

Use of Poultry Litter on Forage Systems

Poultry litter is a good source of slow-release nutrients for forage systems in South Carolina. The poultry industry is one of the most important agricultural activities in the state, and producers are located throughout the state allowing for local access to poultry litter. It provides nitrogen (N), phosphorus (P), potassium (K), and micronutrients. Poultry litter application helps to improve soil fertility and health by adding organic matter and enhancing water infiltration. This publication outlines considerations for using poultry litter in forage-livestock systems in South Carolina.



Introduction

Poultry litter is a valuable resource locally available to producers in South Carolina. It improves soil fertility, health, and quality of plant production. Poultry litter provides N, P, K, and micronutrients such as boron, copper, manganese, and zinc. It can also increase soil organic matter and water infiltration and help to reduce soil erosion and inorganic fertilizers input.

Poultry litter is a by-product of poultry production, consisting of feces, wasted feed, water, feathers, and bedding materials (e.g., peanut hulls, pine shavings, and wood chips). On average, poultry litter has a fertilizer value of 2-3-2 (N-P-K), but this value can vary greatly depending on the production stage, management practices, and handling at the source of the litter. A **litter sample** should be obtained to determine the actual nutrients in the litter utilized to spread at the appropriate rate.

Producers should implement best management practices (BMP) to prevent nutrient losses when using poultry litter on forage systems. The BMPs are guidelines for managing the rate, source, placement, and timing of plant nutrients and soil amendments while reducing environmental impacts. Some potential environmental issues (leaching, runoff, odor, and particulates) are associated with its use, but these issues can be mitigated using BMPs. Following BMPs allows growers to protect surface and groundwater from excess nutrients and potential pathogens and to protect air quality by reducing particulate matter and objectionable odors. Replacing synthetic

fertilizers can reduce nutrient input costs and reduce the emissions of greenhouse gases and ozone precursors.

Preparation

The first step when considering poultry litter is to develop a **nutrient management plan** (NMP) for N, P, and K, which assumes all nutrient input and removal from the system. In this plan, pastures should have well-defined boundaries (e.g., fences, topography, drainage) and be mapped and identified in the NMP. This approach aids producers in keeping records of nutrient input (e.g., litter, fertilizer) or removal (e.g., forage harvested by grazing or hay and baleage production). In addition to pasture fields, the NMP should map water sources (e.g., surface water, wells) to observe appropriate setback distances.

When starting an NMP utilizing poultry litter, it is essential to conduct a **soil test** to determine the soil nutrient levels and pH in each pasture and the recommended amendments based on the crops to be grown. For participation in the Climate-Smart Forages program and by law, every field receiving animal manure soil samples must be tested yearly. Soil pH should be maintained in the recommended range for forages used and will require a lime application, according to the soil test, to correct it and ensure nutrient availability.

Poultry litter can be found locally; contact the South Carolina Department of Health and Environmental Control (SCDHEC) for local litter sources. Anyone purchasing litter must buy it through a manure broker or become a manure broker themselves. The manure broker should provide a laboratory nutrient analysis to determine the appropriate application rate.



Implementation

Storage - Litter should not be stockpiled. This can result in reduced nutrient value, more difficulty spreading, accumulation of weed seeds, and potential pollution of water resources. If litter must be stored for a short period of time before its application to the pasture, it should be stored away from water resources. If stored for 24 hours or more, it must be stored in a well-drained site on a pad (concrete or other approved) and covered with a secured tarp to prevent runoff during rainfall. It should be piled no higher than 5 feet (to prevent fire).



The 4 Rs of Nutrient Stewardship

Manage nutrients based on the 4Rs of nutrient stewardship – apply the **right nutrient source** at the **correct rate** at the **right time** in the **right place** – to improve nutrient use efficiency by the crop and to reduce nutrient losses to surface and groundwater and the atmosphere.

Nutrient Source - Areas of the farm that have different soil types, previous use, or topography should be soil tested separately, and rates should be specific to pasture or division needs. Choose nutrient sources compatible with your forage system. Determine the nutrient value of the litter prior to land application. Repeated use of poultry litter in a pasture can cause soil phosphorus accumulation. If soil tests for P are high, poultry litter use may need to be deferred until soil phosphorus levels are lowered. This will be site-specific. Contact your local Extension agent for guidance on this decision.

Correct Rate - Litter should be spread at the appropriate rate. Typically, this rate is 2-4 tons per acre, but it should be determined based on recommendations for the forage to be grown, the soil test results, and the nutrient content of the litter.

Proper Timing - Litter does not need to be incorporated into the soil. It should be applied just before or at the beginning of the growing season for the forage in the pasture. It **cannot** be applied to dormant crops or more than 30 days before planting. Nutrient uptake is maximized when plants are actively growing. For poultry litter application time recommendations on your farm, consult your local Extension agent. Litter cannot be applied when there is a high risk of heavy rainfall events or when the land is saturated from recent precipitation, frozen or snow-covered. Doing so can lead to nutrient loss and water pollution due to runoff or leaching. Applying litter when pastures are saturated can also lead to soil compaction. Litter should not be used on windy days where particulates and odors might be carried off-site.

Correct Location - It is important to consider environmental and community impacts when planning poultry litter application sites. To help prevent water contamination, poultry litter should not be applied to land that is too steep (greater than 10% slope). Surface litter applications must observe **300-foot setbacks** from residences, **100-foot setbacks** from surface waters, and **200-foot setbacks** from wells. There may be additional setbacks depending on adjacent land and water usage. It is the responsibility of the manure broker to be aware of and observe all litter application requirements.

Step-By-Step Instructions for Poultry Litter Use

1. Collect soil samples and have them tested to determine need/rate of poultry litter application. Instructions for how to sample a pasture and where to send samples can be found [here](#).
 - a. [How to Collect Soil Samples](#). When soil sampling for Poultry litter application, 6" samples should be taken **before** litter application. Within 45 days after litter application, 0-6", 6"-12", and 12"-18" (total of 3) samples should be taken on one representative pasture per forage grown for three years after initial litter application.
 - b. [Soil Form](#) can be found here.
 - c. Instructions for how to complete the Soil Form can be found [here](#). (Select Standard Soil Test)
 - d. You can send the sample directly to the Clemson University Agriculture Service Laboratory by purchasing a [Soil Sample Mailer](#), or you can drop samples off at your local Extension office.
2. Obtain a Nutrient analysis of the Poultry Litter that you plan to use on your pasture. The broker can provide you with a recent analysis. If you need to collect a representative sample of the litter that you plan to use and have it tested at the [CU Agricultural Service Lab](#) or another approved lab, it can be done as follows:
 - a. [How to Collect Poultry Litter Samples](#)
 - b. Containers for submitting your Poultry Litter samples can be obtained from your [local Extension office](#).
 - c. [Animal Waste Form](#) can be found here.
 - d. Instructions for how to complete the Animal Waste Form can be found [here](#). (Select Special and any other tests you desire)
 - e. You can submit the sample directly to the Ag Service Lab using sample bags obtained at your local Extension office.
3. Information on spreader maintenance and calibration can be found [here](#). Litter should be spread at the **recommended rate** when the **conditions** are right:
 - a. Actively growing forages
 - b. No heavy rain forecast
 - c. Low wind
 - d. Know and observe setbacks.
4. Keep detailed **records** of any soil amendments that are applied to the pasture (lime, litter), including:
 - a. Location/ID of pasture where manure is applied
 - b. Soil test results for each pasture
 - c. Nutrient analysis of litter applied
 - d. Amount of manure applied
 - e. Date and time of manure application
 - f. Forage grown
 - g. Groundwater monitoring results (if applicable)



Additional Resources

1. Confined animal manure managers poultry training manual. Clemson University Cooperative Extension. Available at:
https://www.clemson.edu/extension/camm/manuals/poultry_toc.html
2. Natural Resources Conservation Service, United States Department of Agriculture. Conservation Practice Standard 590 - Nutrient Management. May 2019. Available at:
https://www.nrcs.usda.gov/sites/default/files/2022-09/Nutrient_Management_590_NHCP_CPS_2017.pdf
3. Prashad, R. and Stanford, K. Nutrient content and composition of poultry litter. 2019. ANR-2522. Available at: <https://www.aces.edu/blog/topics/farming/nutrient-content-and-composition-of-poultry-litter/>
4. Ritz, C.W., Cunningham, D.L., Merka, W.C. Best management practices for storing and applying poultry litter. University of Georgia Extension, UGA Cooperative Extension Bulletin 1230. 2022. Available at:
https://secure.caes.uga.edu/extension/publications/files/pdf/B%201230_5.PDF
5. Silva, L.S.; Dillard, S.L.; Mullenix, M.K; Wallau, M.; Vasco, C.; Tucker, J.J; Keishmer, K.; Russell, D.; Kelley, K.; Runge, M.; Gamble, A.; Prasad, R.; Elmore, M.; Burns, M; Stanford, K.; Niyigena, V; Wickens, C.; Sawadgo, W.; Heaton, C. Concepts and research-based guidelines for forage-livestock systems in the Southeast region. Supported by the 2021 Southern Region Sustainable Agriculture Research and Education Professional Development Grant. Use of poultry litter in pastures and hayfields. (p.37-39). Available at: <https://projects.sare.org/information-product/concepts-and-research-based-guidelines-for-forage-livestock-systems-in-the-southeast-region/>
6. Smith, W.B., Beer, B., Chastain, J.P., Van Vlakte, L. Solid manure spreader calibration. 2019. Land Grant Press 1016. Available at:
<https://lgrpress.clemson.edu/publication/solid-manure-spreader-calibration/>
7. South Carolina Department of Health and Environmental Control. Regulation 61-43: Standards for the permitting of agricultural animal facilities. Available at:
<https://scdhec.gov/sites/default/files/Library/Regulations/R.61-43.pdf>