CCA Pretest

Legume & Manure Credits
Nitrogen credits for forage legumes

Based on:

- Crop
- Soil Texture
- Plant density
- Harvest management
In a mature alfalfa plant, 40-60% of the N is in above-ground plant parts and 40-60% is in the roots.
Legume Nitrogen credits

Forages (alfalfa) *:

- Good stand (>70%) = 190 lb N/a
- Fair stand (50%) = 160 lb N/a
- Poor stand (<30%) = 130 lb N/a

* Use 80% of alfalfa credits for red clover & birdsfoot trefoil.
Legume Nitrogen credits

- Reduce credit by 50 lb N/a on sands and loamy sands
- Reduce credit by 40 lb N/a if less than 8 in. of regrowth
- Second year credits:
  - 50 lb N/a for good or fair stand
  - No credit on sand or loamy sand
## Nitrogen credits for alfalfa

<table>
<thead>
<tr>
<th>Stand density</th>
<th>Sandy soils</th>
<th>Other soils</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regrowth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤8”</td>
<td>&gt;8”</td>
</tr>
<tr>
<td>Good</td>
<td>100</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td>(70-100%, &gt;4 plants/sq ft)</td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>70</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>(30-69%, 1.5-4 plants/sq ft)</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>(0-29%, &lt;1.5 plants/sq ft)</td>
<td></td>
</tr>
</tbody>
</table>

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lb N/a
Legume N credits not affected by:

• **Time of killing**
  – spring or fall

• **Method of killing**
  – herbicide, tillage, or winterkill

• **Tillage**
Legume N credits

- Key information:
  - stand density
  - regrowth in late October

- Confirm credits with presidedress soil nitrate test (PSNT)
Legume N credits

- Vegetable crops:
  - Peas, beans, dry beans; credit 20 lb N/a
  - No credit on sand or loamy sand
Nitrogen credits for soybean

- Credit 40 lb N/acre
- Credit varies over sites and years
- Credit not affected by soybean residue
- Use preplant soil nitrate test to fine-tune credit
- No credit on sands or loamy sands
What you need to know

1. Manure contains nutrients

2. All manure is not the same

3. All manure nutrients are not available

4. Some available nutrients can be lost

5. Amount applied
## Average nutrient & dry matter content from solid manure

<table>
<thead>
<tr>
<th>Species</th>
<th>% Dry Matter</th>
<th>N</th>
<th>P$_2$O$_5$</th>
<th>K$_2$O</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>24</td>
<td>10</td>
<td>5</td>
<td>9</td>
<td>1.3</td>
</tr>
<tr>
<td>Beef</td>
<td>35</td>
<td>14</td>
<td>9</td>
<td>11</td>
<td>1.5</td>
</tr>
<tr>
<td>Swine</td>
<td>20</td>
<td>14</td>
<td>10</td>
<td>9</td>
<td>2.5</td>
</tr>
<tr>
<td>Duck</td>
<td>35</td>
<td>17</td>
<td>21</td>
<td>30</td>
<td>3.3</td>
</tr>
<tr>
<td>Chicken</td>
<td>60</td>
<td>40</td>
<td>50</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>Turkey</td>
<td>60</td>
<td>40</td>
<td>40</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>Sheep</td>
<td>45</td>
<td>26</td>
<td>18</td>
<td>40</td>
<td>3.3</td>
</tr>
<tr>
<td>Horse</td>
<td>45</td>
<td>10</td>
<td>6</td>
<td>10</td>
<td>1.7</td>
</tr>
</tbody>
</table>
Available and lost nitrogen

\[
\text{Avail. } N = \text{ inorganic } N + \text{ mineralized } N - \text{ lost } N
\]

\[
\text{Lost } N = \text{ volatilized } N + \text{ leach } N + \text{ denitrified } N + \text{ soil stored } N
\]
N availability studies with dairy manure:

- 37 studies with dairy manure
  - 4 incubations, 15 apparent N recovery by crops,
  - 18 fertilizer equivalence, 1 model fitting
    - 17 liquid
    - 18 solid
    - 2 dried
- Average availability
  - Range 10 – 54%
  - Mean 37.5%
- Within study availability
  - 10 – 65%
Phosphorus availability

- Most commonly based on change in soil test
- Less than P fertilizer
- Need to do crop trials on responsive soils
- 40 - 90%
Potassium availability

- K in liquid fraction
- 70 – 100%
Summary:

• Availability depends on content, release, and losses

• Nitrogen
  10 – 60%; average 37%

• Phosphorus
  40 – 90%; average 60%

• Potassium
  70 – 100%; average 80%

• Residual effects significant
  0.30 – 0.10 – 0.05 – 0.02
Nutrient availability as determined by fertilizer equivalence for multiple manure applications

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Applications</th>
<th>Avg. N Availability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall River</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>47</td>
</tr>
<tr>
<td>Sun Prairie</td>
<td>1</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>54</td>
</tr>
<tr>
<td>Baraboo</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>26</td>
</tr>
</tbody>
</table>
Where do we put it:

1. Where nutrients can be recycled
2. Where environmental risks are small
3. Consider crop year and rotation
4. Consider restrictions
Questions?