2014 KSU Swine Day Program

• 8:00 a.m. – 3:30 p.m. - Trade Show Open
• 9:45 a.m. – Delta Coronavirus and PED by Drs. Hesse, Dritz, and Woodworth
• 11:00 a.m. – What’s next for the Swine Industry by Dr. DiPietre
• 11:45 noon - Pork Lunch in Main Ballroom
• 1:30 p.m. – Improving survivability of low birth weight pigs by Drs. Nelssen, Davis, and Gonzalez
• 2:00 p.m. – Keeping up with rapidly changing ingredient prices by Drs. Tokach, DeRouchey, and Goodband
• 3:00 p.m – How retailers are changing the Australian Swine Industry by Dr. John Pluske
Recent K-State Research to aid decision making during rapidly changing feed cost

www.ksuswine.org
Recent K-State Research to aid decision making during rapidly changing feed cost

• The ones that do the work!
2014 Swine Day Report

available at: www.KSUswine.org

• 32 papers
• 41 experiments
• 28,791 pigs
Undergraduate research projects

• Kiah Gourley - Lactational estrous
• Jake Erceg - Mycotoxins
• Annie Clark - Pepsoygen
• Korinn Card - EPI system
• Andrea Jeffries - Soy proteins
• Suzy Fowler - Mycotoxin binders
• Cheyanne Evans - Nutrigold & bovine plasma
• Jacob Jacquez - Late finishing amino acids
Congratulations!

• Undergraduate Student Achievements
  – Kia Gourley, Midwest ASAS 1st oral undergraduate competition and NPB Scholarship recipient
  – Jake Erceg, NPB scholarship recipient
  – Jared Mumm, NPB scholarship recipient

• Graduate Student Achievements
  – Chad Paulk, Midwest ASAS Young Scholar
  – Hyatt Frobose, 1st place Ph.D. oral abstract
  – Kyle Coble, 2nd place Ph.D. oral abstract and Pinnacle Award winner from International Ingredients Inc.
  – Marcio Gonclaves, Pinnacle Award winner from International Ingredients Inc.
HOG PRODUCTION COSTS* AND PRICES

$/cwt carcass

Source: DLR 11-4-2014

2013 Profits = $-8.84
Forecast 2014 Profits = $53.19
Forecast 2015 Profits = $31.87

*Based on relationship between ISU Estimated Costs & Returns data and historic Omaha corn and Decatur soybean meal prices
Triumph barn dump contract

<table>
<thead>
<tr>
<th>Carcass Feed cost base, $/cwt</th>
<th>Feed cost, $/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ 90.00</td>
<td>$ 300.00</td>
</tr>
</tbody>
</table>

![Graph showing the relationship between weight and price per pig. The graph includes two lines: one for opportunity over feed and another for opportunity over feed & facility cost.](image)
Triumph barn dump contract

<table>
<thead>
<tr>
<th>Carcass base, $/cwt</th>
<th>Feed cost $/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ 90.00</td>
<td>$ 170.00</td>
</tr>
</tbody>
</table>
Continue to focus on feed cost

- DDGS
- Amino acids
- Fat
- Avoid adding additives that don’t provide benefit
  - Some additives do provide benefit
- Don’t forget feed processing
- Rethink practices that cost money
### K-State DDGS Calculator (Variable DDGS Energy)

The Calculator attempts to consider economic return per pig from change in diet cost, feed efficiency, and growth rate. It does not account for any economic impact on yield or iodine value.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Price per Unit</th>
<th>Price per Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn, $/bu</td>
<td>$3.50</td>
<td>$151.79</td>
</tr>
<tr>
<td>SBM, $/ton</td>
<td>$400.00</td>
<td></td>
</tr>
<tr>
<td>Monocal, $/ton</td>
<td>$600.00</td>
<td></td>
</tr>
<tr>
<td>Limestone, $/ton</td>
<td>$36.20</td>
<td></td>
</tr>
<tr>
<td>Lysine HCl, $/lb</td>
<td>$1.30</td>
<td></td>
</tr>
<tr>
<td>DL-Met, $/lb</td>
<td>$3.50</td>
<td></td>
</tr>
<tr>
<td>L-Threonine, $/lb</td>
<td>$2.50</td>
<td></td>
</tr>
<tr>
<td>DDGS, $/ton</td>
<td>$115.00</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use fat to equalize energy</th>
<th>DDGS N</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Include L-Trp in diets?</th>
<th>DDGS N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy as % of corn or oil content</th>
<th>DDGS N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil, %</td>
<td></td>
</tr>
<tr>
<td>8.0%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value of pig gain, $/lb</th>
<th>DDGS N</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.70</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fat, $/lb</th>
<th>DDGS N</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.30</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L-Trp, $/lb</th>
<th>DDGS N</th>
</tr>
</thead>
<tbody>
<tr>
<td>$13.50</td>
<td></td>
</tr>
</tbody>
</table>

**Start weight, lb:** 50, 75, 125, 170, 210, 246

**End weight, lb:** 75, 125, 170, 210, 246, 280

**DDGS maximum value**

<table>
<thead>
<tr>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
<th>F6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>8.32</td>
</tr>
</tbody>
</table>

**DDGS % at max savings**

| 40 |

**Max savings, $/pig**

| $0.73 | $1.66 | $1.57 | $1.49 | $1.44 | $1.43 | $8.32 |

**DDGS levels chosen**

| 30% | 30% | 30% | 30% | 25% | 0% |

**- Savings, $/pig**

| $0.55 | $1.26 | $1.26 | $1.21 | $1.00 | $0.00 | $5.29 |
### K-State DDGS Calculator (Variable DDGS Energy)

Calculator attempts to consider economic return per pig from change in diet cost, feed efficiency, and growth rate. It does not account for any economic impact on yield or iodine value.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Unit Price</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn, $/bu</td>
<td>$3.50</td>
<td>$151.79</td>
</tr>
<tr>
<td>SBM, $/ton</td>
<td>$400.00</td>
<td></td>
</tr>
<tr>
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<td>$600.00</td>
<td></td>
</tr>
<tr>
<td>Limestone, $/ton</td>
<td>$36.20</td>
<td></td>
</tr>
<tr>
<td>Lysine HCl, $/lb</td>
<td>$1.30</td>
<td></td>
</tr>
<tr>
<td>DL-Met, $/lb</td>
<td>$3.50</td>
<td></td>
</tr>
<tr>
<td>L-Threonine, $/lb</td>
<td>$2.50</td>
<td></td>
</tr>
<tr>
<td>DDGS, $/ton</td>
<td>$115.00</td>
<td></td>
</tr>
</tbody>
</table>

76% = DDGS to Corn price ratio

Use fat to equalize energy: No
Include L-Trp in diets: No

Energy as % of corn or oil content:
DDGS oil content, %: 8.0%
Value of pig gain, $/lb: $0.70
Fat, $/lb: $0.30
L-Trp, $/lb: $13.50

Start weight, lb: 50, 75, 125, 170, 210, 246
End weight, lb: 75, 125, 170, 210, 246, 280

<table>
<thead>
<tr>
<th>DDGS levels chosen</th>
<th>Max savings, $/pig</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>$0.63</td>
</tr>
<tr>
<td>30%</td>
<td>$1.23</td>
</tr>
<tr>
<td>30%</td>
<td>$1.09</td>
</tr>
<tr>
<td>30%</td>
<td>$1.04</td>
</tr>
<tr>
<td>25%</td>
<td>$0.88</td>
</tr>
<tr>
<td>0%</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

Max savings, $/pig: $0.73, $1.47, $1.35, $1.30, $1.28, $1.36, $7.49

**Total DDGS maximum value**: $7.49

**Total DDGS % at max savings**: 40, 40, 40, 40, 40, 40

**Total DDGS levels chosen**: 30%, 30%, 30%, 30%, 25%, 0%

**Total savings, $/pig**: $4.87
Incremental “potential” savings with DDGS
11-17-2014

<table>
<thead>
<tr>
<th>DDGS, %</th>
<th>$/pig</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>$1.15</td>
</tr>
<tr>
<td>10</td>
<td>$2.35</td>
</tr>
<tr>
<td>15</td>
<td>$3.55</td>
</tr>
<tr>
<td>20</td>
<td>$4.56</td>
</tr>
<tr>
<td>25</td>
<td>$5.58</td>
</tr>
<tr>
<td>30</td>
<td>$6.53</td>
</tr>
<tr>
<td>35</td>
<td>$7.48</td>
</tr>
<tr>
<td>40</td>
<td>$8.32</td>
</tr>
</tbody>
</table>
Effect of DDGS (30%) and Midds (19%) at varied withdraw times prior to slaughter

Exp. 1

Carcass Yield, %

<table>
<thead>
<tr>
<th>Corn-Soy</th>
<th>20 d</th>
<th>15 d</th>
<th>10 d</th>
<th>5 d</th>
<th>High fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>72.7</td>
<td>72.5</td>
<td>72.5</td>
<td>72.2</td>
<td>72.0</td>
<td>71.2</td>
</tr>
</tbody>
</table>

Corn-soy vs high fiber, P = 0.01
Withdraw effects, quadratic P < 0.03
SEM 0.20

Days fed corn-soy from high fiber prior to marketing

Coble et al., 2013
Effect of DDGS (30%) and Midds (19%) at varied withdraw times prior to slaughter

Exp. 1

Carcass weight, lb

<table>
<thead>
<tr>
<th>Days fed corn-soy from high fiber prior to marketing</th>
<th>Corn-Soy</th>
<th>20 d</th>
<th>15 d</th>
<th>10 d</th>
<th>5 d</th>
<th>High fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>203.3</td>
<td>200.7</td>
<td>201.6</td>
<td>200.7</td>
<td>199.9</td>
<td>196.8</td>
</tr>
</tbody>
</table>

Corn-soy vs high fiber, P = 0.11
No withdraw effects, P > 0.29
SEM 2.88

Coble et al., 2013
Effect of DDGS (30%) and Midds (19%) at varied withdraw times prior to slaughter

Exp. 2 (Nov 17, 2014 prices)

| Value, $  | 124.57 | 118.29 | 119.76 | 119.15 | 117.78 | 116.40 |
| Feed, $   | 53.88  | 46.55  | 45.68  | 45.56  | 44.74  | 44.06  |

Days fed corn-soy from high fiber prior to marketing

Coble et al., 2013
Influence of SID Trp:Lys ratio on ADG

Goncalves et al., 2014
Trp:Lys ratio as a percentage of maximum ADG
Summary of all 4 GF trials

ADG, lb = 0.418 + 13.41\times (Trp:Lys) - 28.39\times (Trp:Lys)^2

Goncalves et al., 2014
Influence of SID Trp:Lys ratio on F/G

Goncalves et al., 2014
Influence of Trp:Lys ratio on ADG of nursery pigs from 24 to 49 lb

Goncalves et al., 2014
Trp:Lys ratio as a percentage of maximum ADG
Regression analysis of nursery trial

Goncalves et al., 2014
Influence of Trp:Lys ratio on F/G of nursery pigs from 24 to 49 lb

Feed/gain vs. Trp:Lys ratio, %

Broken line linear = 16.6%

Goncalves et al., 2014
Continue to focus on feed cost

✔ DDGS
  • Amino acids - Good News, Bad News
  • Fat – Offers some savings
  • Avoid adding additives that don’t provide benefit
    – Some additives do provide benefit
  • Don’t forget feed processing
  • Rethink practices that cost money
Low-protein, Amino Acid Diets with Corn or Milo
A Good News Bad News Story

• 25 to 50 lb and 100 to 290 lb pigs
• 2 × 3 factorials:
  • Milo vs. corn
  • Amino acid supplementation (low, medium, or high).
• Low amino acids: L-lysine HCl and DL-methionine.
• Medium amino acids: L-lysine HCl, DL-methionine, and L-threonine
• High amino acids: L-lysine HCl, DL-methionine, L-threonine, and L-valine.
Effect of Grain Source on Average Daily Gain and Feed Efficiency – 25 to 50 lb Pigs

No differences

No differences

ADG, lb

Milo: 1.05
Corn: 1.05

F/G

Milo: 1.54
Corn: 1.53

Jordan et al., 2014
Effect of Amino Acid Supplementation on Average Daily Gain and Feed Efficiency – 25 to 50 lb Pigs

- **No differences**

<table>
<thead>
<tr>
<th>ADG, lb</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.06</td>
<td>1.05</td>
<td>1.04</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F/G</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.53</td>
<td>1.51</td>
<td>1.55</td>
<td></td>
</tr>
</tbody>
</table>

*Jordan et al., 2014*
Effect of Grain Source on Average Daily Gain and Feed Efficiency – 100 to 290 lb Pigs

- **ADG, lb**
  - Milo: 1.97
  - Corn: 2.02
  - **P < 0.07**

- **F/G**
  - Milo: 2.92
  - Corn: 2.84
  - **P < 0.01**

*Jordan et al., 2014*
Effect of Amino Acid Supplementation on Average Daily Gain and Feed Efficiency – 100 to 290 lb Pigs

Quadratic, P < 0.05

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG, lb</td>
<td>2.01</td>
<td>2.03</td>
<td>1.95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>F/G</td>
<td>2.90</td>
<td>2.86</td>
<td>2.88</td>
</tr>
</tbody>
</table>

Jordan et al., 2014
Effect of Amino Acid Supplementation on Iodine Value – 100 to 290 lb Pigs

Milo vs. Corn, P < 0.01

- **Milo**
  - Low: 67.9
  - Medium: 67.9
  - High: 67.3

- **Corn**
  - Low: 68.8
  - Medium: 68.9
  - High: 69.6

Jordan et al., 2014
Amino Acids

<table>
<thead>
<tr>
<th></th>
<th>Price, $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>3.5 $/bu</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>420 $/ton</td>
</tr>
<tr>
<td>L-Lysine</td>
<td>1.2 $/lb</td>
</tr>
<tr>
<td>DL-Methionine</td>
<td>3.5 $/lb</td>
</tr>
<tr>
<td>L-Threonine</td>
<td>2.5 $/lb</td>
</tr>
</tbody>
</table>

Savings per pig with AA fortified diet, $  $ 0.86

Even though crystalline amino acids can save money, its their availability that is the issue!
Amino Acid Shortages

- L-lysine HCl – shortage of HCl due to oil industry
- DL-methionine - shortage of precursors in manufacturing process
- L-threonine – economic situation for manufacturing
  » China
- Options – corn-soybean meal with some L-lysine
- DDGS-based diets do not need much Methionine or Threonine
- Save amino acids currently on hand for starter diets
Effects of Increasing L-lysine HCl on Finishing Pig Growth Performance

Linear, (P < 0.01)

De La Llatta, et al., 2000
Economics of Added Fat in Finishing Diets

- Depends on grain and fat prices
  - Corn $3.50
    - Fat $.33 = $.66 loss
    - Fat $.30 = Breakeven
    - Fat $.27 = $.63 benefit
## Comparison of Different Levels and Sources of Oil on Nursery Pig Performance

<table>
<thead>
<tr>
<th>Source</th>
<th>2.5</th>
<th>5.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean Oil</td>
<td>1.50</td>
<td>1.53</td>
</tr>
<tr>
<td>Corn Oil 1</td>
<td>1.46</td>
<td>1.48</td>
</tr>
<tr>
<td>Corn Oil 2</td>
<td>1.46</td>
<td>1.44</td>
</tr>
<tr>
<td>Control</td>
<td>1.39</td>
<td></td>
</tr>
</tbody>
</table>

*Source × level interaction; $P < 0.05$*

---

**Notes:**
- Jordan et al., 2014
- K-State Research and Extension
- Knowledge for Life
Comparison of Different Levels and Sources of Oil on Nursery Pig Performance

Each oil source, linear, P < 0.05)

K-State Research and Extension

Jordan et al., 2014
Effects of Oil Source and Level on Pig Performance – 25 to 50 lb

- **Control Soybean Oil**: 1.42
- **Corn Oil**: 1.42
- **ONE**: 1.42

<table>
<thead>
<tr>
<th>Source</th>
<th>25 lb</th>
<th>50 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1.54</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Soybean Oil</td>
<td>1.45</td>
<td></td>
</tr>
<tr>
<td>Corn Oil</td>
<td>1.44</td>
<td></td>
</tr>
</tbody>
</table>

**ADG, lb**

**F/G**

*Jordan et al., 2014*
Effects of Oil Source and Level on Income over Feed Costs – 25 to 50 lb

<table>
<thead>
<tr>
<th>Oil level, %</th>
<th>IOFC, $/pig</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>13.47</td>
</tr>
<tr>
<td>2.5</td>
<td>13.83</td>
</tr>
<tr>
<td>5</td>
<td>13.88</td>
</tr>
</tbody>
</table>

Jordan et al., 2014
Effects of Dietary Copper, Zinc, Essential Oils and Chlortetracycline (CTC) on Nursery Pig Growth Performance

- **Copper sulfate** (CuSO$_4$; 0 vs. 125 ppm Cu)
- **Zinc oxide** (ZnO; none vs. 3,000 ppm Zn from d 5 to 12 and 2,000 ppm Zn from d 12 to 33),
- **Essential oils blend**
- **Feed–grade medication** Growth-promoting and therapeutic levels of chlortetracycline (CTC at 50 or 400 g/ton). (CTC was removed from the diet on d 19 then added again from d 20 to 33.)
Effects of Dietary Copper, Zinc, Essential Oils and Chlortetracycline (CTC) on Nursery Pig Growth Performance Day 5 to 33

ADG, lb

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Cu</th>
<th>Zn</th>
<th>EO</th>
<th>CTC50</th>
<th>CTC400</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.96(^a)</td>
<td>1.01(^b)</td>
<td>1.04(^b)</td>
<td>0.92(^a)</td>
<td>0.96(^c)</td>
<td>1.02(^c)</td>
</tr>
</tbody>
</table>

\(^a\) Linear effect of CTC

Feldpausch et al., 2014
Effects of Zinc Oxide and Chlortetracycline on Nursery Pig Growth Performance

ZnO; $P < 0.01$

Linear effect of CTC; $P < 0.01$

Feldpausch et al., 2014
Effects of Dietary Zinc Source Nursery Pig Growth Performance - Day 7 to 21

Encapsulated ZnO, linear, P < 0.07
ZnO, linear, P < 0.01

ADG, lb

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>500</th>
<th>1,500</th>
<th>500</th>
<th>1,500</th>
<th>3,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encapsulated ZnO</td>
<td>0.58</td>
<td>0.60</td>
<td>0.67</td>
<td>0.60</td>
<td>0.70</td>
<td>0.76</td>
</tr>
<tr>
<td>ZnO</td>
<td>0.58</td>
<td>0.60</td>
<td>0.67</td>
<td>0.60</td>
<td>0.70</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Jordan et al., 2014
Effects of Vomitoxin (DON) and Algae-modified Clay Average Daily Gain - 25 to 50 lb

ADG, lb

<table>
<thead>
<tr>
<th>Vomitoxin, ppm</th>
<th>0</th>
<th>1.5</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG, lb</td>
<td>1.22</td>
<td>1.10</td>
<td>1.07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Algae-Modified Clay, %</th>
<th>0</th>
<th>0.17</th>
<th>0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG, lb</td>
<td>1.15</td>
<td>1.12</td>
<td>1.13</td>
</tr>
</tbody>
</table>

Fowler et al., 2014
Vomitoxin and Other Mycotoxins

• Some initial reports indicating some vomitoxin in DDGS (~ 3.0 ppm)
• We need to continually monitor the situation
• If you have DON-contaminated grain
  – Dilution is best solution
  – Sodium metabisulfite or Defusion for short periods provides benefit
Feed Additive Potential Opportunities

- Skycis 100 (Narasin)
- Tri-Basic Copper Chloride
- Ractopamine Hydrochloride
### Skycis™ Label

<table>
<thead>
<tr>
<th>Indications</th>
<th>Appropriate concentration of narasin in Type C Medicated feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased rate of weight gain in growing-finishing swine when fed for at least 4 weeks</td>
<td>13.6 to 27.2 g/ton (15 ppm to 30 ppm)</td>
</tr>
<tr>
<td>Increased rate of weight gain and improved feed efficiency in growing-finishing swine when fed for at least 4 weeks</td>
<td>18.1 to 27.2 g/ton (20 ppm to 30 ppm)</td>
</tr>
</tbody>
</table>

- No withdrawal period is required when used according to the label.
- Swine being fed with Skycis (narasin) should not have access to feeds containing pleuromutilins (e.g., tiamulin) as adverse reactions may occur.
Tri-Basic Copper Chloride on HCW

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Concentration</th>
<th>Change vs. Control, lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. 1</td>
<td>75 ppm</td>
<td>3.9</td>
</tr>
<tr>
<td>Exp. 1</td>
<td>150 ppm</td>
<td>7.7</td>
</tr>
<tr>
<td>Exp. 2</td>
<td>150 ppm</td>
<td>3.5</td>
</tr>
<tr>
<td>Exp. 3</td>
<td>150 ppm</td>
<td>5.6</td>
</tr>
<tr>
<td>Exp. 4</td>
<td>200 ppm</td>
<td>5.0</td>
</tr>
</tbody>
</table>
Ractopamine Hydrochloride

• Traditionally known as Paylean (Elanco)
  – This past year product concentration level changed and is now 2.25 g/ton
  – Thus, 4 lb/ton Paylean = 9 g/ton of complete feed

• Engain 9 (Zoetis) is a new commercial product
  – Product concentration level is 9 g/ton
  – Thus, 1 lb/ton Engain = 9 g/ton of complete feed

• Know your product and inclusion level
Wheat and Particle Size

• Surprising little research has been completed evaluating wheat particle size and finishing pigs
• Wheat is more likely to “flour” as particle size is reduced
• Do pigs respond similarly to particle size in meal and pelleted diets – no available data
• Important to further understand ground wheat in swine diets to capture value when economical to use
Effect of wheat particle size on angle of repose of meal diets

De Jong et al., 2014
Effect of wheat particle size on ADG 
(d 0 to 83; BW 97 - 265 lb)

- Linear $P = 0.47$
- Quadratic $P = 0.47$
- SEM = 0.02

<table>
<thead>
<tr>
<th>Particle size, µ</th>
<th>ADG, lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>728 µ</td>
<td>2.02</td>
</tr>
<tr>
<td>579 µ</td>
<td>2.01</td>
</tr>
<tr>
<td>326 µ</td>
<td>2.04</td>
</tr>
</tbody>
</table>

De Jong et al., 2014
Effect of wheat particle size on ADFI (d 0 to 83; BW 97 – 265 lb)

Particle size, µ

<table>
<thead>
<tr>
<th>Particle size, µ</th>
<th>ADFI, lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>728 µ</td>
<td>5.71</td>
</tr>
<tr>
<td>579 µ</td>
<td>5.58</td>
</tr>
<tr>
<td>326 µ</td>
<td>5.57</td>
</tr>
</tbody>
</table>

Linear $P = 0.13$
Quadratic $P = 0.43$
SEM = 0.06

De Jong et al., 2014
Effect of wheat particle size on F/G (d 0 to 83; BW 97 – 265 lb)

Particle size, μ

<table>
<thead>
<tr>
<th>Particle size</th>
<th>F/G</th>
</tr>
</thead>
<tbody>
<tr>
<td>728 μ</td>
<td>2.83</td>
</tr>
<tr>
<td>579 μ</td>
<td>2.77</td>
</tr>
<tr>
<td>326 μ</td>
<td>2.73</td>
</tr>
</tbody>
</table>

Linear $P = 0.001$
Quadratic $P = 0.82$
SEM = 0.02

De Jong et al., 2014
Effect of wheat particle size on DM Digestibility

<table>
<thead>
<tr>
<th>Particle size, μ</th>
<th>DM Digestibility, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>728 μ</td>
<td>88.95</td>
</tr>
<tr>
<td>579 μ</td>
<td>91.15</td>
</tr>
<tr>
<td>326 μ</td>
<td>91.47</td>
</tr>
</tbody>
</table>

Linear $P = 0.01$
Quadratic $P = 0.25$
SEM = 0.70

De Jong et al., 2014

K-State Research and Extension
Effect of wheat particle size on ADG (Pelleted Diets) (BW 96 - 277 lb)

No effect, $P = 0.51$
SEM = 0.02

De Jong et al., 2014
Effect of wheat particle size on F/G (Pelleted diets) (BW 96 – 277 lb)

No effect, \( P = 0.85 \)
SEM = 0.01

De Jong et al., 2014
Retrospective Analysis of Particle Size by Mill Type

2013 2-high Roller Mill Average Particle size = 602 µ

2014 3-high Roller Mill Average Particle size = 530 µ
Pellet Quality

• Past research at KSU has shown that >25% fines in pelleted feed at the feeder results in similar growth performance to feeding mash.

• No research to document where the fines are generated from the pellet mill to the feeder.
Pellet location within feed mill on percentage fines

\[ \text{Pellet Mill} \quad \text{Cooler} \quad \text{Fat Coater} \quad \text{Load-out} \]

- Pellet Mill: 9.4\(^c\)
- Cooler: 8.5\(^c\)
- Fat Coater: 14.2\(^b\)
- Load-out: 20.5\(^a\)

\[ ^{abc} P < 0.05 \quad \text{SEM} = 0.77 \]

De Jong et al., 2014
Pellet location within feed mill on PDI

Pellet Mill 77.0\textsuperscript{d}  
Cooler 78.3\textsuperscript{c}  
Fat Coater 84.6\textsuperscript{a}  
Load-out 81.9\textsuperscript{b}  

\(abcd \ P < 0.05\)

SEM = 0.82

De Jong et al., 2014
Crude protein of pellets and fines

Fines vs pellets, $P < 0.05$
SEM = 0.48

De Jong et al., 2014
Fat concentration of pellets and fines

Fines vs pellets, $P < 0.05$
SEM = 0.20

De Jong et al., 2014
Effects of pelleting regime on F/G

- Meal: 2.46
- Pellet: 2.33
- Meal/Pellet: 2.38
- Pellet/Meal: 2.37
- Rotated: 2.38
- Rotated: 2.36

SEM = 0.002
abc P < 0.05

De Jong et al., 2014
Effects of pelleting regime on pig removals per pen

- Meal: 0.50
- Pellet: 1.92
- Meal/Pellet: 1.06
- Pellet/Meal: 0.93
- Rotated: 0.85 (b)
- Rotated: 0.92 (b)

$^{ab} P < 0.05$
SEM = 0.265

De Jong et al., 2014
Effects of pelleting regime on stomach morphology (combined ulceration & keratinization)

De Jong et al., 2014
Should you bump feed?

- 1105 sows
- 2 x 2 factorial
  - SID Lysine intake (10.7 vs 20.0 g/d)
  - NE intake (4.5 vs 6.7 Mcal/d)
- D 90 to farrowing

Goncalves et al., 2015
Influence of lysine and energy intake from d 90 to farrowing on sow weight gain

Goncalves et al., 2015
Influence of lysine and energy intake from d 90 to farrowing on born alive

- Low Lys: 14.1, 13.8, 13.7, 13.9
- High Lys: 14.1, 13.8, 13.7, 13.9

P = 0.215

Goncalves et al., 2015
Influence of lysine and energy intake from d 90 to farrowing on litter birth weight

Goncalves et al., 2015

P = 0.189
Effects of Electrostatic Particle Ionization on Hog Barn Air Quality, Emissions and Pig Growth Performance

De Jong et al., 2014
Effect of EPI system on dust in inside air - 39 to 56% reduction

*P < 0.02

De Jong et al., 2014
Effect of EPI system on dust in exhaust air
- 48 to 64% reduction

De Jong et al., 2014
Effect of EPI system on ADG

$P < 0.09$

$SEM = 0.028$

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>EPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG, lb</td>
<td>0.91</td>
<td>0.97</td>
</tr>
</tbody>
</table>

De Jong et al., 2014
EPI system – removes dust from the air
New Nursery Building at the K-State Swine Teaching and Research Center

Special “Thank You”:
Kansas Pork Association
Department of Animal Sciences and Industry
Midwest Livestock Systems Inc.
KSU Campus Planning and Facilities Management
Pat Murphy
Swine Farm Crew
New Nursery Barn Information:

- Overall building dimensions = 140’ x 33’
- 86 pens with a capacity of up to 5 pigs per pen
- Connecting hallway to existing buildings for access to sow farrowing and nursery
- Feed room (16’ x 33’) for bagged research diet storage
- Two bulk feed bins to provide standard nursery feed directly to the feed room or individual pens
- Galvanized gating and flooring
- Hanging floor scale for weighing entire pens of pigs
- Multiple windows to provide natural lighting
- Easy adjust feeders and nipple waterers in each pen