

# Utilizing Dry Poultry Litter – An Overview

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## Introduction

Poultry is Arkansas' top farm commodity, valued at more than \$2.7 billion in 1997. Arkansas is the second largest broiler-producing state in the nation and ranks third in national turkey production and eighth in egg production.

The manure produced by these birds is a valuable by-product of the state's poultry industry. Poultry litter is a natural soil amendment that adds nutrients and organic matter to increase soil fertility. Without proper management, it is also a potential pollutant of surface and groundwater.

## Handling and Storage of Poultry Manure

Poultry manure is stored in a variety of ways depending on the needs of the producer. The methods used to handle and store manure greatly affect its value as a soil nutrient.

Litter nutrient concentration depends on the type of poultry being raised, the number of flocks between house cleanouts and litter management practices. This results in a wide range of possible nutrient values (Table 1). This variability indicates the importance of proper sampling to determine litter application rates.

The most economical way to store litter is to leave it in the poultry house until it can be used, usually by land application. However, limited cleanout time and/or unfavorable weather conditions may require storing the litter outside the poultry house until it can be used. Proper storage is essential for litter to maintain its value as a soil nutrient and to prevent it from polluting surface or groundwater. Ideally litter application rates and timing should be such that forage growth is promoted and negative environmental impacts are minimized. Storage provides greater flexibility in the timing of litter applications and marketing excesses off farm.

**Table 1. Typical Range of Nitrogen, Phosphorus and Potassium Values for Broiler Litter.**

	H <sub>2</sub> O %	N Lb/ton	P <sub>2</sub> O <sub>5</sub> Lb/ton	K <sub>2</sub> O Lb/ton	Ca Lb/ton
Minimum	2	22	18	23	18
Maximum	47	98	96	80	108
Mean	23	60	58	52	45

These values are for 2,054 broiler litter samples collected by producers and analyzed by the University of Arkansas Agricultural Diagnostics Laboratory from 1993 to 2000.

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The key to proper storage is to keep the litter dry. Protect the litter stack from rainfall and surface runoff to avoid the leaching of nutrients from the stack. Avoid stacking litter more than 5 to 6 feet deep to prevent overheating and burning.

A roofed structure with a clay or concrete floor provides easy access to poultry litter that must be stored. Large quantities of litter can be stored and kept dry in these “dry stack” structures. Another option is to cover the stack with a well-secured tarpaulin or heavy plastic sheeting. Covered stockpiles are normally used to satisfy occasional short-term storage needs. Poultry litter should not be stored outside unless some type of waterproof sheeting covers it and surface runoff water is diverted away from the stack. Piles of litter should not be stored where runoff reaches streams, wells or other water sources.

## Using Poultry Litter

Poultry litter is a valuable resource and can be used in many ways. Cattlemen who don't raise poultry often purchase litter to fertilize forages. Quality litter is routinely used as an ingredient in beef cattle rations. Litter may be composted to produce a rich, uniform mixture suitable for use in gardens and nurseries. Arkansas row crop producers have found that litter is a natural soil amendment that may enhance crop production more than a mineral fertilizer, especially where topsoil has been cut during land leveling operations. Currently, the predominant use of most poultry litter is as a fertilizer for forage production.

To ensure the most effective use of litter nutrients a Comprehensive Nutrient Management Plan (CNMP) should be developed and followed.

Comprehensive Nutrient Management Plans are simply long term plans that identify the fertility needs of a farm's fields and the estimated litter application rates needed to obtain the desired fertility. The goal of a CNMP is to balance the practical, economic and environmental aspects of litter management. A voluntary plan should be developed for each field that will receive a litter application. For assistance in exploring the various options and developing a CNMP for a specific farm, contact the local county Extension and Natural Resources Conservation Service offices.

## Phosphorus Environmental Concern

Poultry litter has traditionally been land applied at rates to supply the crop's nitrogen needs. Due to differences between the litter's and the crop's nitrogen, phosphorus and potassium ratios, an over application of phosphorus results. Therefore, repeated nitrogen-based litter application causes phosphorus accumulation in the soil (Table 2). Depending on the forage and the nitrogen application losses, an over or under application of potassium is possible.

Recent research has revealed that increasing the phosphorus level above that needed for crop production increases the potential for phosphorus in the runoff water from the field. Since phosphorus is normally the limiting nutrient in low-fertility clear-water lakes and streams, a slight increase can result in unwanted algae blooms and other aquatic vegetation. This new research has resulted in recommendations for reduced litter application rates. It has also increased the need for litter storage and hauling from farms where land is limited for applications.

**Table 2. Typical Forage Nutrient Needs and Potential Nutrient Excesses/ Deficits With Nitrogen-Based Litter Applications.**

	N Lb/ton	P <sub>2</sub> O <sub>5</sub> Lb/ton	K <sub>2</sub> O Lb/ton	N/P <sub>2</sub> O <sub>5</sub> Lb/ton	N/K <sub>2</sub> O Lb/ton	Surplus P <sub>2</sub> O <sub>5</sub> Lb/ton	Surplus K <sub>2</sub> O Lb/ton
Bahiagrass	31	8	34	3.9	0.9	32	2
Bermudagrass	40	12	44	3.3	0.9	40	2
Fescue	36	14	50	2.6	0.7	32	-8
Ryegrass	39	16	54	2.4	0.7	34	-9
Sudangrass	37	14	47	2.6	0.8	34	-4
Wheat	36	13	40	2.8	0.9	33	2

The forage information is averages of measurements from 1984 to 1996 Arkansas forage tests. From Table 1 the litter nutrient values for N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O are assumed to be 60, 58 and 52. An assumed loss of 25% results in an available N, N/P<sub>2</sub>O<sub>5</sub> and N/K<sub>2</sub>O values of 45, 0.78 and 0.87, respectively.

## Best Management Practices

Best Management Practices (BMPs) are simply recommended practices for proper litter management. The objectives of the BMPs listed below are to maximize the value of the litter, protect the environment and maintain good relationships with neighbors.

- Develop and follow a CNMP for your operation. This plan will be tailored to fit the conditions of your farm and provide management guidelines that are more specific to your farm than the BMPs listed below.
- Have the soils in the application fields tested (see the local county Extension office for assistance). If soil test phosphorus is a concern, consider reducing litter application rates and supplementing with commercial fertilizer.
- Spread litter uniformly over the application site. Unless specified by a CNMP, apply no more than 2 tons per acre for each application, with an annual application of no more than 4 tons per year.
- Do not apply poultry litter on land when the soil is saturated, frozen, covered with snow, during rainy weather or when precipitation is in the immediate forecast.
- Do not apply poultry litter on slopes with a grade of more than 15 percent or in any way that allows manure to enter water sources.
- Do not apply litter within 100 feet of streams, ponds, lakes, springs, sinkholes, wells, water supplies and dwellings. Do not apply within 25 feet of rock outcroppings.
- Keep records of the dates, amounts and litter application sites. If you sell litter, keep a record of who buys the litter and the dates and amounts sold.
- Cover or tarp vehicles when transporting litter on public roads.
- Develop a good relationship with the surrounding community. Avoid spreading litter when it would be objectionable to your neighbors.

For additional information on litter management and use, contact your local county Extension office.

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