Introduction

- MAXIMIZE lactation feed intake is our goal
- Removing blocks to high feed intake is our approach
- We will focus on management
  - Preparing the sow for success
  - No diet formulations
  - Environmental mgt. (includes facilities)

Gestation/Lactation Relationship

Effect of Late Gestation Feeding Level on Lactation Feed Intake of Sows

Body Condition Scores of Sows

Effect of Late Gestation Feeding Level on Lactation Feed Intake

(Smits and King, 2005)
What are we measuring?

- Air temperature
- Seldom temperature pig feels
- Air speed
- Humidity
- Building materials, design, surface temperature

**Effective Environmental Temperature (EET)**
- What pig **really** feels
- Combined influence of many factors

Concepts Related to EET

- **Lower Critical Temperature (LCT)**
  - Consume more feed
  - Apply extraordinary measures to keep warm
- **Upper Critical Temperature (UCT)**
  - Suppress feed intake
  - Apply extraordinary measures to stay cool
- **Thermal Neutral Zone (TNZ)**
  - EET that optimizes production efficiency and comfort

This is our goal!

Temperature Effects on Sow Feed Intake

- Sow’s TNZ = 60 to 65 °F
- Sow’s UCT is about 70 °F
- Feed intake inversely related to room temperature
- Thumb rule: 1 °F of “hotness” reduces feed intake about .2 lb/d

Routes of Heat Escape

- Convection
- Radiation
- Conduction
- Evaporation
Convection

- Transferring heat by physical contact with fluid (air, mud, or water) that is at a different temperature than the pig
- Main components are:
  - Surface-to-fluid temperature difference
  - Speed of the fluid
  - Contact area with the fluid
- Cool drafts – natural or man-made

Radiation

- Transfer of heat to a surface without direct contact to it
- Main components:
  - Pig’s surface area exposure to other surfaces
  - Difference in temperature between pig & surfaces

Conduction

- Transferring heat by physical contact with another surface
- Main components:
  - Core-to-floor temp difference
  - Conductivity of floor
  - Contact area between pig & floor

Convection

- 40-45% of total heat loss

Radiation

- 30-35% of heat loss

Conduction

- 10-15% of heat loss
Evaporation

- Transferring heat by converting liquid water to vapor
- Main components:
  - Relative humidity
  - Air temperature
  - Speed of air
  - Wetted surface area
  - Volume of air respired

10-15% of heat loss

Drip Cooling for Sows

Drip Cooling Issues
- Emit small droplets of water on neck & shoulders (areas of high blood flow)
- Flow rate = .5 – 1 gal/hr while dripping
- Sow should dry off before next drip cycle starts
- Consider layout of supply lines to increase uniformity of supply
- Start dripping at 75 to 80 °F

Dippers and Heat (86 F)

Methods of Cooling Sows

- Feed intake, lb/d
- Lactation wt. loss, lb

McGlone et al. (1988)
Water Flow Rate and Lactation Feed Intake

Feed intake, lb/d

Water flow rate, cups/min.

0 2 4 6 8 10 12 14

Winter Summer

0.3

11.5 8.7

9.5 8.2

Winter

Summer

(Leibbrandt et al., 2001)

Effects of Self Feeding on Lactation Feed Intake

Feeding method

Pounds

Hand feeding

Self feeding

11.9 13.5 13 13.7 14.6

1 2 3 4 5 6 7 8 9 10

(Leibbrandt et al., 2001)

Effect of Wet Feeding on Sow Feed Intake

Feed intake, lb/d

Dry feeder

Wet feeder

6.2 8.1 7.2 10.6

Cool Season Hot Seasons

(Pettigrew et al., 1988)

Relationship of Rectal Temp on Lactation Feed Intake of Sows

Feed intake, lb

Day of lactation

(Matitz, 1989)
Impact of Immune System Activation on Performance

<table>
<thead>
<tr>
<th>Trait</th>
<th>Low</th>
<th>High</th>
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<tbody>
<tr>
<td>Number of sows</td>
<td>9</td>
<td>11</td>
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<tr>
<td>Feed Intake, lb/d</td>
<td>11.8</td>
<td>10.6</td>
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<tr>
<td>Wt. Change, lb/d</td>
<td>-1.6</td>
<td>-1.5</td>
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<tr>
<td>Litter gain, lb/d</td>
<td>5.7</td>
<td>5.0</td>
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<tr>
<td>Milk yield, lb/d</td>
<td>25.3</td>
<td>22.9</td>
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</table>

(Sauber et al., 1999)

Effect of SDPP on Lactation Feed Intake in Summer

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<tr>
<th></th>
<th>Control</th>
<th>0.5% SDPP</th>
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<tbody>
<tr>
<td>Feed Intake, lb/d</td>
<td>9.9</td>
<td>11.7</td>
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<tr>
<td>Parity 1</td>
<td>11.1</td>
<td>11.2</td>
</tr>
<tr>
<td>Parity 2</td>
<td>12.3</td>
<td>12.8</td>
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<tr>
<td>Mature sows</td>
<td>13.9</td>
<td>14.4</td>
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</table>

(Crenshaw et al., 2007)

Effect of Dried Porcine Solubles on Feed Intake of Lactating Sows

<table>
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<tr>
<th>Dietary Dried Porcine Solubles, %</th>
<th>Feed Intake, lb/d</th>
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<tr>
<td>0</td>
<td>11.3</td>
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<tr>
<td>1.5</td>
<td>12.2</td>
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<tr>
<td>3</td>
<td>13.9</td>
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(Johnston et al., 2003)

Are Your Sows Comfort as a Pig in Mud?

Thank you! Questions?