Poultry litter is recognized as an excellent source of plant nutrients (nitrogen, phosphorus and potassium) and organic matter. Nitrogen (N) is excreted from birds in the form of uric acid in the manure. Inorganic forms of N such as ammonium nitrate (NH₄-N) and nitrate nitrogen (NO₃-N) account for roughly 14% of the total litter N. The remaining 86% of the total litter N is in the form of organic N (Sharpley et al., 2009).
Research

Published research from the University of Delaware has shown that litter pH and ammonia levels were decreased following repeated PLT® application to broiler litter in both laboratory and field experiments. Furthermore, organic nitrogen and total nitrogen contents were higher in PLT® treated litter compared to untreated litter. This is due to the fact that PLT® reduced ammonia loss (Li et al., 2013).

For every 100 lbs of PLT® applied to poultry litter, 14.5 lbs of ammonia is chemically bound as ammonium sulfate. The formation of ammonium sulfate is non-reversible; therefore, the nitrogen in the litter is not released as ammonia when the pH increases (Ullman et al., 2004). Following poultry litter land application, inorganic, water-soluble forms of litter N such as ammonium sulfate (formed by PLT®), ammonium nitrogen, ammonium nitrate and nitrate nitrogen are transported into the soil by rainfall and are readily available for plant root uptake (Havlin et al., 2005). Organic forms of N are considered slow release fertilizers and are not immediately available for plant uptake. Organic N must first be mineralized by soil microorganisms prior to becoming plant available. Mineralization is a process of converting organic compounds to inorganic compounds.

The following research supports the fact that PLT® use increases litter N content by reducing ammonia volatilization, increasing ammonium nitrogen and forming ammonium sulfate.

In a study conducted at the University of Georgia (Johnson et al., 2006), consecutive use of PLT® for 3 flocks showed a linear increase in both total nitrogen and ammonium nitrogen (NH4-N) retained in the litter as the amount of PLT® applied increased (Fig. 1 & 2). The higher amounts of retained litter nitrogen in the 150 lb/1,000 sq. ft. treatment group indicate a reduction in ammonia emissions compared to the lower treatment rates.
PLT® usage was tested in a high-rise commercial egg layer facility for the reduction of ammonia (Patterson et al., 2006). Because layer manure does not contain a plant substrate, as does broiler litter, the moisture and ammonia content tend to be greater. Repeated applications of a litter amendment at higher rates are often necessary before significant changes in manure characteristics are observed. Manure total nitrogen and ammonium nitrogen (NH₄-N) were higher in PLT® treated manure compared to untreated manure (Table 1).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Total N (lbs/ton)</th>
<th>NH₄-N (lbs/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>38.37b</td>
<td>11.08c</td>
</tr>
<tr>
<td>PLT®-150</td>
<td>40.50ab</td>
<td>13.75b</td>
</tr>
<tr>
<td>PLT®-300</td>
<td>46.08a</td>
<td>17.06a</td>
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<tr>
<td>P-value</td>
<td>0.0551</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Table 1. Commercial Layer Manure Analysis after 8 PLT® treatments over a 45-day period.

**Summary**

- Roughly 86% of poultry litter N is found in the organic (slow release) form while the remaining 14% is inorganic (fast release) N.
- Ammonia losses from litter are reduced following PLT® application.
- PLT® reduces ammonia volatilization by forming ammonium sulfate and increasing litter ammonium N.
- Ammonium sulfate and ammonium N are inorganic, water-soluble, nitrogen fertilizer sources readily available for plant root uptake.
- Research has shown that total nitrogen and ammonium N levels are higher in PLT® treated litter compared to non-treated litter.
References


