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Covered Lagoon Controls Odors

Julian Barham • Zebulon, North Carolina

Julian Barham's decision to build a biogas digester made his hog farm one of the most visible in North Carolina, just when the state's pork industry drew intense scrutiny from media and environmentalists.

He became accustomed to frequent visits by North Carolina State University (NCSU) scientists, who monitor the farm, plus other curious folks. Still, he tried to keep a low profile. "I have always considered myself an environmental steward. I believe most farmers think this way," he says.

His two goals for environmental stewardship: "I want my operation to produce and exist without my neighbors even knowing I'm there. And I want to leave the environment in better shape than I found it," he says.

"What farmers do with their land and how they use their land does affect others. This is the reason we have so many environmental regulations that affect agriculture. I think we can all expect more

regulations in the future. It's obvious that the public wants clean water and clean air and agriculture is beginning to be regulated more like commercial industry."

Barham's 4,000-sow, farrow-to-wean operation, currently contracted with Prestage Farms, didn't happen overnight. He and his wife, Elaine, started with an independent, farrow-to-finish operation in 1979. In 1985, they became contract producers with Murphy Family Farms, leasing a sow farm in Pittsboro, NC, while still running the home farm. In 1987, they bought and began operating three additional farms in Nash County, NC.

With an engineering degree from NCSU, Barham first operated the hog business part-time while working a regular job. When he turned 30, (1980) he decided to farm full-time. But he spent a lot of time driving from farm to farm so he decided to consolidate to gain more efficiency. In 1994, he broke ground on the current farm located on 300 acres.

Barham wanted to build a biogas digester on the new farm but information was unreliable. So, he built what he calls a typical lagoon to handle waste from the two farrowing houses and four gestation houses. Each house has eight pits in a recharge system to collect manure.

By 1996, he decided technological advances made it feasible to build a biogas digester on the farm. An additional lagoon had to be built to biologically stabilize the manure. The original lagoon is now used for temporary storage.

"Not many methane projects are around so there's a lot of interest in it," explains Barham. The close proximity to the university allows Mike Williams and other NCSU staffers convenient access.

"The basic idea of this really appealed to me from the beginning; taking a waste product and making a renewable energy source," he says.

Though the digester seems to be working well now, it got off to a rough start. The concept was fine but finding a

cover that worked well was a problem. “When we started this, I was foolish enough to believe the cover was the sure thing and I was worried about the generator. Just the opposite proved to be true,” he explains.

After two cover failures, he finally found a good, high-density polyethylene material that seems to be well designed. A poor cover won’t keep the gas in or the oxygen out. Nor will it allow gas to be moved to the disposal point – a common problem with methane digesters, he explains.

“The cover came in large rolls that were welded together to fit what we needed. It was all built here on the site,” he says.

Barham believes covered lagoons work great in North Carolina but he’s unsure how they’d do in a cold climate. “I’m only aware of one other (digester) running right now. These systems are not for everybody,” he adds.

Odor-producing compounds are consumed in the anaerobic digestion process in the covered lagoon. Then the biogas, 75% methane, is collected and transferred by the cover to an engine generator. The system is connected with Carolina Power and Light but it mostly generates electricity for the farm.

But selling electricity back to the power company never figured big in his plans. “I never looked at it from a money-making standpoint. My thinking was that with all these people moving into the area, the cover on the lagoon would keep the odor down. From an environmental standpoint, it’s a positive step,” Barham says.

“But then when you look at the cost, you almost have to have a revenue source to justify it. The generator will produce some income. It will pay its way. Environmentally, it’s great. But I don’t know that it’ll ever be a major income source for the farm,” he adds.

Total cost for the cover, lagoon and

generator pushes \$300,000. “A small farm couldn’t do that,” he says.

The covered lagoon effectively stopped odor. The only odors now come from the exhaust fans in the buildings and scientists are working to reduce that.

“These are tunnel-ventilated buildings and the air quality inside is excellent. We’re working on the fan odor and may be able to reduce that,” Barham says.

Currently, the farm’s lagoon water gets irrigated onto hay fields of Tifton 44 Bermudagrass. Even though the water from the traveling gun has no odor, he stays with the irrigation rig at all times.

“I never irrigate unless I’m in the field with the system,” he says. “It’s the most environmentally dangerous thing we can do, so I watch it closely. This is a hard-hose traveler on rolling land with clay soil that changes as you go through the field. The biggest danger is runoff. Belts can break. There can be problems. Because of that danger, I stay with it even though I’m not required to by law.”

But he has become disenchanted with the hay business because it’s a low-value crop and there’s not much market for it in the area.

He’d prefer to grow tomatoes using the lagoon water. Greenhouse tomatoes. It’s such a new idea he’s worked more than a year just to get a permit allowing him to do it.

“I want to put the waste water into greenhouses. Then we’ll know exactly where the water is going, and we’ll be producing a crop of value,” he says. Teams of NCSU researchers – a horticulturist, a nutrient specialist, a pathogen specialist and a greenhouse engineer –

have come to his aid, advising him on the project. “They tell me there’s no danger of pathogens on the tomatoes as long as the water stays in the roots. You can’t over-spray the tomatoes, so we’ll do it through the roots,” he says.

The tomato plant will grow in a soil media, which should improve quality and taste. As long as the tomato itself never touches the soil, no animal pathogens will be on it, according to the researchers. The concept appeals to him just about as much as installing a methane digester did.



After running several widely separated smaller hog farms, the Barhams consolidated on one farm to become more efficient.

“If we do this with tomatoes, we can eliminate our spray fields and stop irrigating.”

Located in a rapidly urbanizing area, Barham would like to give neighbors as little reason to complain as possible. “A lot of the people living in developments around here aren’t even aware the farm is here. In fact, the best compliment we get is when we meet a neighbor and they say they didn’t realize there was a farm back here,” he says.

“I really don’t want any problems. I’d prefer that they’re not bothered by me. Hey, I don’t want to smell the farm and it’s my farm,” he says.

Walking among his clean, well-landscaped buildings, Barham says he’ll keep pushing to get better. “I believe the American dream for most farmers is to leave a farm that will produce in such a way to make life easier for their children and grandchildren,” he says. “We may feel like we own the land, but in God’s eyes and on God’s calendar, we all have a short-term rental agreement.” ◇

Standing on his covered lagoon, Julian Barham says after overcoming initial cover problems, his methane digester is working well and producing electricity for the farm.

