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Manure subsurface injection reduces antibiotic-resistant bacteria runoff

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Lead author Dr. Sheldon Hilaire prepares a subsurface injection treatment of field plots at Virginia Tech's Kentland farm by pouring liquid dairy manure into a premade injection slit. Photo by Dr. Jesse Radolinski.

Compared with surface application, subsurface injection of manure generates less surface runoff of nutrients, sediment, and antibiotics. However, it is unclear how subsurface injection affects the fate of antibiotic-resistant microorganisms in manure.

The *Journal of Environmental Quality* reports new research where dairy manure was surface-applied and subsurface-injected and followed by simulated rainfalls on the first and seventh day. Culturable antibiotic-resistant fecal coliform bacteria (ARFCB) were tested for the surface runoff generated from each simulated rainfall and for the soils up to the 45th day.

Subsurface injection, compared with surface application, resulted in less ARFCB in surface runoff after each simulated rainfall with higher reduction during the first day of simulated rainfall compared with the seventh day. The ARFCB were undetectable in surface soil (0–5 cm) beyond the 14th day after manure surface application, but they were still detectable in the manure injection slits on the 45th day.

This study suggests the co-benefits of manure subsurface injection in reducing the surface runoff of antibiotic-resistant microorganisms along with other manure-associated contaminants. However, longer-term monitoring should be conducted to understand the fate and impact of ARFCB in the manure injection slits.

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Hilaire, S.S., Chen, C., Radolinski, J., Leventhal, T., Preisendanz, H., Kleinman, P.J.A., … & Xia, K. (2022). Culturable antibiotic-resistant fecal coliform bacteria in soil and surface runoff after liquid dairy manure surface application and subsurface injection. *Journal of Environmental Quality*. **https://doi.org/10.1002/jeq2.20332**

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