Corn Distillers Grains & Other Corn Byproducts for Dairy & Beef Cattle

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Introduction

- Distillers grains is a good energy and protein feed to include in livestock rations.
- This presentation will review the results of recent research at SDSU and elsewhere with feeding distillers grains, both wet and dried, to dairy and beef cattle.
- The use of other corn byproducts will also be reviewed.
Processing Co-Products Corn (E) & Soybeans (S)

Green = >4,000 cows, Red = 1,000 to 4,000 cows.

E, S Online; E Online 2002-2003
The Composition of Distillers Grains

<table>
<thead>
<tr>
<th>Item</th>
<th>% of DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein</td>
<td>30-36</td>
</tr>
<tr>
<td>RUP, % of CP</td>
<td>47-57</td>
</tr>
<tr>
<td>NE&lt;sub&gt;L&lt;/sub&gt;, Mcal/lb</td>
<td>1.00</td>
</tr>
<tr>
<td>Fat</td>
<td>9.8</td>
</tr>
<tr>
<td>ADF</td>
<td>19.0</td>
</tr>
<tr>
<td>NDF</td>
<td>38.0</td>
</tr>
<tr>
<td>Ca</td>
<td>0.15</td>
</tr>
<tr>
<td>P</td>
<td>0.83</td>
</tr>
</tbody>
</table>
Protein in Distillers Grains

- > 30% of DM; more than old “book values”
  Similar for DDG & DDGS
- Good source of Ruminally Undegradable Protein (~55% RUP)
  \textit{RUP is slightly less for wet vs. dried DG}
- Protein quality:
  \textit{Fairly good quality}
  \textit{Lysine is the first limiting amino acid}
Production Response of Dairy Cows When Fed CDG

- The same as or greater than when fed SBM
- Increased or no change when supplemented with Protected Lys & Met
- Similar to when fed a blend of protein supplements (SBM, FM, CDG)

**SUMMARY:** a good quality protein
CDG for Beef Cattle

- As protein source, 6-15% of ration DM
- As an energy source, 
  
  *When fed at >15% of DM*

  *May reduce acidosis because highly digestible fiber in place of starch*

- Wt gains & feed efficiency usually better than with corn

*Klopfenstein et al., NE*
Determining the Energy Value of Wet Corn Distillers Grains
Energy in CDG

Today’s CDG contains:

7-11% more energy than “book values”
10-20% more energy than corn

- $N_E_L = 1.00 \text{ Mcal/lb}$
- $N_E_M = 1.06 \text{ Mcal/lb}$
- $N_E_G = 0.73 \text{ Mcal/lb}$

$TDN = 94\%$
$DE = 1.84 \text{ Mcal/lb}$
$ME = 1.64 \text{ Mcal/lb}$
When fed DDGS from Whiskey or Fuel Ethanol Plants:

* Similar milk production whether DDGS was from whiskey or fuel ethanol production
* Higher production than when fed SBM
* If DDGS was dark (heat damaged?), production was the same as when fed SBM

\(^1\) FL Research, 1995
Wet vs. Dried CDG

- Nutrient content of DM is the same for both
- Considerations with wet CDG:
  1) Can usually store only 5-7 days
  2) May need preservatives (e.g. propionic acid or other organic acids, etc.)
  3) Limited economical hauling distances
  4) Rations may be too wet which could limit total DM intake, especially if ensiled forages are also fed
Current Research to Increase the “Shelf Life” of Wet CDG

- Storage in silo bags
  
  *K. Tjardes & C. Wright, SDSU, 2001*

  *Once opened, spoilage will start*

- Blend with soyhulls
  
  *K. Kalscheur & A. Garcia, SDSU, 2002*

- Preservatives
  
  *Various industry groups*

  *May extend by a few days*
How Much CDG Can be Fed to Dairy Cows?

- Recommend max. of ~20% of ration DM
  - e.g. ~10-13 lb/d of Dried; ~30-40 lb/d of Wet
  - Usually no palatability problems
  - Can usually formulate nutritionally balanced diets

- At 30% of DM:
  - May decrease DMI, especially if Wet CDG
  - May feed excess protein
How Much CDG Can be Fed to Beef Cattle?

- Can feed larger percentage of diet but fewer pounds than fed to dairy cattle
- Up to 15% of ration DM as protein source
- At 20-40% of DM:
  - e.g. ~4-8 lb/d of Dried; 12-24 lb/d of Wet
  - May decrease DMI @ >30% of DM, especially if wet CDG
  - May feed excess protein
  - May feed excess P, especially if CDGS
Example Ration Considerations for Dairy Cattle

• Diets containing 50:50 forage:concentrate
  1) If equal proportions of Alfalfa & Corn Silage:
     CDG can replace most or all protein suppl.
  2) If mostly corn silage:
     More CDG can be fed but may need some other protein supplement, check Lys, & P
  3) If mostly alfalfa:
     Less CDG likely needed to supply diet CP
**Other Corn Products as Feeds**

- Corn Gluten Meal
  - High Protein (60%) & High RUP (55% of CP)
  - Low in Lys; best to blend with other proteins

- Corn Gluten Feed
  - Medium Protein (25%), Low RUP (25% of CP), Good Energy (NEL = 0.86 Mcal/lb)

- Corn Distillers Solubles (Syrup)
  - Medium Protein (18% CP), Good Energy (21% EE; NEL ~0.91 Mcal/lb)
  - Increased Milk Production when fed 5% CCDS
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  - *Med. Protein (25%), Low RUP (25% of CP), Good Energy (\(N_{EL} = 0.86 \text{ Mcal/lb}\))*

- **Corn Distillers Solubles (Syrup)**

  - *Often blended with CDG as CDG+Solubles*
  - *Med. Protein (18% CP), Good Energy (21% EE; \(N_{EL} ~ 0.91 \text{ Mcal/lb}\))*
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Conclusions

- CDG is a good protein and energy feed to include in rations of dairy & beef cattle.
- The nutrient content of the dry matter in CDG is essentially the same for both wet & dried CDG.
- The nutrient content is similar for CDG & DDGS although DDGS contains more P.
- Other corn byproducts such as CGM, CGF, & Distillers solubles are also good
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