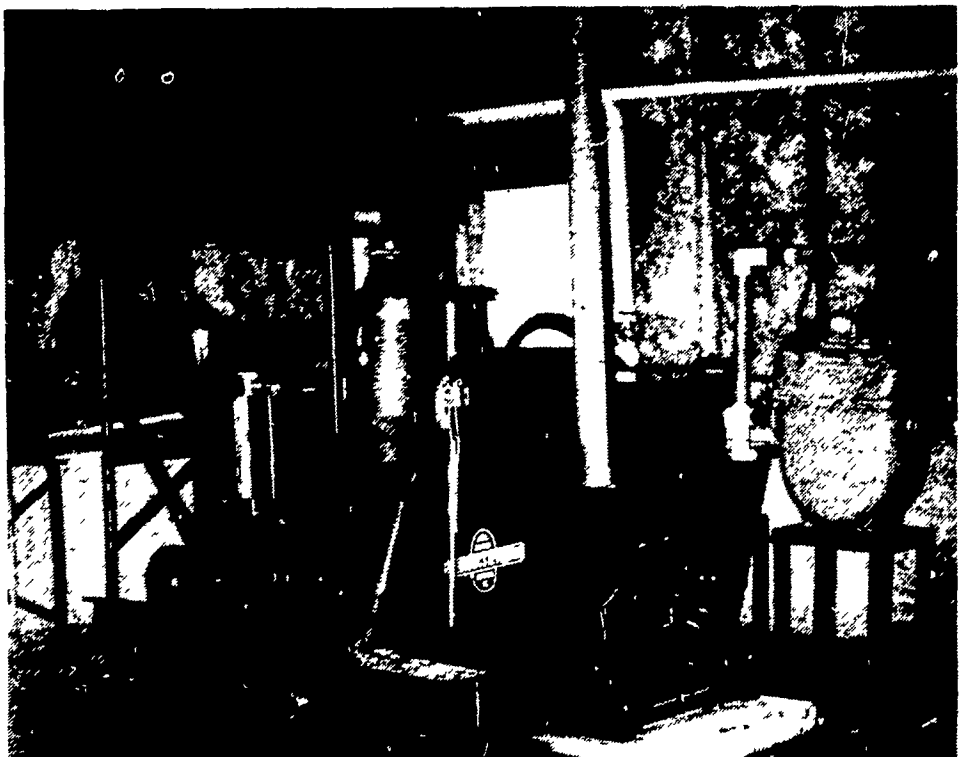
This black rubber bag traps methane gas escaping from fermenting manure from part of the Mason Dixon dairy herd.



Richard Waybright, part-owner and manager of Mason Dixon Farms, Inc.



Some 200 reporters and government officials converged on the Mason Dixon Farm Wednesday to look at a methane digester that should cut the farm's annual electricity bill in half, from \$30,000 to \$15,000 and eventually eliminate the need for any power purchases.



The Stewart & Stevenson dual fuel Diesel engine drives the Delco generator which provides electrical power for the farm. The piping in the background transfers methane gas from the digester to the engine. The rectangular metal box located above the engine in the exhaust piping will recover the waste heat from the engine. Future plans call for this waste heat to power a grain distillation plant.



Manure that has passed through the methane digester is free of disease-causing organisms. By extracting the liquid from the solids, the solids can be used for bedding. The machine that separates the solids and the liquids is a new idea from Surge, and is now being test marketed around the country. Initial units, at about \$25,000, are still quite expensive.