The Current Usage of DDGS and Corn Oil in Poultry Diets

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17th Distillers Grains Symposium
Bloomington, MN May 15 & 16, 2013

Powered by Tyson®
“The greatest dilemma that the (animal) agriculture industry has faced in the last 50 years is ethanol and corn prices”

Rod Smith, Feedstuffs, December 2006
The outline of my presentation today:

• Basics of ethanol production and co-products
• Production and Usage estimates of DDGS
• List the locations currently using DDGS
• Typical analysis
• Effects of reduced oil DDGS – reduced calorie
• Corn oil from DDGS
• Practical concerns and DDGS spec. sheet
• Future opportunities
Dry Milling Fuel Ethanol Process

1. Whole Corn → Hammer Mill → Slurry Tank → Jet Cooker → Liquefaction
2. Water Sources → Enzymes → Mash Cooling → Fermentation
3. 5% Gasoline
4. 200 Proof Denatured Ethanol → Final Product
5. 200 Proof Ethanol
6. Molecular Sieves
7. DDGS → Final Product
8. Drum Dryer
9. Syrup → Evaporators → Thin Stillage → Centrifuge → Whole Stillage
10. Condensate
11. CO₂s
12. Yeast → Beer
13. 190 Proof Ethanol
Mid-Missouri Energy Ethanol Plant
Malta Bend, MO
Potential domestic use of DDGS

Potential DDGS Demand

<table>
<thead>
<tr>
<th>Category</th>
<th>Million Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catfish</td>
<td>1</td>
</tr>
<tr>
<td>Layers</td>
<td>2</td>
</tr>
<tr>
<td>Broilers</td>
<td>4</td>
</tr>
<tr>
<td>Swine</td>
<td>3</td>
</tr>
<tr>
<td>Ruminant</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

Million Tons
# Tyson Mills Currently Using Distillers

- South Fulton, TN  
  - April 2004
- Robards, KY  
  - April 2004
- Ramsey, IN  
  - February 2005
- Pine Bluff, AR (Blending)  
  - February 2005
- Cullman, AL (Blending)  
  - February 2005
- Sedalia, MO  
  - March 2005
- Bergman, AR  
  - March 2005
- Gonzales, TX  
  - April 2005
- Estill Springs, TN  
  - July 2005
- Fairmount, GA  
  - July 2005
- Aurora, MO  
  - July 2005
- Clarksville, AR  
  - August 2005
- Pottsville, AR  
  - August 2005
- Nacogdoches, TX  
  - July 2005
- Springdale, AR  
  - April 2006
- Westville, OK  
  - June 2006
- New Market, VA  
  - July 2006
- Neshoba County, MS  
  - July 2006
- Hope, AR  
  - November 2006
- Nashville, AR  
  - November 2006
- Grannis, AR  
  - November 2006
- Currently in all 30 Tyson Mills  
  - May 2013
% Broiler Complexes Using DDGS

%
Broiler Average Inclusion of DDGS

For Only those using:
Range 1% – 18%
# Average Nutrient Spec for DDGS

<table>
<thead>
<tr>
<th>Calories lb/kg</th>
<th>1224/2693</th>
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<tbody>
<tr>
<td>Protein</td>
<td>29.69</td>
</tr>
<tr>
<td>Lysine</td>
<td>0.87</td>
</tr>
<tr>
<td>TSAA</td>
<td>1.05</td>
</tr>
<tr>
<td>Trp</td>
<td>0.23</td>
</tr>
<tr>
<td>Arg</td>
<td>1.34</td>
</tr>
<tr>
<td>Thr</td>
<td>1.06</td>
</tr>
<tr>
<td>A.Phos</td>
<td>0.44</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.08</td>
</tr>
<tr>
<td>Sodium</td>
<td>0.17</td>
</tr>
</tbody>
</table>
## Nutritional composition of DDGS

**Tyson Samples 2013**

<table>
<thead>
<tr>
<th>Component</th>
<th>Min.</th>
<th>Max.</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>12.28</td>
<td>18.44</td>
<td>14.75</td>
</tr>
<tr>
<td>Crude protein</td>
<td>26.94</td>
<td>31.46</td>
<td>29.45</td>
</tr>
<tr>
<td>Crude fat</td>
<td>4.49</td>
<td>11.47</td>
<td>7.58</td>
</tr>
<tr>
<td>Crude fiber</td>
<td>5.68</td>
<td>7.41</td>
<td>6.49</td>
</tr>
<tr>
<td>Ash</td>
<td>3.74</td>
<td>7.97</td>
<td>5.46</td>
</tr>
</tbody>
</table>

Data from 837 DDGS samples from 50 plants
Corn Oil Extraction?

Dr. Bob Loar’s comments

• Been happening for some time (since 2005)
• Currently more than half the industry deoiling to some degree
• Extraction rate hasn’t been that extreme
• Rapid expansion due to fat/oil price and technology
De-Oil DDGS

Dr. Bob Loar’s comments

- Practices typically involve a centrifugation step performed on the condensed distillers solubles (syrup)
- Results in a DDGS product with a lower crude fat value and subsequent calorie value
- Extraction process can be modified to create different fat levels of de-oiled DDGS (7% or 5% oil content)
- Oil is an excellent source of energy in livestock and poultry diets
- Increases variability of fat content in DDGS by plant and within individual plants
Calorie Value of Reduced Oil DDGS?

• Research conducted at Iowa State Univ. showed a one percent reduction in oil in DDGS lowered AMEn by 45.6 Kcals per pound (IPSF Abst. M23 2013)

• Research conducted at Univ. of Georgia showed lowering the oil content from 10% to 5% reduced the TMEn value 16.5% (38.6 Kcals/lb per 1% drop in oil content) (IPSF Abst. T112 2013)
How does the de-oiling effect DDGS value?

- If the price of fat is $0.40 per pound and we remove 1% oil from a ton of DDGS that we be 20 pounds of fat times $0.40 per pound or $8.00 per ton reduction in value.

- While this is not completely correct it is one way of looking at the effect of de-oiling.
Prediction equations for TMEn

**DDGS** (86% DM basis per Kg)

\[
\text{TMEn} = 2732.7 + 36.4 \text{ (fat)} - 73.6 \text{ (fiber)} + 14.5 \text{ (protein)} - 26.2 \text{ (ash)}
\]

Corn oil from DDGS
Corn Oil Assay Results

- Linoleic acid 53.30%
- Monounsaturated fat 27.76%
- Polyunsaturated fat 56.13%
- Saturated Fat 15.24%
- Free Fatty Acids 4.69%
- Insolubles <0.01%
- Moisture 0.72%
- OSI 8.20 hr
- AME calculated 3900-4000 Kcals/lb
Practical issues with Distillers

- Logistics
  - Truck vs Rail
  - Reliance on one plant
  - Bin/rail track allocation at mills
- Consistency
- Moisture levels
- Mycotoxins
- Pellet quality
Potential uses of DDGS in broiler diets continued:

- The usage of distillers will depend on whether it will cost into the ration when the formulas are optimized
  - Competition from other ingredients
  - Consistency
  - Nutrient value
DDGS Specification Sheet

• Consistent high quality
  – Free flowing
  – Absence of syrup balls
  – Golden color
    • Minolta Color Lightness L > 50
    • Minolta Color Yellowness b > 40.0

• Novus IDEA value for Lysine dig. > 65%
Acceptable Mycotoxin Levels in DDGS

- **Fumonisin** - Max. 30 ppm
- **Vomitoxin** - Max. 10 ppm
- **Aflatoxin** - Only utilize corn with a maximum of 20 ppb of aflatoxin in the ethanol processing plant.
- **Zearalenone** – no standard set
DDGS Specification Sheet

- Moisture max. 15.00%
- Crude protein min. 24%
- Crude fat 4.5-12%
- Crude fiber max. 8.50
- Sodium 0.15-.30%
- Phosphorus (total) 0.70-0.80%
Summary

• DDGS with low, medium, and high oil effecting calorie value and subsequent usage
• Consistency between suppliers/plants is affecting product image
• Corn oil from DDGS process is a valuable energy source
• Economics will determine the future usage of DDGS and Corn Oil in poultry feeds
Thank You for your attention

- Phillip Smith
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