

Options for Managing Phosphorus from Manure

One of the most recent challenges that farmers face in the management of manure is, while they would like to land apply manure for the benefits of the nutrients and organic material, land application can cause environmental concerns related to nearby water bodies. One potential problem is from runoff during large rain and snow melt events, in which the manure entering water bodies can cause fish kills. The second problem is that the amount of phosphorus in manure exceeds the amount needed by plants relative to the amount of nitrogen in the manure. Excessive phosphorus levels in the soil can lead to the washing off of phosphorus to nearby water bodies, contributing to both eutrophication, and the destruction of fish habitat. The concern over phosphorus is increasing due to build ups in soils exceeding crop needs, and leading to water quality threats, as well as requirements for farmers to comply with local, state and federal nutrient management standards.

There are a variety of options for managing the phosphorus in manures, either reducing its initial amount, removing it from the manure (at best, with little to no loss of the beneficial components of the manure), or rendering it immobile in the soil. The major options are listed below. All have advantages and disadvantages, and some are either theoretical or unproven.

More detailed descriptions of some of these techniques will be prepared and available from the below listed compiler, who also welcomes any comments or suggestions.

1. Reduce the generation of phosphorus in manure

- reduce input into feed
- partition more phosphorus into animal or milk, such as by adding phytase to the diet

2. Divert manure off-farm

- haul to other farms where phosphorus limits won't be exceeded
- incinerate or pyrolyze with shipment of by-products off the farm
- sewer to a treatment system with discharge off the farm

3. Remove phosphorus from the manure and divert it to places off the farm, while still land applying the manure to the land

- evaporation and drying
- mechanical solids separation
- precipitation
 - lime
 - Fe or Al salts
 - calcium phosphate
 - struvite (magnesium ammonium phosphate (MAP))
 - Phosnix process
- tie up biologically (such as enhanced biological phosphorus removal or other microbes, or the growth of algae) combined with mechanical separation

4. Increase the utilization of phosphorus by crops by growing those crops that need higher levels of phosphorus

5. Tie-up or "inactivate" the phosphorus in the soil

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