Sow Feeding Considerations for Gestation and Lactation

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Gilt Development

– Acclimated to herd health (SEW – 50lbs)
– Receiving proper developmental nutrition
– Boar Exposure
– Bred on second or later estrus cycles
– Moved to gestation crates 2 to 3 weeks prior to breeding
– Flush feed until mated – then drop immediately to 4 lb. per head per day. Over feeding from breeding to ~21 days may decrease embryo survival (lower litter size)

General Nutrition Principles for Swine – MF2298
Breeding Herd Recommendations for Swine – MF2302

References - Acknowledgements

Kansas State University
• Dr. Robert D. Goodband
  Extension Specialist, Swine
• Dr. Mike D. Tokach
  Extension Specialist, Livestock Production and Management

• IPPA Presentation (1/29/04) – “New Technologies in Swine Nutrition”
• Can be reviewed (pdf format) at the Iowa Pork Producers Association web site: http://www.iowapork.org/

Iowa State University
  Dr. Frank Aherne, Professor Emeritus, University of Alberta
• “Feeding the Gestating Sow”
• “Feeding the Lactating Sow”

Gilt Development

– Key: Have gilts with correct backfat at first farrowing
– Ideal: 0.75 inches of backfat at farrowing!
– Overall goal:
  – Gilts should be mated at a moderate weight (approximately 275 – 290 lbs / 8 to 9 months of age) and allowed to continue growth through the first gestation period

References - Acknowledgements

Kansas State University, (continued)
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Gestation Feeding

• Goals:
  – Prepare sows to be in proper body condition at farrowing
  – Meet daily nutrient requirements at the lowest cost possible:
    • Cost per sow per day
  – Maximize reproductive performance
    • Farrowing rate and litter size

Water Consumption

• The most important nutrient in feeding but often the most neglected
• An essential and cheap nutrient source
• Necessary for body temperature regulation, transport of nutrients and waste, metabolic processes, lubrication, and milk production
• Flow rate of water nipples – 4 cups / 1 quart of water per minute (60 seconds)
• Nipples in proper position for sow to freely drink.

Water Consumption

• Gestation consumption is approximately 2 to 3 gallons per head per day
• Need for water is increased in the lactation phase (4 to 5 gallons or more per day)
• Rule of thumb – For every 1 lb. of dry feed, swine will consume 1 to 2 quarts of water
• Water quality - (Palatability) – Total Dissolved Solids, pH, Water Hardness, sulfates, nitrates, coliform bacteria and protozoa
• HAVE YOU SAMPLED YOUR WATER SOURCE FOR QUALITY ?

Are You Over-feeding Sows ?

• Over-feeding (Fat Sows):
  – Impaired mammary development
  – Reduced feed intake in lactation
  – Unnecessary expense –example: Assume your diet costing $0.08 / lb. is to be fed at 5.0 lbs / hd / day.
    – 10% over = 5.5 lbs / hd / day = 4 cents per day x 110 days = $4.40 / head loss
    – 20% = 6.0 lbs / hd / day = 8 cents x 110 days = $8.80/head loss

Are you Under-feeding Sows ?

• Under-feeding: (Thin Sows)
  - Poor reproductive performance
  - Increased stress - less disease resistance
  - Increased mortality

Are your feed drops calibrated?

• Have you calibrated your feed drop boxes?
  – Randomly select boxes and weigh feed to check for proper drop amounts
  – Bulk density of the diets (weight per cubic foot) will need to be considered. Ex: Diet changes such as addition of a fiber source.
  – With improper calibration you could be over-feeding or under-feeding the sows
Are you using body condition scores?

- Feeding Based on Body Condition Score
  - The amount of gestation feed is arbitrarily estimated from evaluating body condition scores.
  - Variability among evaluators (employees)
  - Feed amounts frequently bounce up and down

Kansas State University Recommendation

- Estimate sow's feed requirements from backfat and weight categories
  - Use Renco Lean-Meter to scan for backfat at last rib
  - More accurate than condition scoring

Estimating Sow Weights

- Do we have to weigh sows? No
  - Use a heart girth tape to estimate weight
  - Use a Rear Flank to Flank procedure - slightly less accurate than heart girth but much easier when sows are in gestation crates
  - Goal is to put sows into one of 4 weight categories.
  - Sow Weight, lb. = 26.85 x (Flank measurement in inches) - 628

K-State - Feeding on Weight and Backfat

- Why feed on weight and backfat instead of body condition score?
  - Why weight? — Maintenance accounts for the majority of the sow feed requirements in gestation.
  - Why backfat instead of body condition score? — Condition score is subjective and not accurate.

K-State Feeding Recommendations

Assumes diet with 1.5 Mcal ME/lb.
All sows fed additional 2 lb/d from day 101 to 115
Sows maintained at or above 68 degrees F

<table>
<thead>
<tr>
<th>Girth, in.</th>
<th>Estimated Weight, lb</th>
<th>Backfat at breeding, inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.35 / 0.43</td>
<td>0.47 / 0.55 / 0.59 / 0.67</td>
</tr>
<tr>
<td>43.0 / 46.5</td>
<td>250 / 325</td>
<td>4.7</td>
</tr>
<tr>
<td>46.6 / 50.0</td>
<td>325 / 400</td>
<td>5.2</td>
</tr>
<tr>
<td>50.1 / 53.0</td>
<td>400 / 475</td>
<td>5.6</td>
</tr>
<tr>
<td>53.1 / 55.0</td>
<td>475 / 600</td>
<td>6.1</td>
</tr>
</tbody>
</table>
K-State Feeding Recommendations
Adapted from Young, et al. 2004

<table>
<thead>
<tr>
<th>Flank to flank, in</th>
<th>Sow appearance</th>
<th>Estimated Sow wt., lb</th>
<th>Backfat at breeding, inches</th>
<th>Body Condition Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 – 35</td>
<td>Very Light</td>
<td>250 – 330</td>
<td>&lt;0.5</td>
<td>1 - 2</td>
</tr>
<tr>
<td>36 – 38</td>
<td>Light</td>
<td>330 – 395</td>
<td>0.5 – 0.6</td>
<td>2 - 3</td>
</tr>
<tr>
<td>39 – 41</td>
<td>Medium</td>
<td>395 – 475</td>
<td>0.6 – 0.7</td>
<td>3 - 4</td>
</tr>
<tr>
<td>42 – 44</td>
<td>Heavy</td>
<td>475 – 550</td>
<td>&gt; 0.7</td>
<td>&gt; 4</td>
</tr>
<tr>
<td>45 – 50</td>
<td>Very Heavy</td>
<td>550 - 650</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Procedures during the first week after breeding:

– Scan and determine weight category on all sows
– Write the backfat on sow card
– Use the feed chart to adjust the feeding level
– Other Issues
  • Must train a person to scan and estimate weight
  • Must know the energy level of the diet
  • Must know volume (lb) dropped at each setting

Procedures for extra feed adjustment at 7 weeks post mating:

Lines will be walked at 7 weeks post mating
– Visually very thin sows will be marked and scanned to determine if backfat gains are on target – approximately 10 to 15 % of sows may be below target
– If they are not reaching targets, feed intake is increased by 1 lb/day.

Feeding Fiber in Gestation Diets

• Fiber in gestation diets(10 – 40 %) may be beneficial
  – Increase in weaned litter size by 0.3 to 0.5 pigs per litter
  – May slightly increase gestation diet cost but additional pigs will offset cost
  – Fiber ingredients: alfalfa meal, soybean hulls, wheat midds, sugar beet pulp, oats, etc.
  – Gestation sows more satisfied – less stress in crates, reduced ulcers
  – Bulkier diets in gestation phase may stimulate the feed intake during lactation.
  – Helps to prevent sow constipation
  – Helps to control body weight gain

Suggested Gestation Weight Gains

• Weight Gains during the gestation phase:
  – Gilts – 100 to 125 lbs
  – Sows – 75 to 100 lbs
  – Approximately 50 lbs of the weight gain should be fetal growth and products of conception with the remaining weight actual body gain

Gestation Diet Recommendations

• Typical Gestation Diet Recommendations
  – Crude Protein = 11.0 to 13.5 %
  – Lysine = 0.45 to 0.60%
  – Calcium = 0.80 to 0.90%
  – Phosphorus (T) = 0.65 to 0.80%
  – Phosphorus (A) = 0.40 to 0.50 %
Make sure folic acid and choline levels are fortified at proper levels
  • Folic Acid = 0.30 to 0.40 mg per lb. of diet
  • Choline = 300 to 400 mg per lb. of diet
Common Sow Diet Formulation Problems

• Selecting gestation dietary energy level by cost per ton instead of cost per sow per day
• Using expensive additives without solid data
• Over formulation of gestation diets and under formulation of lactation diets
• Using ingredients with variable quality in lactation diets
• Synthetic amino acids in lactation and gestation diets

Alternative Feed Ingredients

• Distiller Dried Grain Solubles (DDGS)
  – Gestation diets inclusion rates: Start at 20% with a maximum inclusion at 50%
  – Lactation diets inclusion rates: Start at 5% with a maximum inclusion at 20%
  – Low in lysine – relatively high in protein
  – Poor amino acid balance for swine
  – Good source of phosphorus
  – DDGS contains approximately 10% fat; so subject to rancidity – Keep it fresh!

Comparison of Distiller’s Products

<table>
<thead>
<tr>
<th></th>
<th>Corn</th>
<th>Distiller’s Grains DDG</th>
<th>Distiller’s Solubles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein, %</td>
<td>8 – 10</td>
<td>30.9 (29 – 34)</td>
<td>33.5</td>
</tr>
<tr>
<td>Crude Fat, %</td>
<td>3.5</td>
<td>10.7 (4 – 12)</td>
<td>9.0</td>
</tr>
<tr>
<td>Crude Fiber, %</td>
<td>1.8 – 2.5</td>
<td>7.2 (6 – 8)</td>
<td>9.5</td>
</tr>
<tr>
<td>Phosphorus, %</td>
<td>0.24 – 0.34</td>
<td>0.75 (0.5 – 0.8)</td>
<td>0.54</td>
</tr>
<tr>
<td>Lysine, %</td>
<td>0.22 – 0.32</td>
<td>0.90 (0.6 – 1.1)</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Alternative Feed Ingredients

• Distiller Dried Grain Solubles (DDGS)
  – Rule of thumb
  – 200 lb of DDGS and 3 lb of limestone can replace 177 lb of corn, 20 lb of 46% soybean meal, and 6 lb of dicalcium phosphate in a ton of complete feed.
  – Do your math for the economics of using DDGS in your swine diets.

DDGS Replacement

<table>
<thead>
<tr>
<th>4.5 lbs / day Intake</th>
<th>Gestation Diets</th>
<th>Lactation Diets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>Corn / Soy Diet</td>
<td>20 % DDGS</td>
</tr>
<tr>
<td>Cost / Ton, $</td>
<td>160.07</td>
<td>148.34</td>
</tr>
<tr>
<td>Crude Protein, %</td>
<td>11.6</td>
<td>14.3</td>
</tr>
<tr>
<td>Lysine, %</td>
<td>0.53</td>
<td>0.52</td>
</tr>
<tr>
<td>Kcal / lb of diet</td>
<td>1476</td>
<td>1522</td>
</tr>
<tr>
<td>Expected Weight Gain, lbs</td>
<td>88</td>
<td>97</td>
</tr>
<tr>
<td>Gain, lb</td>
<td>1123</td>
<td>1431</td>
</tr>
<tr>
<td>46% Soybean Meal, lb</td>
<td>290</td>
<td>103</td>
</tr>
<tr>
<td>Dicalc, lbs</td>
<td>6</td>
<td>200</td>
</tr>
<tr>
<td>Limestone, lbs</td>
<td>40</td>
<td>39</td>
</tr>
<tr>
<td>Expected Weight Gain, lbs</td>
<td>18</td>
<td>22</td>
</tr>
</tbody>
</table>

* DDGS Replacement
  - Cost = $3.25 / Bu.
  - 46% Soybean Meal = $230 / Ton
  - DDGS = $100 / Ton

** DDGS Replacement
  - Cost = $2.25 / Bu.
  - 46% Soybean Meal = $230 / Ton
  - DDGS = $100 / Ton
Lab analysis for your diet ingredients

- Do you have your corn tested by a commercial lab for its nutrient values?
- Normal corn – Book value
  - Dry Matter = 88%
  - Crude Protein = 8.0%
  - Lysine = 0.26%
- Balancing rations on actual lysine values – if higher than book value - may reduce your cost of the diet slightly.
- If values are lower, the diet can be fortified to obtain optimum animal performance.

Lactation Feeding

Goals
- Maximize feed intake
  - Prepare sow for rebreeding
  - Litter size and prompt return to estrus
  - Maximize milk production
  - Minimize sow weight loss
- Match nutrient levels to feed intake and level of productivity

Getting Sows on Feed After Farrowing –
- Farrowing day = 3 – 5 lb.
- Day 1 & 2 = 5 - 7 lb.
- The based on appetite, increase feed intake daily to reach the target intake as quickly as possible. ~ Day 8
- Day 8 – 12 = Maintain target level
- Day 13 to Weaning increase feed intake to the sow’s appetite level.

Rule of Thumb for Daily Feed Intake:
4.0 lbs of feed for the Sow
And
1.25 lb of feed per pig nursing
400 lb sow nursing 9 pigs –
4.0 + (1.25 x 9) = 15.25 lbs feed
(Old recommendation was 1.0 lb per pig)

Rule of Thumb for Energy Intake:
1 % of sow weight (400 lb = 4.0 lbs of feed)
And
3.6 Mcal DE per lb of litter gain
4.5 lbs of litter gain (9.0 pigs @ 21 days – 10 gain/pig) x 3.6 Mcal = 16.2 / 1.53 (corn soy diet/lb) = 10.6 lbs + 4.0 = 14.6 total feed intake

Rule of Thumb for Lysine Level:
2 g lysine/day for sow
And
11.8 g lysine per pound of litter gain
400 lb sow nursing 9 pigs with 4.5 lbs of litter gain
(9.0 pigs @ 21 days – 10 gain/pig) = 11.8 x 4.5 = 53.1 g + 2 g = 55.1 g of lysine. Assume average intake of 12 lbs/day = 55.1g / 454 g = 0.12 lbs lysine / 12 = 1.0 % lysine in diet
Lactation Feeding

Rule of Thumb for Protein Level:
0.4 lb. of protein / day for sow
And
0.4 lb. of protein per pound of litter gain
400 lb sow nursing 9 pigs with 4.5 lbs of litter gain/day. 0.4 lbs = 0.4 x 4.5 = 1.8 lbs = 2.2 lbs protein. Assume 12 lbs intake /day - 2.2 / 12 = 18.3 % protein diet

How is lactation feed intake calculated
1. Count feed records for individual sows
2. Total Feed / Crates x Days
   Ex: 11,500 lb / 40 crates x 21 days
   = 11,500 / 840 = 13.69 lbs/day
3. Total Feed / Litters x Lactation Length
   Ex: 140,000 lb / 500 litters x 21 days
   = 140,000 / 10,500 = 13.33 lbs/day

Using Nutrition to Increase Milk Production
- Maximize feed intake during lactation
  - Proper body condition at farrowing
  - Maintain sow comfort
  - Correct feeder design
  - Do not limit consumption
- Match the diet to the level of feed intake and milk production
- Lysine requirement is a linear relationship to the litter growth rate

Dietary Lysine Recommendations

<table>
<thead>
<tr>
<th>Litter Wean Wt. lb</th>
<th>Lactation Feed Intake, lb/d</th>
<th>Lysine g/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 21</td>
<td></td>
<td>Per Cent of Lysine in Diet</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>100</td>
<td>1.0</td>
<td>.9</td>
</tr>
<tr>
<td>110</td>
<td>1.1</td>
<td>.9</td>
</tr>
<tr>
<td>120</td>
<td>1.2</td>
<td>.8</td>
</tr>
<tr>
<td>130</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>140</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td>150</td>
<td>1.2</td>
<td>1.1</td>
</tr>
</tbody>
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What about amino acids other than lysine in lactation diets?
- Threonine ?
- Tryptophan ?
- Methionine ?
- Cystine ?
- Valine ?
- Must have adequate amino acid profile in the diet
- Important: Limit the use of L-Lysine HCL

Lactation Diet Recommendations

Typical Lactation Diet Recommendations
- Crude Protein = 15.0 to 21.0 % (19%)
- Lysine = 0.75 to 1.20% (1.0%)
- Calcium = 0.65 to 1.00% (0.90%)
- Phosphorus (T) = 0.60 to 0.90% (0.80%)
- Phosphorus (A) = 0.30 to 0.60 % (0.50%)
Lactation Summary

- Feed intake is most important!
  - Maximize intake through whatever means possible.
  - Amino acid level should be matched to the level of sow productivity and intake.
  - Do you feed one, two, three or four times daily
  - Monitor the sow feeder – keep fresh feed in front of the sow
  - Consider wet feeding of the diet ~ 10 - 15% increase over dry diets (wet-dry feeders)
  - Average particle size of grain = 700 microns

- No magic bullets to replace excellent sow management (FEED INTAKE)

Questions or Comments

Thank you!