

## Temporary Field Storage of Poultry Litter

The Delaware Department of Agriculture regulates activities involving the generation and application of nutrients under the Delaware Nutrient Management Law to improve the quality of ground and surface waters by reducing nutrient (nitrogen and phosphorus) losses from agricultural land receiving applications of manures and/or fertilizers. Poultry production accounts for the majority of Delaware's agricultural business. Therefore, cost-effective, practical, and environmentally sound best management practices (BMPs) for poultry litter management are needed to reduce nutrient losses to the environment during storage, handling, and land application of poultry litter. These practices help Delaware meet water quality standards and keep poultry growers competitive in national and international markets. The purpose of this fact sheet is to outline Delaware's regulatory requirements and additional recommended BMPs for temporary outdoor field storage of poultry litter.

### Litter Management and Storage

In order to maintain animal health, poultry litter (a combination of manure, feed, bedding and feathers) must be managed in-house to reduce pathogens and ammonia. Proper manure management includes periodic removal of crust (excessively wet litter) and/or full house litter clean out. Other management practices include cutting centers, windrowing, and pulverizing. Applying poultry litter to agricultural fields for crop production remains a viable and efficient use of litter removed from poultry production houses because it supplies valuable plant nutrients and improves soil health.

Poultry litter should only be applied when crops can actively utilize the nutrients in order to avoid an increased risk for nutrient losses.

Delaware regulations PROHIBIT nitrogen and phosphorous fertilizer applications:

- between December 7 - February 15, or
- to frozen or snow covered ground.

In addition, avoid application of poultry litter:

- to saturated soils, or
- before eminent heavy rainfall.

Immediate land application of poultry litter to agricultural fields to provide nutrients for grain crops remains one of the most efficient and desired manure management practices following clean out. However, whole house litter cleanout and between flock "crust out" activities often occur at times when land application of poultry litter is not possible (due to weather, crop rotations, and other factors). When clean out schedules do not accommodate immediate land application, temporary storage (roofed storage or in-field storage) of poultry litter is required prior to land application. In-field storage of poultry litter can help to balance litter supply by benefiting areas with a lack of litter resources when needed for crop production, while reducing excess litter supplies in other areas.

Outdoor storage of poultry litter is only permitted if the practice is included in the operation's nutrient management plan and only after all available space within roofed manure storage structures is used (Figure 1). But since most permanent manure storage structures are

designed to hold only a portion of poultry litter generated (usually 180 days), outdoor in-field storage of poultry litter is often necessary following full house cleanouts.



*Figure 1. Example of a roofed manure storage structure.*

### **Types of Regulated Outdoor Litter Storage**

Delaware regulations include specific requirements for outdoor storage of poultry litter by operations required to implement a nutrient or animal waste management plan. Types of outdoor storage of poultry litter include:

- 1) Field staging - the temporary placement of poultry litter piles in the application area (i.e., agricultural field) for up to 90 days prior to its application in that field.
- 2) Outdoor stockpiling - the temporary placement of poultry litter piles outside of an approved storage structure within the production area (or other non-application areas) for up to 14 days.

Regulatory requirements for each type of outdoor storage are similar except for the amount of time that each practice is permitted. Information on field staging of poultry litter is included in this document.

### **Field Staging Site Requirements**

Delaware regulations require that the specific field location of the poultry litter pile be used no more than once every two years, be located on high ground, and adhere to the following setback requirements:

- 100 feet from any public road and any surface water,
- 200 feet from any home not located on the property and any domestic well, and
- 300 feet from any public water supply well.

The adage “location, location, location” applies in addition to regulatory requirements when siting poultry litter piles. Considering your neighbors and the public goes a long way to reducing

complaints related to temporary field staging. A well-managed and well-located pile serves as an example of good stewardship and enhances public relations.

### **Handling Litter During Cleanout and Transport**

Before litter is stored or field applied, nutrient loss can occur due to litter spillage during cleanout and transport. Use of conveyors or loading equipment (i.e., spreaders) inside the house is recommended. If spillage does occur at the end doors, which cannot be avoided in many cases, removing all the litter from this area is very important. Install heavy use pads for ease of cleaning after handling litter or live-haul events. Also, avoid spillage caused by overloading transport vehicles. Covering trucks with tarpaulins is required by Delaware regulation, reduces biosecurity concerns, and presents a more positive image of agriculture to motorists and the public.

### **Construction and Maintenance of Temporary In-Field Litter Storage Piles**

Results of University of Delaware (UD) research were used to inform Delaware's nutrient handling requirements.

Delaware regulations require that litter temporarily stored in the application area:

- must be at least 6 feet high and conical in shape (Figure 2) and
- must consist of less than 5% crust out material.



*Figure 2. Example of a properly field-staged poultry litter pile that is six feet tall, conically shaped, and conforms to all set back requirements.*

Researchers from UD concluded that shaping an uncovered litter pile into a conical form is the most essential factor in reducing nutrient loss during temporary field staging. A properly shaped pile forms a wet layer (or crust) on the sloped exterior that essentially sheds rainwater and thereby losing very little nutrients. (Figure 3). This crust also prevents water from permeating the entire depth of the pile, thus reducing leaching of nutrients into the soil below. The researchers demonstrated that when litter piles are properly shaped, the amount of nitrogen moving into the

soil below the pile was only 0.2% of the total amount of nitrogen in the poultry litter; similarly, phosphorus losses from poultry litter piles were small.



*Figure 3. Cross sectional view of water penetration into a properly shaped poultry litter pile. Water infiltrated into the top few inches of the pile and formed a hard crust. This crust allows rainwater to be shed from the pile without wetting the bulk of the poultry litter underneath. Photo credit: Greg Binford.*

Covers and bases are NOT required or recommended for properly sited and constructed temporary field-staged litter piles. A variety of covers and bases for piles were evaluated by University of Delaware researchers to determine their impact on loss of nitrogen and phosphorus from field-staged poultry litter piles. Piles used in the study were sized to simulate whole-house cleanouts used in production agriculture, which range from 75 to 200 tons of litter. Ultimately, the researchers found that none of the tested covers or bases significantly reduced nutrient loss from the research piles.

### **Managing Soil After Removal of Temporary In-Field Litter Storage Piles**

Although little nitrogen and phosphorus is lost to the soil when a temporary poultry litter pile is properly formed and maintained, simple steps can be taken to mitigate any nutrients that remain in the soil after removal of the pile for land application.

Delaware regulations require that once a pile has been removed:

- the top 1-2 inches of topsoil must be removed with the litter, and
- a production or cover crop must be established and maintained.

Researchers reported that approximately 75% of the nitrogen that leached into the soil under properly constructed poultry litter piles was found within in the top 24 inches of soil, thus supporting the effectiveness of Delaware's requirements.

While potassium is not a nutrient of environmental concern, high concentrations in the soil can be counterproductive for crop establishment. Researchers at UD revealed high concentrations of soluble potassium in the soil where litter piles were sited (Figure 4). These high concentrations of potassium can prevent germination of seeds or survival of seedlings. In order to improve soil conditions to benefit productivity, removal of some topsoil when removing the poultry litter pile is recommended. In addition, soil potassium can be reduced from the litter pile site by planting crops with higher potassium needs.



*Figure 4. It may be difficult to grow crops immediately after removing a poultry litter pile due to a build-up of potassium salts in the soil.*

### **Summary**

When properly land-applied, there is great value in using poultry litter to enhance crop productivity. Provided piles are properly sited, constructed, and maintained, temporary field staging allows for effective, efficient, and sound use of litter. Delaware regulations were based on results of field research conducted by researchers at University of Delaware. Following these regulations can reduce the potential for nutrient losses during temporary outdoor storage of poultry litter while maximizing the benefits of litter application for crop productivity and profitability.

### **References:**

- Binford, G., G. Malone. 2009. Evaluating BMPs for Temporary Stockpiling of Poultry Litter. University of Delaware. Web. 22. Mar.2015  
[http://mda.maryland.gov/SiteAssets/Pages/Manure/PL\\_Storage\\_Report\\_BINFORD\\_FINAL.PDF](http://mda.maryland.gov/SiteAssets/Pages/Manure/PL_Storage_Report_BINFORD_FINAL.PDF)
- “Delaware Nutrient Management Certification Regulations.” *Delaware General Assembly*. Jan 2011. Web. 22 Mar. 2015 <http://regulations.delaware.gov/AdminCode/title3/1200/1201.shtml>

“Delaware Nutrient Management Program, Delaware Conservation Practice Standard, Nutrient Management Relocation.” *Delaware Department of Agriculture*. Jul. 2010. Web. 22 Mar. 2015. [http://dda.delaware.gov/nutrients/downloads/Draft\\_TechStandards/Nutrient\\_Man\\_Relocation.pdf](http://dda.delaware.gov/nutrients/downloads/Draft_TechStandards/Nutrient_Man_Relocation.pdf)

“Delaware Nutrient Management Program, Delaware Conservation Practice Standard, Production Area Risk Assessment.” *Delaware Department of Agriculture*. Jul. 2010. Web. 22 Mar. 2015. [http://dda.delaware.gov/nutrients/downloads/Draft\\_TechStandards/ProductionAreaRiskAssessment.pdf](http://dda.delaware.gov/nutrients/downloads/Draft_TechStandards/ProductionAreaRiskAssessment.pdf)

“Delaware Nutrient Management Program, Delaware Conservation Practice Standard, Temporary Field Staging.” *Delaware Department of Agriculture*. Jul. 2010. Web. 22 Mar. 2015. [http://dda.delaware.gov/nutrients/downloads/Draft\\_TechStandards/Temp\\_Field\\_Storage.pdf](http://dda.delaware.gov/nutrients/downloads/Draft_TechStandards/Temp_Field_Storage.pdf)

---

Publication Date: March 2015

Amy L. Shober, Sydney Riggi, and Rebecca Rothweiler, Department of Plant and Soil Sciences, University of Delaware Cooperative Extension

Adapted from materials prepared by: Bud Malone (retired) and Dave Hansen, University of Delaware Cooperative Extension; Delaware Nutrient Management Commission

Reviewed by: Bill Brown. University of Delaware Cooperative Extension, Georgetown, DE. March, 2015.

Larry Towle. Delaware Department of Agriculture, Dover, DE. March, 2015.