Using Poultry By-Products in Forage Production

MISSISSIPPI STATE UNIVERSITY EXTENSION

Poultry by-products have long been recognized as a valuable fertilizer for pasture and forage production. Poultry litter is the shavings, manure, and other materials removed from poultry houses during total clean-out operations. Cake is the wetter material removed between individual flocks. Both are excellent soil amendments that provide nutrients for growing crops and improve soil quality when applied wisely.

Environmental concerns and shifting land use have focused attention on more widespread litter uses. All farmers who use fertilizer, whether poultry litter or commercial, should be aware of the principles of nutrient management. This simply means you know what is applied, where it's going, how much is applied, and how to apply it.

Using nutrient management planning and implementing the prepared plan is good business and makes the fertilizer program efficient and effective. Soil and poultry by-product testing is the foundation for a good nutrient management program using poultry litter.

Each farm should develop a sound, regular soil-testing program. Soil testing is an inexpensive, easy-to-do best management practice. It is an extremely powerful management aid. The test report will include pH, lime requirement, and nutrient levels in the soil.

One interesting effect of using litter in soil fertility management is the increased pH levels and decreased lime requirements over time in many soils. These changes are attributed to dicalcium phosphate in the poultry diet, which leads to significant calcium levels in the litter. Therefore, when litter is land-applied, it has a liming effect.

Increasing the pH levels by meeting recommended lime requirements will have the extra benefit of increasing availability of native nutrients in the soil. The recommendations accompanying the soil test results will offer suggestions for economically maximizing crop yields.

Poultry litter and other animal by-products, such as cattle manure, are slow-release nitrogen and phosphate fertilizers. However, research has shown that a high percentage of the total potash from litter is available to growing plants soon after land application. Testing the nutrient content of the litter helps to manage the plant nutrients in the litter more efficiently. About half of the total nitrogen in the litter is available to growing crops in the year of application. The phosphate plants use in the year after application varies widely, from 20 to 80 percent of total applied, depending on soil types and other factors.

Enough litter applied to meet the nitrogen needs of a healthy, growing crop means more phosphate added to the soil than the plants can use. We used to think that soils had unlimited capacity to store this unused phosphate. Now we know that, in certain situations, there is a limit to how much phosphate soils can store, and the phosphate may move through or from the soil where it was applied.

Another laboratory analysis that is necessary for optimum litter management is moisture. Recent Mississippi State University research has found that moisture content of litter can vary from 10 to 40 percent of the total weight, so it is critical to know the moisture content of purchased litter. With the moisture content and nutrient percentages of the litter, you can calculate the actual pounds of nutrient in the litter (see example calculation).

Application quantities should be based on common-sense, reasonable yield goals for the particular pasture or forage crop. On long-term poultry/cattle farms, there is concern about phosphate removal rates. Cutting hay will remove much more phosphate (as well as potash) than grazing cattle on the same acreage.

Litter weighs about 31 pounds per cubic foot, much lighter than inorganic fertilizers. Existing inorganic fertilizer application equipment on many farms may not be able to adequately spread the material. Spreaders should feed evenly and have a good pattern that covers the throw path well.

You should avoid applying on wet soils to lessen soil compaction and nutrient loss through runoff and other pathways. Be careful to avoid any direct application to water along creeks and other water bodies. It is best to maintain good application offsets along property lines, since most complaints to authorities about litter application in Mississippi come from annoyed neighbors.

Time applications, when possible, to coincide with active crop growth. This is not always possible because of scheduling concerns. If you cannot remove by-products during active crop growth, develop options for storage.

You must manage the storage facilities to lessen offsite movement of materials caused by weather. You can do this by using covers, berms, or other techniques.

For more information about using poultry litter in Mississippi farming systems, contact your local MSU Extension office.

The Mississippi Phosphorus Index was developed by the Mississippi Natural Resources Conservation Service and the Mississippi State University Extension Service with input from many stakeholders to address conditions in the state. Phosphorus Index-based risk analysis looks at factors such as soil-test phosphorus levels, soil permeability, field slopes, litter application rates, and distance to surface water to determine the probability of nutrient movement in the landscape.

Farms with a history of poultry litter application or farms that will be used as part of a poultry grower's site permit Waste Management Plan should do an environmental risk analysis using the Phosphorus Index. The analysis determines the potential of each field on a farm to contribute to nutrient movement to adjacent waters. In the planning process, you can evaluate the results of various management options to find the best economically and environmentally protective plan for a specific field and farm.

County Natural Resource Conservation Service offices and certified third-party vendors of conservation planning services use this tool in working with poultry growers. Contact your local Extension office for more information on how you can use the Phosphorus Index in your situation.

Sample calculation using litter analysis results:

water content = 25% (therefore, dry matter = 75%)
nitrogen content = 4%
phosphate content = 2%
potash content = 3%

Calculations:

2,000 pounds litter per ton times 0.75 dry matter
= 1,500 pounds dry matter per ton
1,500 pounds dry matter per ton times 0.04 nitrogen content
= 60 pounds nitrogen per ton
1,500 pounds dry matter per ton times 0.02 phosphate content
= 30 pounds phosphate per ton
1,500 pounds dry matter per ton times 0.03 potash content
= 45 pounds potash per ton

In this case, one ton of litter contains 500 pounds of water, 1,500 pounds of dry matter, 60 pounds of nitrogen, 30 pounds of phosphate, and 45 pounds of potash.

This is just an example. You should use data from your own situation.

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