

Five Cleaner Systems for Treating Hog Waste *What They Are, How They Work*

Traditional lagoon system vs. new technologies

Waste processing on hog farms typically involves several treatment steps. In the traditional lagoon and sprayfield system, the first step is to flush hog waste out of barns and into a lagoon. In the second and third steps, solids settle in the lagoon, and the upper layer of liquid is sprayed on crop fields.

New, cleaner technologies typically include ways to capture waste as it is flushed out of the barn and then separate the liquid and solid portions for further treatment without a lagoon. Of the five systems identified by N.C. State University (NCSU) as environmentally superior technologies (ESTs), four treat solid waste and one treats liquid waste. At least two more systems are close to meeting stronger environmental standards.

The five systems designated as environmentally superior are:

Super Soils (two components, both ESTs)

The Super Soils solids separation and water treatment system and the Super Soils solids compost treatment system are two technologies that link together to provide a complete treatment system. The water treatment system removes nearly all the nitrogen and phosphorus from the liquid phase by converting them to harmless end products or capturing phosphorus within the solids. The treated liquid is then used to flush the barns or applied to land to irrigate crops. Solid waste is transported from the farm to a centralized location, where it is converted into various soil products that meet the specialized needs of various consumers, such as the plant nursery and golf course industries. Solid waste separated by the Super Soils system can also be processed by other approved ESTs.

A second generation of Super Soils technology is off the drawing board and promises to streamline the waste treatment process and reduce costs, while maintaining environmental performance. The second generation testing will also evaluate co-firing the separated solids in a coal power plant.

High Solids Anaerobic Digestion

The ORBIT technology uses bacteria to treat solid waste in an enclosed vessel, capturing the ammonia and breaking down odor compounds. Of special importance, this technology also produces and captures biogas (methane) from solid waste that can be burned as a renewable energy source. ORBIT is unique among anaerobic digesters because it can process waste that is up to 50% solids, much drier than typically used. Because solids separated from hog manure actually still contain about 80% water, ORBIT likely will combine hog waste with drier solids to produce a material more appropriate for this technology. There are many such sources of solid waste, such as poultry litter, available in eastern North Carolina. Residual material from the digester is free of pathogenic bacteria and can be used as a fertilizer, compost, soil amendment or various other products. Currently, the NC Department of Transportation is examining the potential for using these byproducts on roadside vegetation.

Gasification

A gasifier is a nonbiological process with very low emissions that converts solid waste into combustible gases. This process can produce a clean-burning gas from hog manure or poultry litter. The gases could be burned to produce electricity or converted into fuels such as ethanol and hydrogen gas. The residual ash is free of pathogenic bacteria and can be used as a feed supplement or a fertilizer.

Combustion in a Fluidized Bed Reactor

This technology burns dried hog waste solids or poultry litter. It meets the NCSU environmental parameters for ESTs, but it will also have to qualify for all other appropriate environmental permits for emissions of oxides of nitrogen (NO_x), particle pollution (soot) and air toxics (e.g., mercury, arsenic). This technology focuses on converting the solids to ash and reducing its volume to a small percentage of its original state. The ash could be used as a fertilizer or feed amendment. Combustion also holds the potential for electricity generation.

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