

Sampling Manure for Nutrient Content

Introduction For manure to be utilized in an economically and environmentally sound manner in crop production, its nutrient content must be known. Collecting a valid, representative sample of the manure is the key to having a meaningful nutrient analysis.

Information on the average nutrient content of manures is available from many sources. However, manures vary in nutrient content from farm to farm depending upon time of year, storage, type and age of livestock, feed management, amount and type of bedding, and manure management practices. Considerable variability can be encountered within a manure pile or liquid storage system. Some liquid storage systems have agitation capability and can be mixed before sampling thus aiding in the collection of a representative sample. Others have no agitation capability. Liquid manure in a non-agitated liquid storage system will be stratified with a watery, low- nutrient material on top, a material of intermediate solids and nutrient content in the middle, and a nutrient-rich sludge material on the bottom.

The current policy of the Maryland Department of Agriculture's Nutrient Management Program allows the use of a published "typical" manure analysis ("book value") for the development of a producer's first nutrient management plan and requires actual manure analysis for updated plans.

Because the nutrient composition of manure varies from operation to operation, the use of book values is not a recommended practice.

General Principles of Sampling

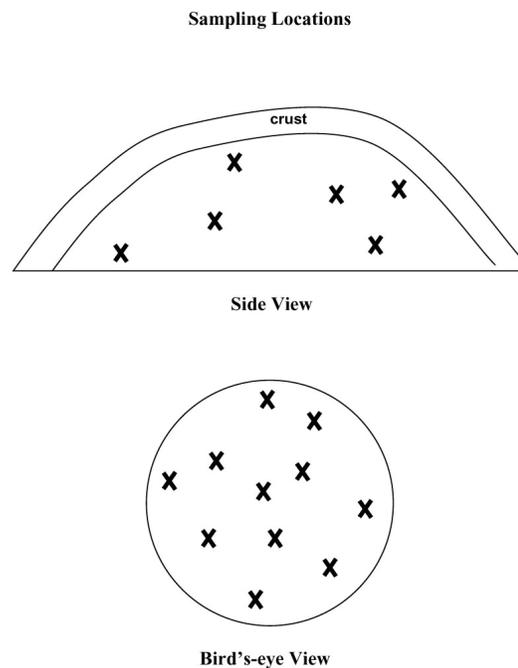
Goal

- COLLECT A REPRESENTATIVE SAMPLE, i.e., a sample whose nutrient analysis represents the nutrient content of the manure being utilized.

Accomplishing the Goal

1. Many individual samples (10 – 15) must be collected to form a composite sample. See Figure 1.
2. Be sure to include any bedding in the sample to the same extent that it exists in the animal waste material being characterized.
3. Mix the composite sample thoroughly in a plastic container. **The composite sample must be mixed well.**
4. Take a small sample (laboratory sample) from the well-mixed composite sample and prepare the laboratory sample for shipment to the lab.

Figure 1. How to collect a sample of solid manure



Avoid the outer crust. Using a long, narrow shovel, collect 10 – 15 samples from various locations and depths around the pile and place the composite sample in a clean, plastic container.

Sampling Options

SAMPLING BEFORE APPLICATION

- Sampling before application allows a timely manure analysis to be used for the calculation of the appropriate rate of manure application.
- Sampling before application is practical for many solid manures.
- The nutrient content of manure can change during storage. Sample as close to application time as is practical, allowing time for both analysis and plan development. Four (4) to 6 weeks is advisable.

SAMPLING DURING LOADING

Sampling during loading is a quick and easy way to collect a representative sample.

Solid or Semi-solid

- Sampling solid and semi-solid manure during loading of the manure spreader is advantageous because the manure has already undergone some mixing.
- It is the most practical time to collect a representative sample in a daily haul operation.
- For daily haul operations, collect a total of 10 – 15 samples, collecting some samples from each load if more than one load is being applied.

Liquid

A good time to collect a liquid sample from an agitated pit is immediately after filling the spreader tank. One or more samples can be collected from each load (tank) at the unloading or outlet port.

SAMPLING DURING SPREADING

Sampling during spreading is a good option for many situations.

Solid or Semi-solid

- For solid manures with lots of bedding, sampling during spreading may be the best method of collecting a representative sample.
- Spread a total of 10 – 15 plastic sheets (3' x 3', for example) in the path of the manure spreader, collecting some manure from each sheet.
- Combine all samples to make a composite sample.

Liquid

- For non-agitated pits, sample collection during spreading is the only practical time to collect samples that represent the different layers of the pit. Separate samples should be collected from the upper, middle, and lower layers of the pit.
 - Place collection containers (for example, aluminum baking pans) near the path of the manure spreader. Collect separate samples at the beginning, middle, and end of the pit emptying process so that samples represent the top, middle, and lower layers of the pit. Make a separate composite sample for each layer in the pit.
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Mixing Composite Samples

The composite manure sample must be very well mixed before shipment to the laboratory for analysis.

- For easily mixed materials like poultry litter, mix well using a baffled tumbler or the sheet method (see page 5).
- Moist manures can be mixed using the sheet method (see page 5).
- Liquid samples should be swirled or mixed thoroughly.

How to Mix a Sample of Manure Using the Sheet Method

1. Pour composite sample onto a plastic sheet (6' x 6').
2. Break up any clumps of manure with a shovel or fork.
3. To obtain a good mix, gradually lift one corner of the plastic sheet, rolling the litter over itself towards the middle of the sheet. Do the same from the diagonally opposite corner. See Figure 2.
4. Roll the manure into a pile using the other two corners. See Figure 3.
5. Once the manure is piled in the center of the sheet, spread it out again and repeat steps 3 and 4 at least 10 more times.

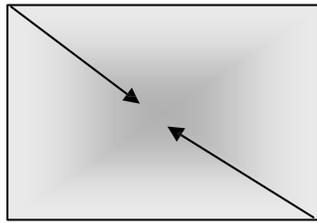


Figure 2

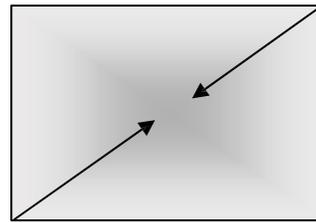


Figure 3

Selecting a Laboratory Sample for Shipment

The composite sample is too large to send to the laboratory for analysis. Consult Table 1 on page 6 to determine the sample size required by the analytical lab you choose. Additional information is available at the University of Maryland Agricultural Nutrient Management Program's website (www.extension.umd.edu/anmp).

Solid and Semi-solid Manures

1. Take several grab samples from the well-mixed composite manure sample and place in a re-sealable plastic bag, filling the bag about half full.
2. Squeeze out excess air before sealing.
3. Double bagging is preferable both for containing the sample and for odor control during shipment.

Liquid Manures

1. While swirling the composite sample, pour the laboratory sample into a clean, plastic bottle. **Never use a glass jar!**
2. Rinse the outside of the bottle with clean water before packing.

Table 1. Comparison of some labs testing manure

Lab Information	Minimum Package to Request	Sample Size Solid/Liquid
<p>A & L Eastern Agricultural Laboratories, Inc. 7621 Whitepine Road Richmond, VA 23237 Ph: 804-743-9401</p> <p>www.al-labs-eastern.com</p>	<p><u>M1 package</u> N (total), NH₄-N, P₂O₅, K₂O, % moisture, and density (lbs/100 gallons)</p>	<p>2 cups/2 cups</p>
<p>Agri Analysis, Inc. 280 Newport Road P.O. Box 483 Leola, PA 17540 Ph: 717-656-9326</p> <p>www.agrianalysis.com</p>	<p><u>MDMP4 package</u> N (total), NH₄-N, P₂O₅, K₂O, % moisture, density (lbs/100 gallons), and % dry matter</p>	<p>4 cups/2 cups</p>
<p>Agricultural Analytical Services Laboratory Penn State University University Park, PA 16802 Ph: 814-863-0841</p> <p>www.aasl.psu.edu</p>	<p><u>Standard Manure Test 1</u> N (total), NH₄-N, P₂O₅, K₂O, and % solids</p>	<p>2 cups/2 cups</p>
<p>Spectrum Analytic, Inc. P.O. Box 639 1087 Jamison Road NW Washington Court House, OH 43160 Ph: 800-321-1562</p> <p>www.spectrumanalytic.com</p>	<p><u>M3 package</u> N (total), NH₄-N, P₂O₅, K₂O, % moisture, and % solids</p>	<p>1 cup/2 cups</p>
<p>Waters Agricultural Laboratories, Inc. P.O. Box 382 257 Newton Highway Camilla, GA 31730-0382 Ph: 229-336-7216</p> <p>www.watersag.com</p>	<p><u>#1 Maryland package</u> N (total), NH₄-N, P₂O₅, K₂O, and % moisture</p>	<p>4 cups/2 cups</p>

General Principles of Packaging and Shipping

- Label the bag or bottle with your name, address, and a manure identification.
- Keep sample cool (preferably refrigerated) until shipment.
- Ship early in the week so the sample does not sit in a mail handling facility over the weekend.
- Ship as soon as possible to minimize sample degradation.

Nutrient Analysis

Minimum analyses required

Be sure the laboratory you choose tests for the following:

- total nitrogen
- ammonium nitrogen
- total phosphorus or phosphate
- total potassium or potash
- moisture (or dry matter)

Optional analyses

Most laboratories offer a selection of secondary and micronutrient analyses for an additional charge.

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