1. Poultry litter: Nutrient availability, value, and storage practices

Poultry litter can provide a significant and important supply of nutrients for crop production in areas of Kansas where a supply of litter is available. Although Kansas is not a major producer of poultry, there is an abundant supply of litter from the nearby states of Arkansas and Oklahoma, which rank among the largest producers of poultry in the U.S. The acreage available to receive poultry litter has been declining in Arkansas and Oklahoma in recent years because of environmental concerns. That trend, coupled with high fertilizer prices, has meant the availability of litter to areas such as southeast Kansas has been on the rise.

Poultry litter should serve as an excellent complement to commercial nitrogen (N) fertilizers. Phosphorus content in poultry litter is usually high, and applications rates should be based on P levels to avoid potential surface water contamination.

<table>
<thead>
<tr>
<th>Types of Poultry Litter</th>
<th>Source</th>
<th>Typical moisture content</th>
<th>Typical nutrient content (lbs/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Layer</td>
<td>High</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Pullet</td>
<td>Low</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>Breeder</td>
<td>High</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Turkey</td>
<td>Low</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Broiler</td>
<td>Low</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

Moisture content and nutrient concentration in poultry litter can be highly variable and depends mainly upon production conditions, storage, and handling methods. Therefore, laboratory analysis is the best way to determine the level of N and P in the material to be applied. The table above presents average values for the different types of poultry manure collected over a period of time. The table below presents the actual laboratory analysis of 45 poultry manure samples from Labette County.
For maximum efficiency of manure use, it is essential to know the nutrient content of the manure. Using a manure lab analysis will help in determining the actual nutrient rates applied. A laboratory analysis should be done on the poultry litter before applying it to land. A laboratory analyses provides information regarding nutrient levels, as well as the chemical forms of these nutrients. This information is necessary for an adequate estimation of nutrient availability and application rates. For more information, see K State Extension publication MF-2562, “Estimating Manure Nutrient Availability,” at: http://www.oznet.ksu.edu/library/crpsl2/mf2562.pdf

**Nitrogen availability**

Nitrogen and P crop availability shortly after application is a common question. In the case of N, it is important to consider that this nutrient is primarily in the organic form in poultry litter (up to 75-80% organic). Organic N needs to mineralize before becoming available to crops. A fraction of this organic N may become part of the soil organic matter pool and unavailable to crops in the short term.

Field and laboratory studies suggest that the fraction of total nitrogen that becomes plant available the first year of application is approximately 45-55%, which includes both the inorganic N in the manure and a percentage of the organic N. This value varies depending upon components in the litter, and the method of handling and application. For example, poultry litter that contains a large fraction of bedding material will tend to have lower N availability the year of application. Reduction in N availability may also occur when litter is aged, and has undergone
some level of composting. Nitrogen lost from the volatile ammonium fraction at the moment of
application to the soil surface can also reduce plant available N. Ammonium volatilization is
typically higher during windy and warm days. Incorporation of litter immediately after
application will reduce volatilization and potential loss by water runoff in case of a rainfall event.

If the manure is applied to pastures, the percentage of nitrogen utilized by the forage the first
year will depend on whether the pasture consists of cool-season or warm-season grasses. For
cool-season grasses, such as fescue pasture, nitrogen utilization will likely be less than 50% the
first year. Most of the growth in cool-season pasture occurs early in the year. Microbes will not
mineralize as much N early in the spring as it will later in the summer. Fall applications may
utilize more N for fescue than winter or spring applications. For warm-season grasses, such as
bermudagrass pasture, nitrogen utilization from manure will likely be close to 50%. In both
cases, producers should base application rates on the P and K needs of the grass, and supplement
additional N fertilizer to meet the N needs of the grass.

Phosphorus and potassium availability

When manure is applied to the soil, what percentage of this phosphorus and potassium is
available to the crop during the first year?

A large fraction of the phosphorus in manure is considered to be plant available immediately
after application. The fraction that is not plant available shortly after application will become
potentially available over time.

Estimated values of phosphorus availability are from 50 to 100%. This range accounts for
variation in sampling and analysis, and for phosphorus requirements with different soil test
levels. Use the lower end of the range of phosphorus availability values (50%) for soils testing
“Very Low” and “Low” (below 20 ppm) in phosphorus. In these situations, large yield loss could
occur if insufficient phosphorus is applied and soil phosphorus buildup is desirable.

On the other hand use 100% availability when manure is applied to maintain soil test phosphorus
in the Optimum soil test category, and when the probability of a yield response is small.

Several studies have shown that manure P is a valuable resource, comparable to inorganic
fertilizer P for crop production. These two P sources are similarly effective when the manure P
concentration is known and the manure is applied properly.

Nevertheless, excessive application of manure phosphorus (for example, applying manure at
rates sufficient to meet the crop’s nitrogen needs) often results in excessive soil phosphorus
buildup over time, resulting in higher risk of surface water contamination. This problem of
excessive phosphorus buildup in the long-term can be minimized by:

* Applying manure to cover the phosphorus needs of the crop and using inorganic sources of
  fertilizer to complement nitrogen needs,

* Constantly monitoring soil test phosphorus levels, and

* Using the P-index to assess potential impact of phosphorus buildup on water quality.
Producers should think in terms of actual phosphorus application rates and not just tons per acre of manure being applied. Uniform application of manure at precise rates can also be difficult. Careful calibration of manure applicators is needed. If these aspects are not considered, the efficiency of manure P compared with inorganic fertilizer P may be reduced. Careful management pays off.

Availability of potassium (K) is usually near 100% with proper application, poultry litter can also provide significant amounts of secondary and micronutrients.

**Value of manure**

The use of poultry litter can contribute to reduce cost of fertilizer inputs for many operations, depending on the price and transportation cost of the litter. For many farmers the use of poultry litter may represent significant savings.

How valuable is poultry manure? This may not be a straightforward answer and depends on several factors, including the nutrient(s) required for a specific field, but here’s one example using bedding manure with low moisture content and a nutrient analysis of 21-18-26 (N-P-K lbs/ton):

- **Year 1:**
  - 35% of N is inorganic (all available) = 7.4 lbs/ton
  - 65% of N is organic (1/4th available in year 1) = 3.4 lbs/ton
  - Total N available in year 1 = 10.8 lbs/ton
  - Total value of N available in year 1 (@ $0.51/lb) = $5.51
  - P is 50% available in year 1 = 9.0 lbs/ton
  - Total value of P in year 1 (@ $0.49/lb) = $4.41
  - K is 85% available in year 1 = 22.1 lbs/ton
  - Total value of K in year 1 (@ $0.48/lb) = $10.61
  - Total in year 1 = $20.53/ton
  - Residual N and P = $5.54/ton

**Storage**

Proper storage of manure is important to prevent runoff contamination of water and odor problems. The following practices should be utilized:

- Avoid stockpiling litter near homes
- Use tarps on litter piles to keep litter dry, reduce smell, and reduce N losses from volatilization
- Stockpile litter at least 200 feet away from “Waters of the State”
Poultry litter stockpiled away from surface water to prevent runoff contamination, being loaded into manure spreader. Photo by Doug Shoup, K-State Research and Extension.

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-- Doug Shoup, Southeast Area Extension Crops and Soils Specialist
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2. Cover Your Acres Conference 2012 Conference

K-State and the Northwest Kansas Crop Residue Alliance are once again hosting the Cover Your Acres Winter Conference for crop producers and consultants on Jan. 17 and 18, 2012.

The conference will focus on the latest technology, methods, and conservation practices to improve crop production on the High Plains. It annually brings in over 500 attendees from the surrounding area. This year it will feature university specialists and industry representatives discussing issues such as kochia biology and control, new fertilizer products, utilizing yield monitor data, vertical tillage, and cover crops. The same programs will be offered both days of the conference.

Registration will begin at 7:45 a.m., with educational sessions ending at 6:10 p.m. followed by a “bull session” where attendees can visit with industry and university specialists.

The conference will be held at the Gateway in Oberlin. Early registration is due by Jan. 10 and is
$30 for Jan. 17 or $25 for Jan. 18. After Jan. 10, the cost is $50 per day. The conference fee includes refreshments and meals. CEU credits are available.

Mail registration, with a check payable to KSU, to the Northwest Area Office, ATTN: Jeanne Falk, P.O. Box 786, Colby, Kan. 67701. To view the conference flyer, please visit the K-State Research and Extension Northwest Area office website at www.northwest.ksu.edu.

Major sponsors of the conference include BASF, Brothers Equipment, Cargill AgHorizons, Hoxie Implement, Lang Diesel, Monsanto, National Sunflower Association, and Simpson Farm Enterprises.

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3. North Central Kansas Experiment Fields Winter Update, January 27

The North Central Kansas Experiment Fields Winter Update will be held Friday, Feb. 1. The update will last from 9:30 a.m. to noon, and will be held in the 4-H Building at the Belleville Fairgrounds.

Topics at the update will include:

* Managing residue: Removal and vertical tillage
* Micronutrient management and tissue analysis
* Herbicide and weed resistance update
* Field research update

Lunch will be served at the conclusion of the meeting. For more information, contact Randall Nelson, Agronomist-in-Charge, at 785-335-2836, or: jrnelson@ksu.edu

-- Steve Watson, Agronomy e-Update Editor
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4. Comparative Vegetation Condition Report: December 6 – 19

K-State’s Ecology and Agriculture Spatial Analysis Laboratory (EASAL) produces weekly Vegetation Condition Report maps. These maps can be a valuable tool for making crop selection and marketing decisions.

Two short videos of Dr. Kevin Price explaining the development of these maps can be viewed on YouTube at:
http://www.youtube.com/watch?v=CRP3Y5NIggw
http://www.youtube.com/watch?v=tUdOK94efxc

The objective of these reports is to provide users with a means of assessing the relative condition of crops and grassland. The maps can be used to assess current plant growth rates, as well as comparisons to the previous year and relative to the 21-year average. The report is used by
individual farmers and ranchers, the commodities market, and political leaders for assessing factors such as production potential and drought impact across their state.

The maps below show the current vegetation conditions in Kansas, the Corn Belt, and the continental U.S., with comments from Mary Knapp, state climatologist:

Map 1. The Vegetation Condition Report for Kansas for December 6 –19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that snow continues to be a feature in the region. This map, however, doesn’t include snow coverage from the storm of Dec. 19-20, which will be included in next week’s two-week composite image. Most vegetation has now moved into dormancy, as seasonal temperatures reduce biomass production. Harper and Sumner counties are exceptions, where some photosynthetic activity is still occurring.
Map 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for December 6 – 19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the southern parts of the state have a higher level of photosynthetic activity. Generally, temperatures and moisture have been more favorable this fall than last year, allowing for greater photosynthetic activity. The decrease in biomass productivity in northwestern Kansas is due to the snow cover in that area. On the 15th of December, snow totals in this area of the state ranged from 2 to 8 inches.
Map 3. Compared to the 22-year average at this time for Kansas, this year’s Vegetation Condition Report for December 6–19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that most of the state is experiencing above average levels of photosynthetic activity. The much-below-average biomass production in Thomas, Rawlins, and Decatur counties is due to the greater and more persistent snow cover than average for this time of year in that area. National Snow Analysis (NOHRSC) reports snow depth of 4 to 8 inches in the area from the 6th through the 18th of December.
Map 4. The Vegetation Condition Report for the Corn Belt for December 6–19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that lack of snow cover continues to be a problem in the upper Midwest, including parts of Wisconsin, eastern North and South Dakota, and western Minnesota. These areas are showing on the Drought Monitor with conditions ranging from abnormally dry to moderate drought.
Map 5. The comparison to last year in the Corn Belt for the period December 6 –19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that much of the northern Corn Belt has a greater level of photosynthetic activity this year. Greater snow pack last year masked activity that is visible this year. In contrast, northwest Kansas and central Nebraska have greater snow cover this winter than at this time last year, and much decreased photosynthetic activity.
Map 6. Compared to the 22-year average at this time for the Corn Belt, this year’s Vegetation Condition Report for December 6–19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows higher-than-average photosynthetic activity for the period. Again, the major reason for this departure is the lack of continuous snow cover that would be normal during the period. In contrast, a narrow band from northwest Kansas into central Nebraska has much-below-average photosynthetic activity. In this area, persistent snow cover of 4 to 8 inches has been present, where typically this region would only have intermittent snow at this time.
Map 7. The Vegetation Condition Report for the U.S. for December 6 – 19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that greatest photosynthetic activity is seen in the Southeast and along the Pacific Northwest. Snow cover into New Mexico and West Texas is unusually persistent for this early in the season.
Map 8. The U.S. comparison to last year at this time for the period December 6 –19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that central Oklahoma and north central Texas are responding to the wetter conditions this fall with greater photosynthetic activity than at this time last year. Last year, snow cover was greater in the northern areas of the U.S. and less in the southern reaches. The switch in the area with greatest snow cover has resulted in areas of decreased biomass production in the Southwest, and increased biomass production in the Northwest, when compared to last year.
Map 9. The U.S. comparison to the 22-year average for the period December 6 –19 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that pockets of persistent snow in Arizona, New Mexico, and the Texas Panhandle have resulted in decreased photosynthetic activity values. On the other hand, lack of snow cover in the Pacific Northwest and northern areas of the U.S. has left more vegetation exposed, and results in higher photosynthetic activity than average. Lack of snow cover is of increasing concern, particularly in the Mountain West, where much of the water supply comes from snow melt.

Note to readers: The maps above represent a subset of the maps available from the EASAL group. If you’d like digital copies of the entire map series please contact us at kpprice@ksu.edu and we can place you on our email list to receive the entire dataset each week as they are produced. The maps are normally first available on Wednesday of each week, unless there is a delay in the posting of the data by EROS Data Center where we obtain the raw data used to make the maps. These maps are provided for free as a service of the Department of Agronomy and K-State Research and Extension.

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5. Happy Holidays from K-State’s Department of Agronomy!

There will be no Agronomy e-Update during the upcoming holiday season (Dec. 24-Jan 2). We’ll be back the first week of 2012 with another exciting year of updates from K-State Agronomy. Happy holidays!

-- Steve Watson, Agronomy e-Update Editor
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