Feeding value of untreated and treated corn stover in high grain diets

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## Nutrient content of corn stover/stalklage (% of DM)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Michigan 2009</th>
<th>Preston, 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NRC, 2000</td>
<td>Baled</td>
</tr>
<tr>
<td>TDN, %</td>
<td>55</td>
<td>61</td>
</tr>
<tr>
<td>$NE_m$, Mcal/lb</td>
<td>.52</td>
<td>.61</td>
</tr>
<tr>
<td>$NE_g$, Mcal/lb</td>
<td>.26</td>
<td>.31</td>
</tr>
<tr>
<td>Crude protein, %</td>
<td>6.3</td>
<td>4.6</td>
</tr>
<tr>
<td>NDF, %</td>
<td>68</td>
<td>---</td>
</tr>
<tr>
<td>ADF, %</td>
<td>55</td>
<td>43</td>
</tr>
<tr>
<td>Ash, %</td>
<td>11.6</td>
<td>7.6</td>
</tr>
<tr>
<td>Calcium, %</td>
<td>.38</td>
<td>.42</td>
</tr>
<tr>
<td>Phosphorus, %</td>
<td>.31</td>
<td>.16</td>
</tr>
<tr>
<td>Potassium, %</td>
<td>1.54</td>
<td>1.32</td>
</tr>
</tbody>
</table>
Use of hydrated lime to improve digestibility

- **Forms of lime**
  - CaCO₃ → CaO → Ca(OH)₂
  - Limestone → Quick lime → Slaked or hydrated lime
- Grind coarsely
- Add 5% CaO on a DM basis
- Need 50% moisture in final product
  - May be impractical to add this much water with a dry corn crop
- Store in plastic silo
- Can be fed without ensiling but must sit for 5-7 days before feeding
- Costs approximately $20/ton for CaO (quick lime)

Schroeder at NDSU, 2012
Use of hydrated lime (calcium hydroxide) to corn stover to increase digestibility

<table>
<thead>
<tr>
<th>Iowa State University&lt;sup&gt;a&lt;/sup&gt;</th>
<th>University of Nebraska&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stalks</td>
</tr>
<tr>
<td>Baled</td>
<td>Stover silage</td>
</tr>
<tr>
<td>75.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>75.5&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Lamb digestion study
<sup>b</sup>IVDMD, 50% DM
Effects of Ca(OH)$_2$ treatment of corn stover on cattle performance

For feed/gain and Choice %, the chart values need to be multiplied by 10
For carcass wt., the chart values need to be multiplied by 100

- **40% MDGS; 20% corn stover (5% in control); 4% supplement**
- **Corn stover replaced a mixture of DRC and HMC**
Ammoniation of corn stover

- Bale stover and pile under plastic
- Add 3.5% ammonia
- Need a minimum of 12% moisture
- Apply as soon after harvest as possible
- Increase forage digestibility by 10-15%
- Increase forage intake by 5-10%
- Increase crude protein percent by 85-125%
- Prevents spoilage of high moisture forages
  - inhibits molds and bacteria that cause spoilage
- Costs $25-30/ton for ammonia
1. Stack hay.

2. Cover with heavy plastic. Make sure to bury edge of plastic.

3. Treat with anhydrous ammonia at 3% (weight basis); trickle through secure pipe overnight. Leave covered 2 weeks in summer or 4 in winter.
Securing the tarp
Effects of temperature on length of storage time

<table>
<thead>
<tr>
<th>Temperature, °F</th>
<th>Length of treatment, weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;39</td>
<td>&gt;8</td>
</tr>
<tr>
<td>40-59</td>
<td>4-8</td>
</tr>
<tr>
<td>60-80</td>
<td>2-4</td>
</tr>
<tr>
<td>&gt;81</td>
<td>2</td>
</tr>
</tbody>
</table>

Lalman et.al.
Effects of ammoniation on digestibility of corn stover

For OMD, protein and NDF digestibilities, the chart values need to be multiplied by 10.

Diets were 82% corn stover.
Effects of ammoniation of corn stalks on growth of steers

For DMI and feed/gain, the chart values need to be multiplied by 10

Klopfenstein, CRC Press, 1994
Summary

- Corn stover can be used to replace forages and or grain in high concentrate diets without sacrificing performance
  - Best with DGS in the diet
- Treatment with hydrated lime or ammonia increased the nutritive value of corn stover
  - Hydrated lime- 10%
  - Ammonia- 10-15%
- Costs about $20-30/ ton for chemical to treat corn stover
For more information

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