Manure Management

What is a manure management plan (MMP)?

Manure management strategies are important for utilization of manure as a fertilizer for croplands. This plan is written by the livestock farmer or by a certified nutrient management specialist but must be kept on the farmstead and available upon request. Livestock operations that are defined as Concentrated Animal Feeding Operations (CAFOs) or Concentrated Animal Operations (CAOs) must also have Nutrient Management Plans prepared by Certified Nutrient Management Specialists that are submitted to local county conservation districts for review and approval. The components of a MMP include:

- Contact and general farm information.
- Maps that include farm features such as streams, ponds, manure storage areas, and field boundaries.
- Where, how, and rates of mechanical manure application.
- Identification of manure storage and stockpiling areas showing the approved base or coverage and distance from environmentally-sensitive areas.
- Pastures must be managed to minimize bare spots and maintain vegetation cover of at least 3 inches of height during the growing season; otherwise, the pasture could be considered an animal concentration area.
- Animal concentration areas (ACAs) include barnyards, feedlots, loafing areas, etc. These areas require the diversion of clean water around the area, collection or treatment of dirty water flowing from them, maintaining vegetation buffers around them, timely removal of manure, and limiting animal access to streams.
- Maintaining records of manure applications, crop yield, manure export, and manure storage.

What to keep in mind before a manure application?

Fields scheduled to receive a manure application should be soil tested first. A comprehensive and representative soil sample can provide current fertility details for the field. In addition, the manure must be analyzed for nitrogen (N), phosphorus (P), and potassium (K) and other nutrients. Nutrient levels in livestock manure can vary widely. Using averages from the research data is not a good substitute for analyzing the manure that will be applied to your fields.

What are the 4 Rs of nutrient management?

Good soil fertility stewardship is the premise of the 4 Rs of nutrient management-applying the **right fertilizer source** at the **right rate** at the **right time** and in the **right place**.

The first step is knowing the current fertility level of a manure-targeted field. Based on the projected crop yield, nutrient removal for a specific crop, and the current fertility level of the field, the right rate of manure based on its nutrient analysis can be applied to the field to help maintain the desired balance. In many situations, additional fertilizer may have to be added to the field to compensate for nutrients that are lacking in the manure. In addition, farmers must account for any potential nutrient loss when manure is applied to the soil surface.

What timeline should you follow for manure application?

The timing of manure application, usually spring or fall, and its placement can impact the rate. Fall- and surface-applied manure applications have greater potential for loss. Spring applications could be hindered by wet weather or result in lost N if volatilization occurs before incorporation. The rate of manure applied is generally based on the plant-available N content of the manure and the recommended N rate needed for the crop to be grown. The available-N content is calculated as 60% of the organic-N and 80% of the ammonium-N for the first year after manure application if the manure is incorporated immediately. Due to volatilization, the ammonium component should be reduced 15% per day for each day the manure is unincorporated.

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// What are the benefits and challenges of using manure as a fertilizer?

N, P, and K are the nutrients that can be returned to the soil with manure applications. Manure can help nourish growing crops and rebuild soil nutrients in the long term. Manure can be difficult to manage as a fertilizer because it can contain organic and inorganic materials, be variable in nutrient concentrations from different animals and even within animal species, can vary from sample to sample, be in liquid or dry forms, and can require large application volumes because of low nutrient concentrations. Additionally, nutrients such as N and P within manure can be tied up until microorganisms are able to free them from fibrous feed or bedding components; however, K is readily available for crop uptake.

// What are the commonly used methods of manure application?

Broadcast, injection, and irrigation are the principle methods for manure application. Benefits of broadcast applications include quick delivery and wider application widths compared to injection. Broadcasting may reach widths of 50 feet while injection systems are much narrower and would require more time to apply. However, without immediate incorporation, broadcast manure can be subject to loss of P through surface runoff, N volatilization, and result in complaints by neighbors from odor. If manure needs to be applied on snow covered fields, the fields should be reasonably flat, with slopes less than 5%, and away from streams and waterways.

Injection and irrigation of liquid manure forms can help control application variability, provide a better means of matching application to the crop's time of nutrient need, and help address some environmental issues. Injection allows for application to growing crops such as alfalfa, grass, or cover crops, and can be potentially used as a sidedress in corn. Injection systems are also compatible with no-till management. However, labor and equipment costs for injectable systems can be high. Regardless of the potential benefits of injection systems, many still prefer broadcasting manure because of the speed of application.

// What are the pros and cons of using center pivots for manure application?

Benefits of using center pivots to distribute liquid manure include the ability to apply during the growing season when the crop is in most need of nutrients, less risk of surface runoff, less potential for nutrient leaching because plants can start accessing the nutrients soon after application, lower distribution costs for producers and reduced risk of spills compared to manure haulers/tankers, reduced traffic and potential damage to roadways, and reduced soil compaction.

However, issues have been expressed regarding odor spikes, risk of influencing air quality with particulates, surface and groundwater effects, and reduction of aquifers. Therefore, these issues should be evaluated for the local area before irrigation equipment is purchased for the sole benefit of manure distribution.

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