Use of Low-Oil DDGS in Swine

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Outline

Energy in DDGS
Energy in low-fat DDGS
AA in low fat DDGS
Conclusions
Classes of Nutrients

- Water
- Protein
- Carbohydrates
- Lipids
- Vitamins
- Minerals

Energy is Not a Nutrient!
Metabolism crate
Sample Collections
GE in corn and DDGS (kcal/kg)

Corn: N = 41; DDGS, N = 12

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Univ. IL., 2014

Corn: 3912 kcal/kg
DDGS: 4827 kcal/kg

ab: P < 0.05
GE and ME (kcal/kg)

Corn: N = 41; DDGS, N = 12

Gross energy

- Corn: 3912
- DDGS: 4827  

Metabolizable energy

- Corn: 3406
- DDGS: 3385  

ab: P < 0.05

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ATTD (%) of GE
Corn: N = 25; DDGS, N = 17

Univ. IL, 2014
Un-utilized energy (Kcal/kg)

- Corn: 430 Kcal/kg
- DDGS: 1062 Kcal/kg
Disappearance of Fiber (%)

Urriola et al., 2010
Effects of Particle size on ME in DDGS

Liu et al., 2012
Low-fat DDGS
Low fat DDGS and De-oiled DDGS

- Conventional DDGS: > 9% Fat
- Low-fat DDGS: 5 to 9% Fat
- De-oiled DDGS: < 5% Fat

NRC, 2012
## Low Fat DDGS

<table>
<thead>
<tr>
<th>Item</th>
<th>DDGS-conv.</th>
<th>Low fat DDGS</th>
<th>Low fat DDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein, %</td>
<td>25.2</td>
<td>27.4</td>
<td>27.1</td>
</tr>
<tr>
<td>Fat, %</td>
<td>11.5</td>
<td>7.5</td>
<td>6.9</td>
</tr>
<tr>
<td>NDF, %</td>
<td>28.6</td>
<td>30.7</td>
<td>29.9</td>
</tr>
<tr>
<td>GE, kcal/kg DM</td>
<td>4,865</td>
<td>4,722</td>
<td>4,497</td>
</tr>
</tbody>
</table>

Navarro et al., 2013
ME in Low Fat DDGS, kcal/kg DM

Navarro et al., 2013

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### Effect of fat on ME

<table>
<thead>
<tr>
<th>Item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat, %</td>
<td>4.88</td>
<td>5.61</td>
<td>7.45</td>
<td>10.88</td>
</tr>
<tr>
<td>GE, Kcal/kg</td>
<td>4,780</td>
<td>4,841</td>
<td>4,943</td>
<td>5,113</td>
</tr>
<tr>
<td>ATTD of GE, %</td>
<td>74.65</td>
<td>79.11</td>
<td>70.77</td>
<td>75.70</td>
</tr>
<tr>
<td>ME, kcal/kg DM</td>
<td>3,698</td>
<td>4,060</td>
<td>3,630</td>
<td>4,110</td>
</tr>
</tbody>
</table>

Kerr et al., 2013
TID of Lipids (%)
De-oiled DDGS
De-oiled DDGS

<table>
<thead>
<tr>
<th>Item</th>
<th>De-oiled DDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein, %</td>
<td>31.2</td>
</tr>
<tr>
<td>Fat, %</td>
<td>4.0</td>
</tr>
<tr>
<td>NDF, %</td>
<td>34.6</td>
</tr>
<tr>
<td>GE, kcal/kg DM</td>
<td>5,098</td>
</tr>
</tbody>
</table>

Jacela et al., 2011
De and ME in De-oiled DDGS,

kcal/kg DM

Jacela et al., 2011
## Chinese De-oiled DDGS

<table>
<thead>
<tr>
<th>Item</th>
<th>DDGS, Conv.</th>
<th>De-oiled DDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein, %</td>
<td>26.6</td>
<td>28.7</td>
</tr>
<tr>
<td>Fat, %</td>
<td>9.24</td>
<td>3.5</td>
</tr>
<tr>
<td>NDF, %</td>
<td>36.0</td>
<td>37.9</td>
</tr>
<tr>
<td>GE, kcal/kg DM</td>
<td>4,833</td>
<td>4,473</td>
</tr>
</tbody>
</table>

Ren et al., 2011
ME in Chinese De-oiled DDGS, kcal/kg DM

Ren et al., 2011
Amino acid digestibility in low-fat DDGS
Ileal AA Digestibility
Ileal AA Digestibility
SID AA (%)

11.5% fat | 7.5% fat | 6.9% fat

- **Lys**: a, a, b
- **Met**: a, b, b
- **Thr**: a, b, b
- **Trp**: a, c, b

Curry et al., 2014
Effect of Oil on SID of AA in SBM and SPC

Cervantes-Pahm and Stein, 2008

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Positive effect of low-fat DDGS
Belly flex, cm

Cromwell et al., 2011
Belly Flop Distance, cm

Germ: $P < 0.05$

0% DDGS
- 0 germ: 17.37 cm
- 10% germ: 14.28 cm
- 20% germ: 11.66 cm
- 30% germ: 9.98 cm

30% DDGS
- 0 germ: 8.1 cm
- 10% germ: 9.45 cm
- 20% germ: 7.37 cm
- 30% germ: 6.22 cm

DDGS: $P < 0.05$

Lee et al., 2012
Conclusions

- Energy value in conventional DDGS similar to corn
- Energy value in low-fat DDGS (5 – 9% fat) slightly less than in conventional DDGS
  - Probably no practical impact
- De-oiled DGGS significantly lower DE and ME
Conclusions, continued

- AA digestibility may be reduced in low-oil DDGS
- Possible positive impact of low-oil DDGS on pork quality
- More data coming soon.
Acknowledgement

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