

MANURE IRRIGATION: BENEFITS AND CHALLENGES

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Introduction

Manure production is an unavoidable by-product of livestock production facilities. In the United States, there are approximately 58,000 dairy farms (USDA-NASS, 2013a) with a total of 9.2 million dairy cows (USDA-NASS, 2013b) which represent a manure production value of nearly 183 million tons of manure per year (USEPA, 2012). Manure production, collection, and land application are a part of every dairy system. When land applied, manure can provide essential nutrients for crop production and promote soil health and fertility. However, during these processes the manure constituents (including pathogens) can be lost to the environment causing negative environmental impacts and potentially human health impacts.

Animal manure is a significant reservoir for pathogens, which include bacteria, viruses and parasites (Gessel et al., 2004; Gerba and Smith, 2005; Pepper et al., 2006; Pachepsky et al., 2011). The presence of these pathogens has led to gastrointestinal illness including diarrhea and other more serious health concerns when people are exposed to the pathogens. At agricultural facilities, we are aware of the potential impact from pathogens and take care in direct handling of manure, but we do not have data on the airborne concentrations and potential transport of these pathogens to the surrounding area.

Manure irrigation has received a lot of attention particularly within the last 2 years in Wisconsin as a method for application. Producers have increasingly been interested in the practice due to the management flexibilities, crop and potential water quality benefits, as well as reducing road use for manure application and reduced application costs. However, the public has significant concerns about the practice and the potential issues related to human and environmental health. This issue became front and center in Wisconsin due to the pressing issues being raised by a number of different stakeholders, UWEX responded by developing resources and a manure irrigation workgroup. Outputs of this workgroup include an evaluation of manure irrigation systems with an assessment of the potential environmental impacts.

Discussion

To use manure irrigation, two important areas of knowledge include (1) technology and operational requirements and (2) management practices to limit environment impacts. Technology and operational information for manure irrigation include:

- Selection of equipment based on producer needs
- Reduced total solids content through processing or settling
- Operational practices including system pressure and nozzle type
- Field location and manure transport options

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Management practices to limit environmental impacts include:

- Knowledge of siting to limit drift
- Understanding of weather limitations including maximum operating wind speeds
- Protection of groundwater through check valves on equipment
- Operational parameters that affect drift (e.g., droplet size)
- Operational parameters that impact pathogen inactivation (e.g., UV intensity)

References

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