Impact of Increasing Dietary Levels of DDGS and Dietary Withdrawal Pre-Harvest, on Growth Performance, Carcass and Pork Quality of Grower-Finisher Pigs

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University of Minnesota
Summary of Growth Performance Responses from Feeding Levels up to 30% DDGS in Grower-Finisher Diets

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>N</th>
<th>Increased</th>
<th>Reduced</th>
<th>Not Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG</td>
<td>25</td>
<td>1</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>ADFI</td>
<td>23</td>
<td>2</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Gain/Feed</td>
<td>25</td>
<td>4</td>
<td>5</td>
<td>16</td>
</tr>
</tbody>
</table>

Stein and Shurson, 2008
## Summary of Carcass Characteristic Responses from Feeding Levels up to 30% DDGS in Grower-Finisher Diets

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>N</th>
<th>Increased</th>
<th>Reduced</th>
<th>Not Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressing %</td>
<td>18</td>
<td>0</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Backfat Thickness</td>
<td>15</td>
<td>0</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Loin Depth</td>
<td>14</td>
<td>0</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>% Carcass Lean</td>
<td>14</td>
<td>0</td>
<td>1</td>
<td>13</td>
</tr>
</tbody>
</table>

Stein and Shurson, 2008
Summary of Belly Quality Characteristics from Feeding Levels up to 30% DDGS in Grower-Finisher Diets

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>N</th>
<th>Increased</th>
<th>Reduced</th>
<th>Not Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belly thickness</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Belly firmness</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Iodine value</td>
<td>8</td>
<td>7</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Stein and Shurson, 2008
Why Is There a Concern About Feeding Diets Containing DDGS on Pork Fat Quality?
Comparison of Selected Nutrients in Corn DDGS and Corn (As Fed Basis)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Corn DDGS</th>
<th>Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swine ME, kcal/kg</td>
<td>3,390</td>
<td>3,420</td>
</tr>
<tr>
<td>Crude fat, %</td>
<td>9.6</td>
<td>3.9</td>
</tr>
<tr>
<td>Linoleic acid (C18:2), %</td>
<td>5.32</td>
<td>1.92</td>
</tr>
<tr>
<td>Oleic acid (C18:1), %</td>
<td>2.47</td>
<td>0.94</td>
</tr>
</tbody>
</table>
Current Pork Fat Quality Standards

- Based on Iodine Value (IV)
  - ratio of unsaturated:saturated fatty acids

- Maximum IV
  - 70 – Danish Meat Research Institute
  - 72 – National Pork Producers Council
  - 74 – Boyd et al. (1997)

- Various adipose tissue sites are affected differently by dietary fatty acid composition
Questions

- Is IV the best criteria for assessing pork fat quality?
- What is the maximum IV for acceptable pork fat quality?
- Which adipose tissue site should be used to measure IV?
- How much DDGS can be added to corn-soybean meal diets to achieve acceptable pork fat quality?
- Will removing high levels of DDGS from the diet for a time period prior to slaughter result in acceptable pork fat quality?
U of M/Land O’ Lakes Pork Fat Quality Field Study (2006)

- **Facilities**
  - Two commercial, 1000 head finishing barns in southern MN
  - Separate sites, two independent producers
  - Each barn had 40 pens, double sided curtain
    - buildings with 8' pits
    - pit fans for ventilation
    - weighted baffle ceiling air inlets

- **Genetics**
  - Monsanto Genepacker sows
  - Monsanto EB terminal semen
Health

- Positive-stable for PRRS
- Positive for Mycoplasma, but do not vaccinate
- Negative for APP
- Health of pigs was good
U of M/Land O’ Lakes Pork Fat Quality Field Study (2006)

Nutrition
- Provided by Land O’ Lakes
- Producer A fed typical corn-SBM diets
- Producer B fed corn-SBM meal diets + 10% DDGS
- 7-phase mixed sex feeding program
- Last finisher diet contained 4.5g Paylean
- Diets contained similar nutrient levels with and without 10% DDGS
- All diets contained choice white grease as the supplemental fat source (1.25 to 3.75%)
Carcass Characteristics of Grow-Finish Pigs Fed 0 or 10% DDGS Diets (UM/LOL Field Trial)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>0% DDGS Diets</th>
<th>10% DDGS Diets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcass weight, lbs</td>
<td>212</td>
<td>210</td>
</tr>
<tr>
<td>Last rib backfat, in.</td>
<td>1.09</td>
<td>1.11</td>
</tr>
<tr>
<td>Tenth rib backfat, in.</td>
<td>1.01</td>
<td>0.99</td>
</tr>
<tr>
<td>Ham, %</td>
<td>11.74</td>
<td>11.74</td>
</tr>
<tr>
<td>Loin, %</td>
<td>7.93</td>
<td>7.91</td>
</tr>
<tr>
<td>Belly, %</td>
<td>10.51</td>
<td>10.41</td>
</tr>
<tr>
<td>Loin depth, in.</td>
<td>2.72</td>
<td>2.72</td>
</tr>
<tr>
<td>Lean %</td>
<td>56.36</td>
<td>56.47</td>
</tr>
</tbody>
</table>

No significant differences in carcass characteristics.
## Mid-Belly Fat Quality Characteristics of Carcasses of Grow-Finish Pigs Fed 0 or 10% DDGS Diets (UM/LOL Field Trial)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>0% DDGS</th>
<th>10% DDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese fat color score (1-4)</td>
<td>1.76</td>
<td>1.81</td>
</tr>
<tr>
<td>Mean melting point, °C</td>
<td>29.26</td>
<td>28.70</td>
</tr>
<tr>
<td>Iodine value</td>
<td>66.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>68.3&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>14:0, 16:0, 16:1, 17:0, 17:1, 18:0, %</td>
<td>No differences</td>
<td>No differences</td>
</tr>
<tr>
<td>18:1 oleic acid, %</td>
<td>47.39&lt;sup&gt;c&lt;/sup&gt;</td>
<td>45.12&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>18:2 linoleic acid, %</td>
<td>11.94&lt;sup&gt;c&lt;/sup&gt;</td>
<td>13.98&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>18:3, 18:4, 20:0, 20:1, 20:2, 20:4, %</td>
<td>No differences</td>
<td>No differences</td>
</tr>
<tr>
<td>Saturated fatty acids, %</td>
<td>33.99</td>
<td>34.26</td>
</tr>
<tr>
<td>Monounsaturated fatty acids, %</td>
<td>51.78&lt;sup&gt;c&lt;/sup&gt;</td>
<td>49.47&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>PUFA, %</td>
<td>14.02&lt;sup&gt;c&lt;/sup&gt;</td>
<td>16.11&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Total Omega 3, %</td>
<td>0.98</td>
<td>0.96</td>
</tr>
<tr>
<td>Total Omega 6, %</td>
<td>13.02&lt;sup&gt;c&lt;/sup&gt;</td>
<td>15.14&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Omega 6:Omega 3 ratio</td>
<td>13.28&lt;sup&gt;c&lt;/sup&gt;</td>
<td>15.78&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a, b</sup> Means within rows with unlike superscripts differ (P < .05).
<sup>c, d</sup> Means within rows with unlike superscripts differ (P < .0001).
Effects of feeding diets containing increasing levels of corn DDGS to grower-finisher pigs on growth performance, carcass, and pork fat quality
Objectives

- To determine the effects of adding 0, 10, 20, and 30% DDGS on:
  - Growth performance
  - Carcass quality
  - Muscle and fat quality
  - Loin fat oxidation
  - Loin and bacon eating characteristics
Materials and Methods

This study was conducted at SROC
Waseca, MN
Animals and Housing

- **Pigs**
  - 512 crossbred pigs (256 gilts and 256 barrows) from two groups
  - Initial weight = 22 kg

- **Housing**
  - Environmentally controlled grower-finisher facility
  - 8 pigs per pen
  - Barrows and gilts housed separately

- **Feeding program**
  - **Diets**
    - formulated on a dig. lys. basis
    - no supplemental fat
  - **Three-phases**
    - 20-50 kg
    - 50-80 kg
    - 80-120 kg
Results
## Effect of Formulating G-F Diets on a Digestible Amino Acid Basis, with Increasing Levels of DDGS, on Overall Growth Performance

<table>
<thead>
<tr>
<th></th>
<th>0% DDGS</th>
<th>10% DDGS</th>
<th>20% DDGS</th>
<th>30% DDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial wt., kg</td>
<td>22.5</td>
<td>22.8</td>
<td>22.5</td>
<td>22.5</td>
</tr>
<tr>
<td>Final wt., kg</td>
<td>114.3</td>
<td>114.7</td>
<td>113.8</td>
<td>113.4</td>
</tr>
<tr>
<td>ADG, kg/d</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.91</td>
</tr>
<tr>
<td>ADFI, kg/d&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.57</td>
<td>2.55</td>
<td>2.49</td>
<td>2.46</td>
</tr>
<tr>
<td>F/G&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.79</td>
<td>2.76</td>
<td>2.71</td>
<td>2.70</td>
</tr>
</tbody>
</table>

<sup>a</sup> Linear effect of DDGS level
Data from 64 pens, 16 pens/treatment (Xu et al., 2007)
Adding Increasing Levels of DDGS to G-F Diets Slightly Reduced Carcass Yield

Xu et al. (2007)
Linear effect (P < 0.01)
Effects of Dietary DDGS Level on Last Rib Backfat

Xu et al. (2007)
30% DDGS tended to be lower than 0% DDGS (P = 0.09)
Effects of Dietary DDGS Level on % Carcass Lean

Xu et al. (2007)
30% DDGS tended to be higher than 0% DDGS (P = 0.11)
Effects of Dietary DDGS Level on Ultimate Muscle pH
Effect of DDGS level on loin firmness and marbling score

<table>
<thead>
<tr>
<th>Diet</th>
<th>Firmness</th>
<th>Marbling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contr.</td>
<td>2.83</td>
<td>2.82</td>
</tr>
<tr>
<td>D10</td>
<td>2.77</td>
<td>2.74</td>
</tr>
<tr>
<td>D20</td>
<td>2.65</td>
<td>2.43</td>
</tr>
<tr>
<td>D30</td>
<td>2.52</td>
<td>2.42</td>
</tr>
</tbody>
</table>
Effects of Increasing Dietary DDGS Level on Loin Characteristics

- **No difference in:**
  - ultimate pH
  - subjective color score
  - drip loss on day 0, 14, 21, or 28 post-harvest
  - lipid oxidation in loins at 28 days of shelf storage

- Loin firmness was linearly reduced
  - Due to reduced marbling?
  - **Within accepted NPPC quality standards**

- Marbling was linearly reduced
  - Due to trend for reduced backfat?
  - **Within accepted NPPC quality standards**

- Pigs fed the 30% DDGS diets had loins that were slightly less red
  - **Within accepted NPPC quality standards**
Muscle Quality is Not Affected by Feeding DDGS Diets to Grower-Finisher Pigs

- No effects on muscle:
  - Color
  - Firmness
  - Marbling
  - Ultimate pH
  - Drip loss
  - Cooking loss
  - Tenderness
Effects of Increasing Dietary DDGS Level on Belly and Backfat Characteristics

- No effect on belly thickness

- No differences in belly fat color
  - Japanese color score
  - Minolta L*, a*, b*

- Backfat was slightly darker (lower L*) for pigs fed the 20% and 30% DDGS diets

- No differences in backfat color
  - Japanese color score
  - Minolta a*, b*
Effect of Dietary DDGS Level on Belly Firmness

- PSE = 2.06
- D10 vs. D0 (P > 0.05)
- D20 < D0 (P < 0.05)
- D30 < D0 (P < 0.05)
Effect of Dietary DDGS Level on C18:2 Content of Pork Fat

Linear effect of DDGS for all fat depot sites (P < 0.01)
Diet × site (P < 0.01)
Effect of Dietary DDGS Level on Iodine Value of Pork Fat

Linear effect of DDGS level for all fat depot sites (P < 0.01)
Diet × site (P < 0.01)
Effect of Increasing Dietary DDGS Level on Fatty Acid Content of Pork Fat

- Linear increase in PUFA
- Linear increase in IV
  - Backfat (58, 63, 68, 72)
  - Belly fat (61, 65, 69, 72)
  - Loin fat (52, 57, 57, 58)
- Linear decrease in monounsaturated fatty acids
- Linear decrease in saturated fatty acids
Effects of Increasing Dietary DDGS Level on Fat Stability of Pork Loins (TBARS, mg malonaldehyde/kg)

No significant differences among dietary treatments.
Effects of Increasing Dietary DDGS Level on Eating Characteristics of Pork Loins

<table>
<thead>
<tr>
<th>Flavor</th>
<th>Juiciness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% DDGS</td>
<td>0% DDGS</td>
</tr>
<tr>
<td>10% DDGS</td>
<td>10% DDGS</td>
</tr>
<tr>
<td>20% DDGS</td>
<td>20% DDGS</td>
</tr>
<tr>
<td>30% DDGS</td>
<td>30% DDGS</td>
</tr>
</tbody>
</table>

No significant differences among dietary treatments.
Effects of Increasing Dietary DDGS Level on Cook Loss and Off Flavor of Pork Loins

No significant differences among dietary treatments.
## Effects of Dietary DDGS Level on Bacon Sensory Test

<table>
<thead>
<tr>
<th></th>
<th>D0</th>
<th>D10</th>
<th>D20</th>
<th>D30</th>
<th>PSE</th>
<th>Linear</th>
<th>Quadratic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flavor</strong></td>
<td>5.17</td>
<td>5.33</td>
<td>5.62</td>
<td>5.20</td>
<td>0.14</td>
<td>0.54</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Tenderness</strong></td>
<td>4.99</td>
<td>5.04</td>
<td>4.99</td>
<td>4.64</td>
<td>0.12</td>
<td>0.04</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>Fattiness</strong></td>
<td>2.61</td>
<td>2.80</td>
<td>2.60</td>
<td>2.07</td>
<td>0.14</td>
<td>&lt;0.001</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Flavor: High = intense

Tenderness: High = tough

Fattiness: High = fatty
Effects of Dietary DDGS Level on Loin and Bacon Sensory Test

- Loin sensory test
  - No difference
    - Cooking loss
    - Flavor
    - Off-flavor
    - Tenderness
    - Overall acceptability

- Bacon sensory test
  - No difference
    - Cooking yield
    - Crispiness
    - Off-flavor
    - Overall acceptability
Summary and Conclusions

- Feeding diets containing up to 30% DDGS has no adverse effects on growth performance of grower-finisher pigs.
- Loin characteristics met NPPC target values.
- Loin fat oxidation was not different among dietary treatments.
- PUFA content and IV of pork fat were linearly increased with increasing dietary DDGS level.
- The highest IV = 72 (D30)
  - exceeded the NPPC standard of 70
  - less than 74 for IV threshold suggested by Boyd et al. (1997)
Summary and Conclusions

- Loin eating quality was not different with increasing dietary DDGS level.

- Bacon taste was not negatively affected when pigs were fed increasing the levels of dietary DDGS from 0 to 30%.

- Maximum usage rate of DDGS in grower-finisher swine diet could be 30%.
The effects of feeding diets containing 0, 15, and 30% corn dried distillers grains with solubles (DDGS), and DDGS withdrawal intervals, on growth performance, pork quality, and pork fatty acid composition in grower-finisher pigs
Alternative Strategies to Improve Pork Fat Quality

- Pork adipose tissue C18:2 incorporation and elimination rate following a dietary fat source change
  - 60 to 70% change in 2 wks
  - > 90% in 6 to 8 wks
  (Wiseman and Agunbiade, 1998; Warnants et al., 1999)

- Alternative strategies to improve pork fat quality
  - Growing phase
    - Feed high levels of DDGS
  - Finish phase
    - Reduce feeding level or withdrawal DDGS from the diet
Specific Objectives

- Determine the effects of the feeding level and withdrawal interval of DDGS on
  - Growth performance
  - Carcass quality
  - Belly fat fatty acid profile
This study was conducted at WCROC, Morris, MN
Animals and Housing

- Pigs
  - 432 crossbred pigs
  - Initial weight = 29.8 kg

- Housing
  - Environmentally controlled grower-finisher facility
  - 9 pigs per pen mixed sex (5 barrows and 4 gilts)

- Feeding program
  - Diets
    - Formulated on a digestible lysine basis
    - No supplemental fat
  - Three-phases
    - 20-50 kg
    - 50-80 kg
    - 80-120 kg
Experimental Design

- Completely randomized arrangement with 9 treatment combinations
- Nine treatment combinations include:
  - Control: D0-0wk (8 pens)
  - D15-0wk (5 pens)
  - D15-3wk (5 pens)
  - D15-6wk (5 pens)
  - D15-9wk (5 pens)
  - D30-0wk (5 pens)
  - D30-3wk (5 pens)
  - D30-6wk (5 pens)
  - D30-9wk (5 pens)
Results
Effects of Dietary DDGS Level and Withdrawal Interval on ADG

DDGS withdrawal interval
D30-0wk < control (P < 0.05)

PSE = 0.01
P-value
D = 0.11
W = 0.76
D×W = 0.02
Effects of Dietary DDGS Level and Withdrawal Interval on ADFI

PSE = 0.04

P-value
D = 0.41
W = 0.91
D×W = 0.98

DDGS withdrawal interval
Effects of Dietary DDGS Level and Withdrawal Interval on G/F

PSE = 0.003

P-value
D = 0.94
W = 0.56
D×W = 0.17
Effects of Dietary DDGS Level and Withdrawal Interval on Carcass Weight

PSE = 0.97

P-value
D = 0.39
W = 0.55
D×W = 0.04

DDGS withdrawal interval
D30-0wk < control (P < 0.05)
Effects of Dietary DDGS Level and Withdrawal Interval on Growth Performance and Carcass Weight

- No effect on ADG except
  - Control > D30 (0.92 kg/d vs. 0.87 kg/d, respectively)

- No effect on ADFI

- No effect on G/F

- No effect on carcass weight except
  - Control > D30 (94.9 kg vs. 92.4 kg, respectively)
Effects of Dietary DDGS Level and Withdrawal Interval on Carcass and Loin Quality

- No difference
  - Dressing %
  - Last rib backfat depth
  - Lean percentage
  - Loin firmness
  - Loin marbling
  - Subjective color score
  - Minolta color L*
Effects of Dietary DDGS Level and Withdrawal Interval on Fatty Acid Content of Belly Fat and Belly Firmness

- **PUFA**
  - Increased with DDGS level
  - Decreased with DDGS withdrawal
    - Control = D15-9

- **Iodine value**
  - Increased with DDGS level
  - Decreased with DDGS withdrawal
    - Control = D15-9 and D30-9

- **Monounsaturated fatty acids**
  - Increased with DDGS level

- **Saturated fatty acids**
  - Decreased with DDGS level
  - Increased with DDGS withdrawal

- **Belly firmness**
  - D30-0 < control
Effects of Dietary DDGS Level and Withdrawal Interval on C18:2 Content of Belly Fat

- PSE = 0.67
- All treatments > control (P < 0.05)

Graph showing the effect of different DDGS withdrawal intervals on C18:2 content over time.
Effects of Dietary DDGS Level and Withdrawal Interval on Fat Color

- No difference:
  - Japanese color score
  - Minolta color
    - L* (lightness)
    - a* (redness)
    - b* (yellowness)
Effects of Dietary DDGS Level and Withdrawal Interval on Belly Firmness

PSE = 1.19

P-value
D = 0.99
W = 0.53
D × W = 0.20

DDGS withdrawal interval
D30-0 < control (P < 0.05)
Effects of Dietary DDGS Level and Withdrawal Interval on C18:2 Content of Belly Fat

DDGS withdrawal interval

All treatments > control (P < 0.05)

PSE = 0.67

P-value
D < 0.001
W < 0.001
D × W = 0.67
Effects of Dietary DDGS Level and Withdrawal Interval on PUFA of Belly Fat

\[ \text{PSE} = 0.74 \]

\[ \text{P-value} \]
\[ D < 0.001 \]
\[ W < 0.001 \]
\[ D \times W = 0.8 \]

**DDGS withdrawal interval**

D15-9 wk = control, others > control (P < 0.01)
Effects of Dietary DDGS Level and Withdrawal Interval on IV of Belly Fat

PSE = 1.30

P-value
D < 0.001
W < 0.001
D \times W = 0.3

DDGS withdrawal interval

D15-9 wk and D30-9 wk = control, others > control (P < 0.05)
Summary and Conclusions

- Increasing DDGS level from 0 to 30% in grower-finisher swine diets
  - Has minimal effects on pig growth performance
  - Linearly increases C18:2 content and IV of belly fat
  - Reduces belly firmness at 30% dietary DDGS level

- Withdrawing DDGS from the diet
  - C18:2 and IV of belly fat are reduced linearly
  - Acceptable pork fat quality (IV < 70) can be achieved in pigs
    - 15% dietary DDGS
    - 30% dietary DDGS with a 3 wk withdrawal interval
Summary of the Effects of Feeding DDGS Diets on Pork Quality

- **Bellies** will be less firm
  - Increased iodine value (linoleic acid content)

- **Bacon** will have an **oily appearance** from pigs fed > 20% DDGS diets

- **Belly thickness** may, or may not, be **affected**

- **Shelf life** and fat oxidation in fresh pork loins is **unaffected** with typical retail storage conditions for 28 days.

- **Muscle quality** is **not affected**

- **Consumer taste** panel acceptability is **unaffected**
  - Cooked pork loin
  - Cooked bacon

- Backfat **iodine value of 70** can be met when feeding 30% DDGS in growing-finishing and **withdrawing** it 3 wks pre-harvest
Michigan State University Study on DDGS Withdrawal Pre-harvest

- Hill et al. (2008)
  - N = 308 pigs
  - 4 dietary treatments (contained 4% CWG)
    - 0% DDGS
    - 10% DDGS until 30 d pre-harvest then 0%
    - 20% DDGS until 30 d pre-harvest then 0%
    - 30% DDGS until 30 d pre-harvest then 0%
DDGS Withdrawal – Hill et al. (2008)

- No differences in:
  - ADG
  - G:F (except 10% > 0%)
  - Dressing %
  - Standardized fat free lean

- IV increased for pigs fed 20 and 30% DDGS diets vs. 0%

- Conclusions
  - IV may not be reflective of fatty acid composition of pork fat
  - removing DDGS from the diet 30 d pre-harvest results in acceptable carcasses
Other Potential Dietary Modifications

- Conjugated linoleic acid
  - FDA has approved for use in grower-finisher diets
  - Diet inclusion rate will likely be 1% and be fed the last 10-30 days pre-harvest
  - Currently cost prohibitive
Effects of Feeding CLA and DDGS

- Purdue study (White et al., 2007)

- Fed 0, 20, or 40% DDGS diets during the final finishing phase
  - n = 36 pigs

- Half of each group (n = 6) were fed 1% CLA during last 10 d pre-harvest
Effects of Feeding CLA and DDGS

- No differences in:
  - Loin eye area
  - 10th rib backfat depth
  - Last rib midline back fat depth
  - Loin color
  - Marbling
  - Firmness
  - Drip loss

- IV and ratio of n6:n3 fatty acids increased with increasing levels of DDGS

- IV and ratio of n6:n3 fatty acids decreased when 1% CLA was added to 20% and 40% DDGS diets

- % lean:fat in bacon decreased when pigs were fed DDGS diets
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