Hand County #2

Manure research article—manure management

I did not print each out; but quoted a few.

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Research articles

<https://www.progressivedairy.com/topics/manure/guidelines-for-applying-liquid-manure-on-tiled-fields>

<https://www.no-tillfarmer.com/articles/8235-tile-covers-and-manure-tame-tough-variable-soils>

<https://farmwest.com/book/export/html/957>

<https://www.agriculture.com/news/livestock/manure-cover-crops-fit-well-together>

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Typically, the contamination concerns are fecal coliform bacteria (E. coli) or nitrate. Although there remains a great deal to learn about how these materials move below ground, much is already known about the characteristics of these contaminants. *Nitrate is highly water-soluble and thus moves readily through the soil as water drains.* E. coli bacteria are not water soluble, but because of their small size, can move through larger soil pores such as cracks or wormholes and so generally require a more direct physical connection to a well to cause problems. *The high water content and organic nature of liquid manure may enhance movement of some contaminants under some conditions*.

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*Wilson, who focuses on manure management and nutrient cycling at the University, explains that manure feeds the soil, but ammonium and nitrates in manure can run off or leach. Fall application of manure tends to drive nutrient loss*. She was one of the featured speakers at the Soil Health Summit January 15-16 in St. Louis.

In theory, the combination of manure and cover crops can serve double-duty. Manure is a great nutrient, while cover crops can take up nutrients and keep them from leaching or being lost to mineralization.

Research at Iowa State University shows that, when 100 pounds of swine manure were applied into a rye cover crop, nearly 60 pounds of nitrogen were retained in the cover crop, as opposed to manure without a cover crop. Manure application into standing cover crops can hold onto the nitrogen and keep it from leaching.

“Where there was manure but no cover crop, there’s a lot of nitrate in the soil. The cover crop took a lot of nitrate up,” Wilson says.

Research by Wilson and colleagues in Minnesota shows that cereal rye took up an average of 45 pounds of nitrogen in on-farm tests where manure is applied. “Anytime you take up 45 pounds of N, you’re not putting it into water. I think that’s a win,” she adds.

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<https://www.iasoybeans.com/news/articles/can-cover-crops-reduce-the-risk-of-early-fall-manure-applications/>

<https://www.agprofessional.com/article/minnesota-targets-nitrates-fall-fertilizers>

<https://themanurescoop.blogspot.com/2014/11/fall-vs-spring-whats-and-whys-we-need.html>

<http://www.channel.com/agronomics/Pages/Applying-Lime-and-Fertilizer-in-the-Fall.aspx>

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Manure can be a good multiple nutrient source of N, P, K, and micronutrients. However, one application rate will not necessarily be optimal for all nutrients. Nutrient content of manure varies depending on the type of livestock, ration being fed, and storage and handling of the manure. You should have the manure analyzed for nutrient content before application in order to plan an efficient fertilization and management program.

To receive the most benefit from manure applied for N, you should apply manure sources that have high inorganic ammonium content, like liquid swine manure, in the fall **after soils cool.** Fall application can also give manure that is mixed with considerable bedding a longer time-period for microbial mineralization of inorganic N, which can increase N availability to the crop. Since N in manure is subject to volatilization, injection or immediate incorporation can reduce potential losses associated with surface application. Manure applications should be managed to reduce the chances of P loss with runoff. Injection or incorporation of fertilizer products into the soil, avoiding application to frozen or sloping soils, and *managing soil residue cover can help to reduce P loss in runoff, and reduce N loss.*

<https://www.nationalhogfarmer.com/livestock-handling/get-most-your-manure-applications>

*The nitrogen and phosphorus in animal manure and chemical fertilizers are necessary to grow crops. However, when these nutrients are not fully utilized by plants they can be lost from the farm fields and negatively impact air and downstream water quality*

<https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_043440.pdf>.