

# Southern soils mitigate manure microbes

September 10 2010

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That swine manure sprayed on to fields adds valuable nutrients to the soil is well known. But what is not known is whether all that manure is bringing harmful bacteria with it.

A new study looks at the levels of nutrients and bacteria in soils of fields that have been sprayed with manure for fifteen years or more. The research team, composed of scientists from the USDA-ARS Crop Science Research Laboratory at Mississippi State, tested soils inside and outside fields of five farms on twenty different soils types. Their results are reported in the September-October 2010 [Journal of Environmental Quality](#), published by the American Society of Agronomy, the Crop Science Society of America, and the [Soil](#) Science Society of America.

Manure sprayed fields were found to contain higher concentrations of several types of bacteria. These include measurements of total bacteria, fecal bacteria, *Staphylococcus* (a common bacteria living inside animals and a potential human pathogen) and *Clostridium* (common gut inhabitants and potential pathogens).

Two other types of bacteria that are potential pathogens, *E. coli* and *Enterococcus*, showed no differences in between sprayed or non-sprayed fields. One type of bacteria, Listeria, was found in higher concentrations outside, rather than inside, the fields. Two gastrointestinal pathogens, *Campylobacter* and *Salmonella*, could not be cultured in any significant amount from the fields, although [DNA testing](#) did detect some bacteria, though there were no differences between sprayed and non-sprayed fields.

The investigators also analyzed public health data from three public health districts with similar land areas, populations, and agricultural bases, but with varying numbers of swine confined animal feeding operations (CAFOs), a typical source of swine manure. Their analysis of annual reports of illnesses caused by *Campylobacter* and *Salmonella* from 1993 through 2008 showed no relationship between reported cases of these human illnesses and swine CAFO numbers.

The research team also tested soils for nutrient levels. These tests showed higher pH and higher levels of phosphorus, potassium, magnesium, sodium, copper, and zinc inside spray fields compared to outside. These results were consistent with what was expected for spray fields after long-term use. Finding differences between the same soil types inside and outside confirmed that outside soils had not been contaminated with manure and would provide good comparisons of bacteria.

"Finding low levels of pathogens outside spray fields is not surprising, because these bacteria are known to infect a wide range of wild and domestic birds and animals," said team leader Mike McLaughlin.

Team microbiologist, John Brooks, added, "Finding similar low levels inside and outside the spray fields suggests that the low levels of pathogens in [manure] are further diluted in spray fields and either do not survive in soil or survive at low levels below cultural detection limits."

This first report on spray field bacteria in the region suggests that manure nutrient management plans have been effective for nutrients and for bacterial pathogens. Future research will focus on enhanced resolution of pathogen levels in [manure](#) and soils, on pathogen survival and transport in soil and on plants, and on practical solutions to further reduce or eliminate risks from these pathogens.

**More information:** View the abstract at  
[www.agronomy.org/publications/ ... /abstracts/39/5/1829](http://www.agronomy.org/publications/.../abstracts/39/5/1829)

Provided by American Society of Agronomy

Citation: Southern soils mitigate manure microbes (2010, September 10) retrieved 25 April 2024  
from <https://phys.org/news/2010-09-southern-soils-mitigate-manure-microbes.html>

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