

Bacterial filters reduce stink from big pig factories

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Concentrated animal feeding operations (CAFOs) on industrial animal factories can stink up an entire county, due to ammonia, and a smorgasbord of volatile organic compounds (VOCs). Jeppe Lund Nielsen of Aalborg University, Aalborg, Denmark, et al. report that biofiltration with microbial filters can remove most of the butyric acid, dimethyl disulfide, and ammonia from the exhaust air, along with other smelly compounds. The research is published in the December 2011 issue of the journal [Applied and Environmental Microbiology](#).

The investigators mounted trickle biofilters directly on livestock facilities. These filters are stuffed with porous corrugated [cellulose](#) pads that serve the bacteria as soil does plants, and irrigated with water to support the active [biofilm](#) and wash away toxic waste.

“We hypothesized that the bacteria in these air filters would be highly specialized, with individual microbes targeting specific organic compounds in the smell, which consists of 200-300 compounds in total,” says Nielsen. The study’s main aim was to identify microorganisms involved in breaking down butyric acid and dimethyl disulfide, as well as to measure their performance. The filters removed 99.9 percent, 94 percent, and 90 percent of the butyric acid, dimethyl disulfide, and [ammonia](#) in the exhaust air, respectively, as well as reducing carboxylic acid concentrations by more than 70 percent, organic sulfur compounds by up to 50 percent, and various aromatic compounds by anywhere from 48 to 89 percent. The main community members breaking down dimethyl disulfide were Actinobacteria, followed by the

betaproteobacterial ammonia-oxidizing bacteria, and bacteroidetes, as well as some fungi.

Nielsen adds that humans can smell some of these compounds at concentrations of less than a part per billion, and thus, that “only very specialized microbes [would] thrive at such low concentrations... This aspect of the filter environment was expected to select for a uniquely tolerant group of specialized microbes.”

More information: Anja Kristiansen, et al, 2011. Butyric acid- and dimethyl disulfide-assimilating microorganisms in a biofilter treating air emissions from a livestock facility. *Appl. Environ. Microbiol.* 77:8595-8604.

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