

Maximizing the Value of Swine Manure

Author:

Alan Sutton, Purdue University

Reviewers:

Sherrie Clark, University of Illinois
Brian Richert, Purdue University

Value of Swine Manure

Swine manure is a valuable by-product of the swine operation that can be utilized as a fertilizer resource. By conserving the nutrient value of the manure generated by the swine operation, less money can be spent on commercial fertilizer and there is a potential to market manure to local crop producers.

What Affects Manure Composition?

Composition of the pig's feed, utilization of feed nutrients, amount of water and feed spillage and the length and method of manure storage all affect manure composition. If excess nutrients are fed to pigs above the nutrient needs of the pig or if the nutrients are not digested and retained in their bodies, excess nutrients will be excreted and increase manure nutrient composition. Similarly, if excess feed is spilled in manure pits, excess nutrients will be present in the manure. Conversely, excess spillage of water in manure pits will reduce the concentration of manure nutrients. Finally, if manure is stored long-term in a treatment facility such as a lagoon, considerable nitrogen losses occur which reduces its fertilizer value and recovery of the nutrients from settled sludge in the bottom of the lagoon may be difficult. Consider settling nutrients in a storage structure prior to the lagoon treatment system for concentration of nutrients for fertilizer use.

Managing Manure Nutrients

- **Minimize feed spillage** – even though spilled feed will increase manure nutrient content, this is a very costly and inefficient way of fertilizing crops versus using commercial fertilizer.
- **Minimize water spillage** – check water systems daily for leakage problems and repair as needed immediately. Excess water spillage not only dilutes the manure nutrient content, but also reduces the length of manure storage capacity.
- **Cover manure storages** – slurry in buildings or covered outside the building storage that is not

exposed to rainfall will have maximal concentration of manure nutrients.

- **Treating manure nutrients** – concentrate a portion of manure nutrients as a solid through solid-liquid separation techniques and composting. This will allow for reduced transportation costs of manure nutrients for greater distances. Although not used extensively in commercial operations, the separation of urine from feces will minimize the losses of nitrogen from manures. Acidification of manure will reduce the pH of manure and reduce nitrogen losses but this may be expensive to use. Diet manipulation can also reduce the pH of manure, minimizing nitrogen losses during storage.
- **Mix manure before removal from pits** – agitate manure at the time of removal from storage for a uniform mixture of nutrients for application to cropland. For lagoon systems, routine removal of solids from the primary cell may be necessary to avoid build up of solids and reduced storage capacity.
- **Obtain a representative manure sample** – a representative manure sample needs to be obtained and analyzed to establish application rates onto cropland.
- **Determine manure application rates** – this is based on the manure composition analysis and nutrient needs for the crop to be grown on the application site.
- **Calibrate application equipment** – use routine calibration methods on your application equipment to establish accurate manure application rates.
- **Incorporate manure** – use direct injection or other



incorporation land application techniques to minimize volatile (especially nitrogen) losses. If surface applying, try to incorporate as soon as possible. Odors will be eliminated or suppressed with incorporation of manure.

- **Select the application sites**
– place a high priority on applying manure to fields where the soil test is low (especially for phosphorus) and with crops removing the most total nutrients from the manure (generally corn and other cereal grains).



- **Select the time of application** – applying manure nutrients near the time that the plants can use nutrients to meet the crop needs is most beneficial. Applying manure in summer or fall may result in considerable nitrogen losses. However, cost and amount of manure storage may dictate when manure must be applied. Use a nitrification inhibitor to retain manure nitrogen if applied in the fall or wait to apply manure in the late fall when soil temperatures are low (below 50°F).

What about the Feed Rations?

Availability of feed ingredients, costs and performance of pigs on the rations will dictate how the rations will be formulated. If significant diet formulation changes are made, it will change the output of nutrients and potentially volume of manure produced. Analysis of manure and adjustments for application rates will need to be made. Do not feed excess nutrients (especially nitrogen) for the purpose of creating manure with concentrated nutrients because there can be considerable losses during storage and lack of recovery of nutrients. In addition, excess nutrients can accumulate in the soil (especially phosphorus and potassium) from concentrated manure applications and the need for greater acreages and cost for manure application may result.

What is the Goal?

Develop a whole farm nutrient balance on your farm so that you can utilize the generated manure nutrients efficiently for the cropping program to maximize its fertilizer value. Is the cropping program utilizing all of the nitrogen, phosphorus and potassium of the manure nutrients generated on the farm?



If phosphorus is accumulating in the soil is it because of selection of application sites, cropping program or lack of sufficient land for manure application? Can phosphorus be reduced in the pig's diet to reduce phosphorus excretion and manure P concentration? Comparing the amount of nutrient inputs (imports) on the farm to the amount of nutrient exports through sale of animals and crops can determine a whole farm nutrient balance. Consult with a technical service provider, crop consultant or nutritionist for assistance.

For more information, please search for the following resources in PIG:

PIG Factsheets :

- Marketing Swine Manure as a Fertilizer
- Energy and Nutrient Recovery from Swine Manures
- Solids Separation in Manure Handling Systems
- Phosphorus Management in Pork Production
- Comprehensive Nutrient Management Planning for Your Pork Production Operation
- Managing Nutrient Excretion and Odor in Pork Production through Nutrition

PIG References :

- Phosphorus Management in Pork Production
- Energy and Nutrient Recovery from Swine Manures

References:

- Massey, R. Marketing Swine Manure as a Fertilizer. Factsheet 10-02-06. Pork Information Gateway; 2007.
- Powers, W. & Burns, R. Energy and Nutrient Recovery from Swine Manures. Factsheet 10-02-01. Pork Information Gateway; 2006.