DDGS

A Growing Opportunity

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Land O’ Lakes Feed

Vision:
“To be the leading animal nutrition company in North America, utilizing world-class operating systems, meeting the demands of coordinated food chains.”

- North America’s largest feed company
- Acquisition of Purina Mills (Oct. 2001)
- #1 manufacturer of animal milk replacer

United States Ethanol Outlook

Nutrients Concentrate:
- 56 pounds of corn.
- remove the starch.
- add remnants of enzymes and yeast added to process.
- nutrients “concentrated” into 17 - 18 pounds of DDGS
DDGS Nutrient Profile Comparison

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Grains Fraction</th>
<th>Solubles Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Matter, %</td>
<td>34.3</td>
<td>27.7</td>
</tr>
<tr>
<td>Crude protein, %</td>
<td>33.8</td>
<td>19.3</td>
</tr>
<tr>
<td>Crude fat, %</td>
<td>17.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Ash, %</td>
<td>3.0</td>
<td>8.4</td>
</tr>
<tr>
<td>Calcium, %</td>
<td>0.04</td>
<td>0.09</td>
</tr>
<tr>
<td>Phosphorus, %</td>
<td>0.56</td>
<td>1.38</td>
</tr>
</tbody>
</table>

*Goihl, Knott, and Shurson: Random samples from 6 Minnesota ethanol plants taken over a three week period and tested at Iowa Testing Laboratories, Eagle Grove, Iowa. Mean values reported.

Dry-Mill Ethanol Co-products

Other Factors that influence use of DDGS:
- **Health & Performance**:
  - Swine: Improved gut health, Reproductive performance
  - Cattle: Reduce acidosis & laminitis
  - Poultry: Meat & egg color issues

Other Factors that influence use of DDGS:
- **Protein Value of Distillers Grains for Ruminants**
  - 25-30% of DM More than old “book values”
  - Good source of Ruminally Undegradable Protein (~55% RUP/UIP)
    - RUP/UIP slightly less for wet vs. dried
  - Protein quality:
    - Fairly good quality (color/heat damaged)
    - Lysine may be limiting

Why use a Co-Product?

- Get similar nutrition at a lower cost
- Get enhanced performance at a positive return on investment

DDGS use factors:
- Must use dried products to accommodate current feeding systems for non-ruminants
- Understand available lysine:
  - Lysine = 78% (avg of 11 samples)
  - Ranged from .65 to .97% lysine
- Mycotoxins can survive process; purchase from known source.
**Energy Value of Distillers Grain for Ruminants**

- May be decreased slightly with drying
- May vary with addition of solubles
- May vary with source plant
- Will vary with fat content
- Will vary with inclusion rate
- Is dependent upon associative effects of feedstuffs
- Calculated to be 100-150% that of corn

**Condensed Distillers Solubles**

- Added to back to dried & wet grains
- Available as a liquid feed ingredient/conditioner
- Dry matter basis
  - Typical DM 25 – 50% (30)
  - 25-29% protein
  - 8-13% fat
  - 4% fiber
- Excellent source of vitamins and minerals (phosphorous and potassium)
- Highly palatable
- Dairy = 5% of DM
- Beef = 10-15% of DM

**FEEDING RECOMMENDATIONS DISTILLERS GRAINS (Beef)**

- Maximum 6-15% of diet DM as Protein Source (1-2 lbs/d)
- Maximum 20-40% of diet DM as Energy Source (4-8 lbs/d)
- Maximum 30% of diet DM for cows (8 lbs/d)
- Balance CP, DIP, UIP
- Watch Mineral Balance (Ca:P)
- Effective NDF content of distillers grains is limited
  - Does not replace all roughage sources

**Example Ration Considerations for Dairy Cattle**

Diets containing 50:50 forage:concentrate

1) If equal proportions of Alfalfa & Corn Silage:
   - Distillers Grain can replace most or all protein supplement
2) If mostly corn silage:
   - More Distillers Grain can be fed but may need some other protein supplement, check Lysine, & P
3) If mostly alfalfa:
   - Less Distillers Grains likely needed to supply diet CP

**DDGS in Laying Hens**

- No adverse effect on production
- No effect on egg weights
- No significant effect on shell quality
- Inclusion levels of 10 – 12% entirely feasible, with little or no risk to production
- Research from U. of Georgia; reported by Dale & Batel, 2002.

**DDGS in Broilers**

- Chicks fed 0, 6, or 12% DDGS diets
- No significant difference in weight gain
- Comparable growth and feed conversion
- No difference in carcass yields
- “new generation” DDGS is highly satisfactory for broilers at levels to 12%
- U. of GA; 2002; Dale, Batel, & Lumpkins
DDGS in Poultry

- Broilers could use about 1 pound per bird
- Laying hens could consume about 8.7# per hen per year, or about 4300 tons of DDGS/million hens/year.

DDGS use in Swine Diets

- Competitive price
- Increasing availability
- Improved quality, consistency
- Observed health benefits

Land O’Lakes Feed Suggested Swine Ration Inclusion Levels:

- Nursery: 5% max.
- Grow-Finish: 10% max.
- Sow Gestation: 20% max.
- Sow Lactation: 5% max.

DDGS Value Comparison:

<table>
<thead>
<tr>
<th>NRC vs. “Golden” DDGS</th>
<th>DDGS (NRC)</th>
<th>“Golden” DDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME, kcal/lb</td>
<td>1,282</td>
<td>1,452</td>
</tr>
<tr>
<td>C. Protein, %</td>
<td>27.7</td>
<td>26.9</td>
</tr>
<tr>
<td>C. Fat, %</td>
<td>8.4</td>
<td>9.7</td>
</tr>
<tr>
<td>Lysine, %</td>
<td>.62</td>
<td>.76</td>
</tr>
<tr>
<td>Dig. Lys., %</td>
<td>.29</td>
<td>.40</td>
</tr>
<tr>
<td>P, %</td>
<td>.77</td>
<td>.79</td>
</tr>
<tr>
<td>Av. P, %</td>
<td>.59</td>
<td>.63</td>
</tr>
</tbody>
</table>

Assumptions:
- Corn = $1.93/bu
- Hi-Pro SBM = $163.50/ton
- L-Lysine.HCl = $70/mt
- No added fat

Value of Using 200 lb Per Ton of Golden DDGS

<table>
<thead>
<tr>
<th>Ingredient Prices</th>
<th>$/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com</td>
<td>76.76</td>
</tr>
<tr>
<td>Hi-Pro Soybean Meal</td>
<td>226.00</td>
</tr>
<tr>
<td>Dicalcium Phosphate, 18.5%</td>
<td>335.00</td>
</tr>
<tr>
<td>DDGS (Golden)</td>
<td>130.00</td>
</tr>
<tr>
<td>Limestone</td>
<td>30.00</td>
</tr>
</tbody>
</table>

Savings from using 200 lb DDGS $ (1.77) /ton

Break-Even Price for DDGS $ 112.27 /ton DDGS
**Grow-Finish Pigs Fed Diets Containing DDGS**

<table>
<thead>
<tr>
<th></th>
<th>No DDGS</th>
<th>10% DDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigs in</td>
<td>993</td>
<td>988</td>
</tr>
<tr>
<td>Pigs Out</td>
<td>979</td>
<td>971</td>
</tr>
<tr>
<td>Daily Gain, lb</td>
<td>1.63</td>
<td>1.62</td>
</tr>
<tr>
<td>Feed:Gain</td>
<td>2.75</td>
<td>2.74</td>
</tr>
<tr>
<td>Feed cost, $/hd</td>
<td>32.69</td>
<td>32.53</td>
</tr>
</tbody>
</table>

Source: Land O’ Lakes Farmland Feed

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**Close out performance 10% DDGS diets:**

<table>
<thead>
<tr>
<th></th>
<th>Farms 1</th>
<th>Farms 2</th>
<th>Farms 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Averages</td>
<td>Averages</td>
<td>Averages</td>
</tr>
<tr>
<td>Pigs in</td>
<td></td>
<td></td>
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**DDGS Cut-out Information**

- 11,000 pigs yield & lean data from 2002
- Incorporate 10% DDGS in diets mid-year

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**DDGS Market Positioning**

- Feed Sales force understands ingredient well enough to help livestock producers realize benefit and to make best use of related feed products
- DDGS marketer helps direct DDGS to most appropriate end-user
- DDGS producer and end-user benefit from utilizing comparative nutritional value of DDGS

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**Potential use of DDGS**

<table>
<thead>
<tr>
<th></th>
<th>Catfish</th>
<th>Layers</th>
<th>Broilers</th>
<th>Swine</th>
<th>Ruminant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Million Tons</td>
<td>0.2</td>
<td>0.6</td>
<td>4.0</td>
<td>12.0</td>
<td>8.3</td>
<td>31.1</td>
</tr>
</tbody>
</table>

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**DDGS Supply/Usage**

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2012</th>
<th>LOL</th>
<th>Sparks*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Million Tons</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

(*Sparks Cattle Maximum usage is 155 million tons.*)
**DDGS Value Comparison**

<table>
<thead>
<tr>
<th>Assumptions:</th>
<th>Dairy Lactation</th>
<th>114.24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn $2.00 / bu</td>
<td>Poultry Finisher</td>
<td>100.09</td>
</tr>
<tr>
<td>SBM $175.00 / ton</td>
<td>Layer Diet</td>
<td>104.66</td>
</tr>
<tr>
<td>Urea $350.00 / ton</td>
<td>Swine G-F Diet</td>
<td>96.34</td>
</tr>
<tr>
<td>Non-ruminant diets corn/SBM</td>
<td>Beef Feedlot</td>
<td>98.00</td>
</tr>
</tbody>
</table>

**Land O’ Lakes commitment to research:**
- Large number of Ph. D. nutritionist on staff.
- Partnering with several universities on DDGS research.
- LongView Animal Nutrition Center.
- Commercial field trials and demonstrations.

**Land O Lakes Feed Research**
- Provide:
  - New Products
  - New Feeding Programs
  - Updated Information
- Envision the Future
  - Develop supplier/industry relationships
  - Target specific opportunities for innovative nutritional solutions to industry challenges

**For more information about DDGS from Land O’ Lakes Feed contact:**
- Land O’ Lakes Feed DDGS Marketing
  - at 800-333-9774
  - 651-765-5658
  - or jdjolly@landolakes.com

**Thank You**