UNDERSTANDING THE USE OF DISTILLERS CO-PRODUCTS AS ANIMAL FEEDS IN THE U.S.

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Overview

• What do we know?

• What don’t we know?
  – Previous studies & surveys
  – Pilot study of SD Dairy Producers
  – Nationwide study of livestock producers
  – Nationwide study of ethanol plants
Overview

Livestock producers

Availability

Ethanol manufacturers

Price
What do we know?

- “Grain distillers have developed equipment and an attractive market for their recovered grains” (Boruff, 1947)
- “Distillers are recovering, drying, and marketing their destarched grain stillage as distillers dried grains and dried solubles” (Boruff, 1952)
DDGS – Some Key Issues

2006

- “Mountains of distillers grains”
- Standardized grading system
- Livestock feed
  - Current generation products
  - Next generation products
  - Processed feeds
  - New species
- Antibiotic residues
- Sulfur / phosphorous
- Aflatoxin contamination
- Energy consumption / cost
- Optimizing quality w/ ethanol

• Consistency / variability
• Transportation
  - Domestic
  - International
  - Flowability
• Other value-added uses
  - Human foods
  - Industrial products
What do we know?
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Based on data provided by Cheryl Anderson, DTN
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What do we know?

• More than 40 million metric tons of distillers grains produced in 2013
  – Currently being fed domestically and exported (up to 25%)

• Animal feed
  – Beef and dairy; swine and poultry
  – Many feeding trials have been conducted
  – Inclusion levels have increased for all animal species as understanding has increased.

• Still unclear
  – How much each livestock sector actually consumes
  – How coproducts are specifically used at individual feeding operations
What don’t we know?

• In other words,
  – We need to understand
    • Proportions in beef, dairy, swine, and poultry?
    • Which distillers coproducts are being used?
    • Coproduct dietary inclusion rates?
    • Which ingredients these coproducts substitute for?
    • Challenges associated with coproduct use?
Ethanol Co-Products Used for Livestock Feed
USDA NASS, 2007

- Surveyed feeders of cow/calf, fed cattle, dairy cattle, and swine, but not poultry in 2006
  - Mainly selected Midwest states
  - Lacked national scope
  - 9,400 livestock operations contacted by mail, with a second mailing two weeks later, and a telephone follow-up during the following month

- Minimum operation size: 20 head dairy cattle, 50 head cattle on feed, 10 head beef cattle, 25 head hogs
Ethanol Co-Products Used for Livestock Feed
USDA NASS, 2007

• Coproducts surveyed:
  – Condensed Distillers Grains (CDS)
  – Distillers Dried Grains, No Solubles (DDG)
  – Distillers Dried Grains with Solubles (DDGS)
  – Corn Gluten Feed
  – Brewers Grains
  – Distillers Wet Grains (25-40%, and over 40%)
  – Complete Commercial Feed
  – Coproducts from New Processes
  – Combinations of Coproducts
  – Other Coproducts

• Of 9,400 operations contacted, 1,276 indicated that they used coproducts during 2006

13.5% response rate
• Beef cattle (cow/calf)
  – Fed DDGS at 22% inclusion rate
• Cattle on feed
  – Fed DDGS at 23% inclusion rate
• Dairy
  – Fed DGGS at 8% inclusion rate
• Hogs
  – Fed DDGS at 10% inclusion rate
Higher percentage of cow/calf operations, dairy, and cattle on feed were fed co-products than swine operations.

Most co-products were purchased through the ethanol plant or feed companies/co-ops.

Co-products most used:
- Distillers Dried Grains, No Solubles (DDG)
- Distillers Dried Grains with Solubles (DDGS)
- Corn Gluten Feed (CGF)
• Purpose: estimate substitution potential of DDGS for corn (energy) and soybean meal (protein), and the impact this has upon the U.S. livestock industry

• Examined:
  – Feeding characteristics of DDGS
  – Inclusion rates for livestock/poultry
  – Substitution rates for DDGS for corn and soybean meal
  – DDGS consumption estimates by crop year
  – DDGS exports
  – Impacts on the U.S. feed industry
• Beef Cattle of feed:
  – Maximum potential inclusion rate: 20-40%
  – NASS 2007: 22%

• Dairy Cows:
  – Maximum potential inclusion rate: 10-30%
  – NASS 2007: 8%

• Market Swine:
  – Maximum potential inclusion rate: 10-30%,
  – NASS 2007: 10%

• Poultry (Layers, Broilers, Turkeys):
  – Maximum potential inclusion rate: 10-15%
  – NASS 2007: N/A
### Table 8

**Estimates of potential annual DDGS consumption, by selected crop year and type of livestock/poultry**

<table>
<thead>
<tr>
<th>Type of livestock/poultry</th>
<th>2006/07</th>
<th>2007/08</th>
<th>2008/09</th>
<th>2009/10</th>
<th>2010/11</th>
<th>Average of all estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000 metric tons</td>
<td>Percent</td>
<td>1,000 metric tons</td>
<td>Percent</td>
<td>1,000 metric tons</td>
<td>Percent</td>
</tr>
<tr>
<td><strong>Beef</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cows</td>
<td>4,735</td>
<td>7.6</td>
<td>4,705</td>
<td>7.4</td>
<td>4,600</td>
<td>7.4</td>
</tr>
<tr>
<td>Replacement heifers</td>
<td>1,235</td>
<td>2.0</td>
<td>1,194</td>
<td>1.9</td>
<td>1,170</td>
<td>1.9</td>
</tr>
<tr>
<td>Cattle on feed</td>
<td>20,633</td>
<td>33.2</td>
<td>20,886</td>
<td>33.1</td>
<td>19,519</td>
<td>31.6</td>
</tr>
<tr>
<td>Other cattle</td>
<td>4,576</td>
<td>7.4</td>
<td>4,488</td>
<td>7.1</td>
<td>4,542</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>Dairy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cows</td>
<td>15,218</td>
<td>24.5</td>
<td>15,404</td>
<td>24.4</td>
<td>15,119</td>
<td>24.9</td>
</tr>
<tr>
<td>Replacement heifers</td>
<td>937</td>
<td>1.5</td>
<td>958</td>
<td>1.5</td>
<td>956</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Hogs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breeding swine</td>
<td>1,359</td>
<td>2.2</td>
<td>1,373</td>
<td>2.2</td>
<td>1,334</td>
<td>2.2</td>
</tr>
<tr>
<td>Market swine</td>
<td>6,421</td>
<td>10.3</td>
<td>7,067</td>
<td>11.2</td>
<td>7,269</td>
<td>11.8</td>
</tr>
<tr>
<td><strong>Poultry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Layers</td>
<td>1,479</td>
<td>2.4</td>
<td>1,456</td>
<td>2.3</td>
<td>1,438</td>
<td>2.3</td>
</tr>
<tr>
<td>Pullets</td>
<td>287</td>
<td>0.5</td>
<td>295</td>
<td>0.5</td>
<td>290</td>
<td>0.5</td>
</tr>
<tr>
<td>Broilers</td>
<td>4,284</td>
<td>6.9</td>
<td>4,323</td>
<td>6.8</td>
<td>4,192</td>
<td>6.8</td>
</tr>
<tr>
<td>Turkeys</td>
<td>1,013</td>
<td>1.6</td>
<td>1,035</td>
<td>1.6</td>
<td>977</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>62,177</td>
<td>100.0</td>
<td>63,184</td>
<td>100.0</td>
<td>61,819</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Note: Totals may not add due to rounding.*

*Sources: USDA, Economic Research Service calculations based on data from tables 3, 4, 5, 6, and 7.*
• 1 tonne of DDGS can replace 1.22 tonnes of corn/soybean meal
• Estimates may not match current feeding levels as prices change
• Potential consumption rates are based on the price of DDGS not being a barrier to use
What don’t we know?

• Still need current, specific information
  – 2006 survey data is dated
    • Ethanol & livestock industries have been dynamic
  – Modeling study
    • Based on literature review & estimates, not specific data
Pilot Study – SD Dairy Farms

- 2011/2012
  - 358 total dairy farms operating in SD
  - Surveys were mailed to all Grade A facilities (303)
  - 15 questions, < 20 minutes
  - No identifiable information
  - All responses were kept confidential

- Response rate: 16.17% (49 of 303 completed surveys)
1 – Did you feed ethanol co-products to your dairy cattle?

% of farmers who feed ethanol co-products to dairy cattle

- Yes: 73%
- No: 27%
2 – What is the primary reason for not feeding ethanol co-products to your dairy cattle?
2 – Number of years have you been feeding co-products?

- 51% have been feeding with ethanol co-products for 0 to 5 years.
- 37% have been feeding with ethanol co-products for 6 to 10 years.
- 3% have been feeding with ethanol co-products for 11 to 15 years.
- 3% have been feeding with ethanol co-products for 16 to 20 years.
- 6% have been feeding with ethanol co-products for > 20 years.
3 – What was the average moisture content?
4 – What was fed and how much?
4 – What was fed and how much?

![Graph showing mean inclusion of different types of co-product feed for lactating cows, dry cows, and heifers.]
5 – How long are the co-products stored in the farm before use?

- **WDG/MWDG**
  - 1-3 days: 1
  - 4-7 days: 6
  - 8-14 days: 4
  - 15 days - 1 month: 5
  - >1 Month: 2

- **DDGS**
  - 1-15 days: 9
  - 15 days - 1 month: 8
  - 1-3 month: 2
  - >3 month: 0
6 – What is the level of importance of the various co-product characteristics?

Level of Importance for Various Attributes of Co-products

(from 1 = No importance; to 4 = High Importance)
7 – Are you adding any preservatives or mold inhibitors?

Adding preservatives or mold inhibitors to WDG or MWDG

- 75% all respondents answered "NO"
- 25% % not responded to Q4
7 – Are you adding any preservatives or mold inhibitors?

% of respondents who add preservatives or mold inhibitors to TMR

- Yes: 10%
- No: 90%
8 – Are you adding any mycotoxins binders?
9 – Where do you store the co-products in your farm?
10 – Additional protein sources added to your dairy rations?

Additional protein sources added to dairy ratios

<table>
<thead>
<tr>
<th>Protein Source</th>
<th>No. of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean meal (Solvent extracted)</td>
<td>23</td>
</tr>
<tr>
<td>Soybean meal (high bypass)</td>
<td>12</td>
</tr>
<tr>
<td>Cottonseed (whole or meal)</td>
<td>9</td>
</tr>
<tr>
<td>Sunflower meal</td>
<td>5</td>
</tr>
<tr>
<td>Canola meal</td>
<td>4</td>
</tr>
<tr>
<td>Corn gluten feed</td>
<td>3</td>
</tr>
<tr>
<td>Corn gluten meal</td>
<td>2</td>
</tr>
<tr>
<td>Blood meal</td>
<td>2</td>
</tr>
<tr>
<td>Porcine meat bone meal</td>
<td>1</td>
</tr>
<tr>
<td>Fish meal</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
</tr>
</tbody>
</table>
Pilot Study – Open Responses

- Consistency.
- It works well for us.
- Would like to see a little less moisture.
- Feed price is getting very high.
- Only use small amount of DDGS. Does not work in dairy rations at higher levels.
- Price is too high.
- Will stop feeding ASAP as it is not very cost effective!
- Competing with ethanol plant for corn is very difficult for dairy farmers.
- We feed wet corn gluten instead.
- We remain HUGE supporters of the ethanol industry in South Dakota.
- Can only feed a small amount to dairy cows.
- Fed it in the past, too much variability/wary of mycotoxins.
- We are not set-up to handle by-products. Too small of a dairy & too old.
- Don't use due to moldy corn in area being used in processing plant.
- Lost too many animals to Clostridia A in 2004. Stopped the use of distillers and stopped losing animals.
Pilot Study – Summary

- South Dakota dairy producers surveyed that were using ethanol co-products during 2010/2011: **73%**
- These producers had been using ethanol co-products, on average, for **8** years (S.D. = 4.6).
- **Price** was the main reason for not feeding ethanol co-products.
- DDGS was the co-product most frequently fed to lactating dairy cows (27.7%).
- Modified DG were mostly used in dry cows and dairy heifer rations (29.4 and 36.8%, respectively).
- **Outside pile** was the most common storage method for wet or modified DG, while **commodity sheds** was for DDGS.
- **Soybean meal** (solvent extracted) was the protein source most frequently used in rations that contained ethanol co-products.
- “**Variability** between batches” was the issue with the highest degree of importance.
1 – Next Steps

• 2013 U.S. livestock & poultry survey
  – Beef
  – Dairy
  – Swine
  – Poultry

• 2-stage survey
  – Online
    • Open until June 19
      http://humansciences.ethanolcoproducts.sgizmo.com/s3/
  – Mailed survey June 20 – August 20
1 – Next Steps

• 17 questions
We need your help!!!

We need livestock producers to complete the survey

Could you please get the message out?

– http://humansciences.ethanolcoproducts.sgizmo.com/s3
2 – Next Steps

• 2013 U.S. Ethanol Plant Survey
• 19 questions
• Mailed survey June 20 – August 20
• Also need your help!
3 – Next Steps

• Need DDGS samples from beverage alcohol production
  – Compare DDGS to DDGS
  – Potential
    • Food grade applications
    • Pet food applications
    • Other value-added applications
Conclusions

• Feedback gained from these surveys will be used to help improve coproduct quality
  – Can help ethanol plants understand their customers
  – Can help livestock producers with their feed costs and livestock performance
Acknowledgements

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Thank you!

Any questions?

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