Use of “New Generation” DDGS in Ruminant Diets

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Nutrient Composition

<table>
<thead>
<tr>
<th>Item</th>
<th>% of DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein</td>
<td>28 to 36</td>
</tr>
<tr>
<td>RUP, % of CP</td>
<td>47 to 63</td>
</tr>
<tr>
<td>NEI, Mcal/kg</td>
<td>2.20</td>
</tr>
<tr>
<td>Fat</td>
<td>8.2 to 11.7</td>
</tr>
<tr>
<td>ADF</td>
<td>19 to 24</td>
</tr>
<tr>
<td>NDF</td>
<td>38 to 44</td>
</tr>
<tr>
<td>Ca</td>
<td>0.10 to 0.15</td>
</tr>
<tr>
<td>P</td>
<td>0.43 to 0.83</td>
</tr>
</tbody>
</table>

NDF
As effective as Alfalfa haylage
Only 68% as effective as Corn silage

High-bypass potential with >80% SI digestion
Handling that causes particle separation will result in considerable variation of DDG or DDGS composition. Akayezu et al., 1998

Fine particles (< 1 mm) represented 58% of the sample weight on average across 6 ethanol production facilities (CV 20.6%). Harty et al., 1998

Amino Acid Profile

<table>
<thead>
<tr>
<th>Amino acid</th>
<th>1993</th>
<th>1996</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lys</td>
<td>0.8</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Met</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>His</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Arg</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
</tr>
</tbody>
</table>
When ADIN>13% N lightness correlated with ADIN and IARUP.

Owen and Larson, 1991
(Ammoniated corn silage 50% diet DM)
Owen and Larson, 1991
(Ammoniated corn silage 50% diet DM)

Grings et al., 1992
(Alfalfa 39% diet DM)
**Staples et al., 1995**
(corn silage 30%, 45%, 60% diet DM)

![Graph showing milk and DMI per day for different treatments.](image)

**Recommendations**

- Research suggests DDGS can comprise between 20% and 26% of the diet DM
  - Limiting factors: CP, RUP and lysine content
    - Balance for RUP, RDP, CP and lysine
    - Limit CP coming from corn sources to less than 60% of total CP
      - Corn grain, silage, DDGS, gluten meal, gluten feed

- DDGS replaces forage NDF at 66% effectiveness
  - For every 1 lb forage replaced, use 1.5 lb NDF from DDGS
DDGS Research in Ruminants

- **NCR-88 Beef Growing-Finishing Systems**
  - Summarized studies in 1984 (NCR No. 297)
    - Characterization of fermentation by-products
      - Higher protein concentration than corn
      - Similar or greater RUP
      - Similar energy concentration as corn
  - DDGS as a protein source
    - Replacement for other protein sources
      - When combined with urea of equal value as SBM
    - As a bypass source
      - Fortified with urea > urea alone
      - More efficient protein source when combined with urea than SBM
  - DDGS as an energy source
    - “if abundant supplies of wet distillers’ grains should become available—as a result, for example, of increased production of fuel alcohol—this by-product could be used as an energy source in livestock feeds.”

Beef Feedlot Research

- **Focus of most of the DDGS and WDGS work**
  - No complications with composition of gain
  - Typically require lower fiber and CP concentrations
- **Variable**
  - Crude protein sources
  - Crude protein concentrations
  - Age and/or weight at feedlot entry
Research

- Data from studies conducted since 1990
- 264 pens housing 1,541 head of cattle
- 796 lb (361 kg) initial weight
- NE, IA, KS, SD
**Recommendations**

- Feed between 25% and 30% DDGS for enhanced gain
- Intake response is linear, and greater at lower dietary CP
- Feed 10% DDGS for enhanced feed conversion
- Feed conversion response is greater at lower dietary CP