



Poultry Litter Sampling

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Poultry litter is a mixture of poultry manure, feathers, wasted feed, and bedding material that contains nitrogen, phosphate, potash, and other nutrients essential for plant growth. Poultry litter can vary considerably in nutrient content due to bird type, feed composition, bedding materials used, clean-out frequency, storage and handling practices, use of litter amendments, and other factors. Therefore, sampling poultry litter to obtain a nutrient content analysis is an important step for managing manure nutrients appropriately.

Moisture management has perhaps the greatest effect on litter nutrient content. Crusted or caked litter around drinkers and feeders is usually wetter and higher in nitrogen and phosphorous than whole house litter. This caked litter represents approximately 30-35 percent of the weight of the whole litter and typically has different handling characteristics than the rest of the house litter. Poultry litter testing determines the fertilizer value of the litter, which can be used to calculate land application rates or market value. Table 1 summarizes the fertilizer content of selected types of poultry litter.

Table 1. Nutrient values for various whole-house poultry litters on an "as-received" basis.

Litter Type	Nitrogen	Phosphate (P ₂ O ₅)	Potash (K ₂ O)
	----- % -----		
Fresh Broiler Litter (2,903 samples)	3.15 (0.60)	2.77 (0.81)	2.33 (0.62)
Stockpiled Broiler Litter (262 samples)	2.78 (0.86)	2.84 (0.94)	2.29 (0.69)
Composted Broiler Litter (62 samples)	2.80 (0.98)	3.00 (1.00)	2.30 (0.83)
Fresh Layer Manure (209 samples)	2.26 (0.83)	3.16 (1.34)	2.05 (0.81)
Broiler Breeder Litter (325 samples)	2.12 (0.79)	3.14 (1.17)	1.93 (0.63)

(Standard deviation in parenthesis.)
 Values listed are from samples submitted to the University of Georgia Agricultural and Environmental Services Laboratory between July, 2000, and July, 2002.

Producers who fail to test poultry litter nutrient sources and the soils to which they are applied are faced with a number of questions they cannot answer. Are they supplying plants with adequate nutrients? Are they building up excess nutrients in the soil that may ultimately move into surface water or groundwater? Are they applying trace metals at levels that can accumulate and become toxic to plants, permanently altering soil productivity, or creating runoff water that is toxic to aquatic life?

Obtaining nutrient concentration data for poultry litter is a crucial step in developing and using a nutrient management plan (NMP). Measuring the average nutrient concentrations of litter within a poultry house requires sampling procedures that ensure representative samples. Research shows that spatial variability of nitrogen and phosphorous concentrations can be influenced by conditions such as litter moisture content and waste feed.

Book values provide an estimate of the nutrient value of poultry litter for planning purposes. However, there can be a wide range of nutrient concentration among poultry houses under different management. The unpredictability of nutrient content from farm to farm, even house to house, makes nutrient testing an essential part of using poultry litter to supply plant available nutrients. The attention to detail in the sampling of litter will determine how well nutrient applications match the nutrient requirements of the crops to which it is applied.

Collecting Samples

Collecting samples that are representative of the entire litter volume is essential for reliable nutrient analysis and subsequent nutrient management planning efforts. Sub-sampling is needed to obtain a composite sample that is representative of the volume of material being land applied. Samples should be taken as close to application as possible, allowing time for laboratory analysis, house cleanout, and litter spreader calibration when needed.

In-House Litter

Sampling litter while still in the poultry house has been the standard method of sampling with the advent of nutrient management planning. However, the nutrient content of litter in a poultry house can vary considerably depending on

location. The variability of the nitrogen content of 30 uniformly spaced broiler litter samples from within a house is shown in the following table:

Handling and Timing of Poultry Litter Samples

Table 2. Nitrogen variability within the poultry house.

	Center of house	Around feeders	Around drinkers
	----- (% Total Nitrogen) -----		
Average	3.31	4.44	3.49
Minimum	2.83	4.15	2.35
Maximum	3.68	4.75	4.50

The average percent N of samples taken around feeders was 25 percent higher than samples taken from the center of the house and 21 percent higher than the average around drinkers. Samples taken around drinkers varied as much as 48 percent (range 2.35 to 4.50 %N). Sub-sampling from areas such as feeders and drinkers in proportion to their corresponding surface area within the house can complicate taking an approximate sample.

Based on this data, it is recommended that growers **not sample** litter when it is still being used as a bedding in the poultry house. Wait until clean-out to obtain samples, when house litter is more mixed. Then follow the procedures given below for sampling litter from in-house piles, spreader trucks or stable stockpiles.

Spreader Truck Litter

To obtain a representative sample at clean-out, collect at least 10 shovels-full from the in-house piles or truck spreader so that the sample represents all of the litter to be removed. Combine the collected portions in a clean 5-gallon plastic bucket or wheelbarrow, and mix thoroughly. Place a 1-quart portion from this mixture in a plastic bag, seal it securely, and submit it to the laboratory for analysis.

Stockpiled Litter

A stockpile consists of manure or litter stored in a pile for later use. Nitrogen concentrations can change substantially in this material, particularly if the storage site is exposed to fluctuating weather conditions. If stockpiled manure or litter is not stored under cover on an impervious surface, the material on the weathered exterior may not accurately represent the majority of the material, since rainfall generally moves water-soluble nutrients down into the pile. Avoid stockpiling poultry litter and manure under such conditions when at all possible. Sample stockpiles using the same method for trucks described above, except collect at a depth of 18 inches from the surface of the pile and as close as possible to its land application date. Material from such piles will typically have higher levels of phosphorus and potash than whole house litter directly from the house.

Just as storage and handling of litter can alter the nutrient content, so can sample handling and sample submission timing. Avoid placing collected samples in a hot spot such as the dashboard or trunk of a vehicle. If samples must be held for longer than 24 hours prior to submission, refrigerate the sample until it is sent to the testing lab. Litter samples should be sent to the laboratory for nutrient analysis as soon as possible after collection. It is best to send samples early in the week so that they do not sit in the mail over the weekend.

Interpreting Poultry Litter Test Results

Poultry litter is an unbalanced fertilizer, and repeated land applications based on crop nitrogen needs can cause a build-up of phosphorus and potassium in the soil. Excessively high phosphorus in the erosion and runoff from litter-amended soil can cause water quality issues in nearby surface water bodies. Applying nutrients without a litter analysis could cause crop yield reductions due to lack of adequate nutrients, applying nutrients when they are not needed, or over-applying nutrients that may contribute to water quality impairments.

A basic litter sample submitted to the University of Georgia Agricultural and Environmental Services Laboratory should be analyzed for nitrogen, phosphorus, potassium, magnesium, manganese, aluminum, zinc and copper. The lab will report results for solid manures in both percentages and pounds of nutrients per ton on an “as-received” basis. A pound of manure phosphate or potash has a nutrient value that is equivalent to that of commercial fertilizer. However, only a portion of the nitrogen content is available to crops when first applied. Approximately 70 percent of the total nitrogen applied is available to the crop in the first year. County extension agents or other qualified professionals can assist with the calculation of manure nutrient availability based on when and how poultry litter is land applied. This information, combined with the soil test report and other crop information, is necessary to develop a nutrient management plan.

The money and effort invested in appropriate litter sampling is small compared to the money that can be saved on commercial fertilizer expenses. With the increased awareness of potential environmental impacts of land application of manures, poultry producers can more effectively use poultry litter within a NMP through improved sampling procedures.



 | LAB# _____ |
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POULTRY LITTER/MANURE SUBMISSION FORM
FOR NUTRIENT MANAGEMENT PLANS

Please Note - Retain a copy of this form for your files. Submit one copy per sample.

Name: _____
 Mailing address: _____
 City,State,Zip: _____
 Phone #: _____

Sample #: _____ (One form per sample)
 County: _____
 Date: _____

For Free Basic Test please answer the following:

- Will these results be used for:
 Nutrient Management Planning? Yes ___ No ___ Marketing of litter? Yes ___ No ___
- Treatment product(s) used on this litter (e.g. Alum, PLT, etc.) _____
- How many flocks were produced on this litter? ___
- Was the litter caked ___ or full clean-out ___? (Check One)
- Describe the kind of litter, its condition, and the application method **by checking below:**

<u>Kind</u>	<u>Condition</u>
Broiler _____	Fresh _____
Layer _____	Stockpiled: <i>Stackhouse</i> _____
Breeder _____	<i>Under tarp</i> _____
Pullet _____	<i>Other</i> _____
	Composted _____
	Lagoon _____
	Other _____
	(Describe)

<u>Application Method</u>
(Check One)
Surface _____
Incorporated _____
(within 2 days)
Soil Injected _____
Irrigation applied _____

TESTS REQUESTED

___ Total Minerals (free basic test)
 (Includes: total nitrogen,phosphorus,potassium,calcium,magnesium,sulfur,manganese
 iron,aluminum,boron,copper,zinc,sodium)

___ Extra Tests (price per fee schedule)
 Nitrate Nitrogen _____ Ammonium Nitrogen _____
 Moisture _____ Solids _____ Other _____

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Date Received: _____ Date Returned: _____
 Payment Received: _____ Invoice #: _____

NH₄-N _____ Moisture/Solids _____ NO₃-N _____ Total Nitrogen _____ Other _____

