GESTATING FEMALE MANAGEMENT

TERRIBLE!

After the sensuous dark, the weeks of passion and feasting . . . terrible my return. I screamed when they dragged me outdoors to the truck. Harsh light jumped at my eyes. My body's weight sagged on my slender legs. In the house of My Lord Boar, I had eaten rich swill!

Back home, I headed for my private house, the house of Sylvia, my swill-swollen body would not enter, could not fit. In shame, I lay many nights on the ground outside my Humans' window, and passed my days silent and humble in the bare pasture, until I was lean again, until I could enter my maiden chamber once more.

But now I carried in me the fruit of my passion!

(Adapted from “Pig Dreams” by Levertov, 1981)

INTRODUCTION

1. Embryonic Losses

A. Gradual losses from ovulation to weaning continue throughout the gestation phase, but the greatest loss during the first 25 days - Account for 25 to 30%!

B. Embryonic development:

1) Eleven days after fertilization, embryos are still less than 1/2" long. But during the day 12, they elongate to more than 1' in length (dramatic change!).

2) Obviously, important to avoid or reduce any stress before pregnancy can be firmly established - e.g., heat stress, handling sows, housing, feeding, etc.!

EFFECT OF TEMPERATURES

1. Heat Stress

• Effect of heat stress after breeding: (Omtvedt et al., 1971. JAS 32:312)

<table>
<thead>
<tr>
<th>Item</th>
<th>Contr.</th>
<th>Heat</th>
<th>Contr.</th>
<th>Heat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-8 days</td>
<td>8-16 days</td>
<td>53-61 days</td>
<td>102-110 days</td>
</tr>
<tr>
<td>No. gilts</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>No. pregnant at d 30</td>
<td>14</td>
<td>8</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>No. CL/gilt</td>
<td>13.4</td>
<td>14.8</td>
<td>15.1</td>
<td>16.1</td>
</tr>
<tr>
<td>No. embryos/gilt</td>
<td>13.0</td>
<td>11.4</td>
<td>12.8</td>
<td>6.9</td>
</tr>
<tr>
<td>No. gilts farrowing</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>No. five pigs/litter</td>
<td>10.8</td>
<td>10.3</td>
<td>10.4</td>
<td>6.0</td>
</tr>
<tr>
<td>No. dead pigs/litter</td>
<td>2.2</td>
<td>.7</td>
<td>.4</td>
<td>5.2</td>
</tr>
<tr>
<td>Avg. pig wt, lb</td>
<td>2.9</td>
<td>2.9</td>
<td>3.1</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Losses from ovulation to weaning:

- Eggs shed: 17
- Eggs fertilized: 16.2
- Embryos at 25 days of gestation: 12.3
- Embryos at 50 days of gestation: 11.2
- Embryos at 75 days of gestation: 10.4
- Embryos at 100 days of gestation: 9.8
- Pigs born alive: 9.4
- Pigs weaned per litter: 7.3

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The bottom line:

1) Heat stress during the early phase of pregnancy (1st 16 d) reduces reproductive performance because pregnancy (& litter size to a large extent) is established during this phase. (The heat stress can also reduce the initial conception rate!)
2) During the mid-gestation phase, ♀ are little more resistant to stress! (Cooling sows may not be that critical during this phase, but still important though!)
3) Heat stress during the late gestation can ↑ death loss before parturition & at birth! (↑ important to avoid heat stress!)

2. Low Temperature - Has little or no adverse effect unless sows are exposed to extremely uncomfortable environment, i.e., wet & cold.

3. Reduce Seasonal Infertility by Housing Indoors?
   
   A. Farrowing rate tends to be higher in sows housed indoors compared to those housed outdoors, especially during the summer months. [1993. Pork'93 13(7):37]
   B. Reproductively, pigs are less efficient when a day length starts to decrease, i.e., ↑ anestrus or abortions during the summer time:
      a) By nature, pigs are seasonal breeders - May be evolved in order to ↓ No. of litters born in early winter (e.g., in the wild pig population)?
      b) Plus adverse effects of high temperatures/humidity.

But, may not be just “indoor vs outdoor” per se . . . rather the reproductive efficiency may be increased by reducing/preventing various adverse conditions!

HANDLING OF SOWS AFTER BREEDING

1. Grouping or Regrouping
   
   A. Must be careful in grouping or regrouping sows after breeding.
   B. Grouping - Best to group bred sows as soon as possible, preferably < 3 days, but not until enough bred sows to complete a “group!”
   C. Sows should be grouped and moved to their new environment at the same time to minimize fighting.
   D. Maintaining bred sows in a small group (6-8 or less) can facilitate grouping and moving into a new environment.
   E. Outside lots - Sows are usually housed in a larger group (15-20/pen or even more), and often it is not possible to group & move together. But, sows may have a better chance of escaping aggressors or aggressive actions because of the size of pens, so . . .

HOUSING FOR GESTATION FEMALES

1. Individual Living Space Concept
   
   A. Reasons for its popularity? Can reduce/eliminate fighting, improve waste management or easier handling of wastes, control feed intake of individual ♀, convenience in health cares, and others.
   B. Side effects? Can limit the sow’s opportunity to walk and turn around, and the concerns regarding the welfare of gestating sows focus mostly on this issue.
C. Should we be concerned about this drawback in terms of the welfare of animals?

- Friend et al. (1988. JAS 66:2906) compared four types, tether, crate, loose stall & dirt-lot, and found:
  a) Tethered gilts - Seemed to be stressed at day 2, but no effect thereafter.
  b) No effect of four types on white blood cell counts or percentages of neutrophils, monocytes and lymphocytes.
  c) Their main conclusion? “Sows can be adapted to various housing systems!”

A general assumption made for this type of research is that “Physiological characteristics used to assess stress and welfare of animals are appropriate,” which may or may not be true, so . . .?

D. How about sow productivity? See an example (Kittok & Zimmerman, 1984. NE Swine Rep.).

1) No effect on the No. of pigs born alive, the No. weaned or weaning weight!
2) Thus, “Sows can be housed successfully in many types of housing during gestation!”

E. Food for thought?

1) “An animal should, at least have sufficient freedom of movement to be able, without difficulty, to turn around, groom itself, get up, lie down and stretch its limbs!” (U.K. Tech. Comm. for the Welfare of Animals in Intensive Husbandry Systems, 1965)

2) Modified gestation crates (see McFarlane et al., 1988. JAS 66:326):
   - Provide an opportunity to turn around and interact with others, ∴ better physical and psychological well-being of animals!

An alternative to regular crates if the use of pens is not desirable or feasible!

FEEDING GESTATING SOWS/GILTS

1. Requirements and Feeding

A. Requirements: (NRC, 1998)

<table>
<thead>
<tr>
<th>Item</th>
<th>125 kg at breeding</th>
<th>200 kg at breeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>DE, Mcal/day</td>
<td>6.66</td>
<td>6.28</td>
</tr>
<tr>
<td>Crude protein, g/day</td>
<td>253</td>
<td>229</td>
</tr>
<tr>
<td>Total lysine, g/day</td>
<td>11.4</td>
<td>10.0</td>
</tr>
<tr>
<td>Calcium, g/day</td>
<td>13.9</td>
<td>13.9</td>
</tr>
<tr>
<td>Total phosphorus, g/day</td>
<td>11.1</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Gestation housing: (Zimmerman & Kittock, 1984)

<table>
<thead>
<tr>
<th>Item</th>
<th>Stalls</th>
<th>Pens</th>
<th>Lots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born alive</td>
<td>9.8</td>
<td>9.6</td>
<td>9.5</td>
</tr>
<tr>
<td>Weaned</td>
<td>8.9</td>
<td>9.1</td>
<td>8.9</td>
</tr>
<tr>
<td>Birth wt, lb</td>
<td>2.8</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Weaning wt, lb</td>
<td>11.2</td>
<td>12.0</td>
<td>11.7</td>
</tr>
<tr>
<td>Sow wt (pregarowing), lb</td>
<td>376.8</td>
<td>404.7</td>
<td>416.2</td>
</tr>
<tr>
<td>Sow wt loss (lactation), lb</td>
<td>52.7</td>
<td>72.6</td>
<td>72.3</td>
</tr>
</tbody>
</table>

*Stalls vs pens and lots (P < 0.05).
B. Common feeding scheme:

1) Feed 4 lb/day of corn-soy diet containing 14% CP, 0.9% Ca & 0.8% P.
2) Sows should be consuming 254 g CP, 11.8 g Lys, 16.3 g Ca & 14.5 g P/day.
3) For thin sows (especially 1st litter sows), feed 5-6 lb/day of corn-soy diet.

C. Adjusting feeding levels:

1) “Bulky ingredients” - Must adjust feeding levels to achieve required daily energy intake.
2) “Confinement” - Can be maintained in a proper condition with 0.5 lb/day less feed vs outside because of less physical activity, and relatively constant ambient temperatures regardless of the season.
3) Outdoors - Increase feeding level by ¾ lb/day for each 20°F below the 70°F, and for thin sows, feed 1¼ lb more/day.

2. Restriction of Energy Intake

A. High-energy feeding or flushing (very effective means to ↑ ovulation rate in gilts & also in thin sows) should be terminated immediately after breeding because:

1) Feeding excess energy is costly & may lead to increased embryonic loss.
2) But, it should not be automatic, i.e., it depends on the condition of sows, feeding methods, etc.!

B. Be sure to provide adequate levels of all other nutrients.

3. How to Accomplish Restricted-Feeding? (Make sure that each sow gets her share of feed!)

A. Individual hand-feeding:

1) ♀ are maintained in individual stalls, or maintained in pens but fed individually using feeding stalls - Can feed according to individual needs & also no competition for feed.
2) Feeding stalls - Should be designed to allow a group of sows to be locked in, and should not exceed 16-18 inches in width to prevent smaller gilts from turning around.

B. Group hand feeding - Feed in a group in a common trough or on a concrete slab:

1) Not preferred because of no control over sow weight and condition (i.e., no control over individual's feed intake vs its needs).
2) Variation can be reduced by providing extra feeding space and/or grouping females according to their age, size and aggressiveness.

C. Interval feeding - Sows are allowed to consume 2 or 3 d of feed in one day, then wait!

1) Can adjust feed intake by controlling by the time on the feeder (2 to 12 hours) or the time off the feeder (2 or 3 days):
   a) Two hours out of 72 h is generally adequate for sows.
   b) But for gilts, every third day feeding is not recommended because it can reduce the efficiency of utilization of protein and litter sizes at birth and weaning.
2) If the time on the feeder is restricted, should provide one feeder hole per sow. (But one set of feeders can be used for several pens of sows!)
3) Advantages/drawbacks? (+) Save labor & (+) more contented sows between feedings, but (-) no control over individual sow’s condition (over- or under-conditioned) & (-) producers may not observe sows daily for possible problems.

D. Self-feeding high-fiber diets - Generally, not recommended!
1) Use of corn stalks, straw, corn cobs, etc.
2) Can be used, but sows tend to overeat, over-conditioned, feed costs also increase (↑ consumption), some ingredients are rather expensive, grinding, storage and(or) mixing can be problems, and problems in achieving a proper daily nutrient intake, need a special diet formulation.
3) Variations of this would be to, e.g., feed silage, whole plant pellets, alfalfa & others on a “free-choice” basis. (Ensuring an adequate intake of supplements can be a problem though!)

4. Electronic Feeders
A. Have been developed and being used in Europe possibly because “out of necessity?” (e.g., High cost of feeds & pressures from the animal welfare group on the use of gestation crates!)
1) Sows are housed in the group:
   a) One feeding station can serve about 50 sows.
   b) Any open buildings can be used, thus facility costs can be quite low.
2) Identification - Each sow wears an electronic responder (neck collar, ear tag or implant), and information is stored in the computer that runs the feeder.
3) As a sow enters the feeder, computer reads her No. & meters out feed (and possibly water) based on her preset daily allowance & the amounts she’s already consumed.
C. The results of preliminary studies at the U.S. Universities:
1) Positive results in some studies (see Purdue data), but not in others.
2) No saving in labor, and may require higher levels of management?
3) Training sows & frequent replacement of transponders are major problems!
4) No advantages in the welfare aspect, and the opposite might be true because of constant fighting to reestablish pecking order?
5) More mummies and stillbirths vs crates, possibly because of fighting.

☞ The concept/idea is excellent, and can be a feeder/feeding method of the future?!
SOME QUESTIONS ON MANAGING GESTATING FEMALES

- Should we increase feeding level toward the end of gestation?
  
  Additional 2-3 lb in the late gestation (about 3 weeks before parturition) can increase birth and weaning weights, and may increase pig survival rate (Cromwell et al., 1989. JAS 67:3). Perhaps, more beneficial for primiparous & thin sows!

- What are the effects of feeding fats to sows during the late gestation?
  
  A. Feeding fats 1-2 wk before farrowing may increase energy reserves of pigs & fat content of milk, and also may increase baby pig survival rate and weaning weight (Moser et al., 1978. NE Swine Rep.).
  
  B. Can be done by feeding 5% dietary fat for 2 weeks or 10% dietary fat for 1 week, or top dressing with ¼ lb of melted fat or dried fat or with 1 lb of ground soybeans for 2 wk before parturition. (To see beneficial effects, sows should consume 2½ lb of fat before parturition!)

- Can we use raw soybeans for gestating sows?
  
  Sows perform as well as those fed soybean meal in terms of sow weight change, litter size, etc., and may increase birth weight and survival rate of pigs because soybeans contain 18-19% lipids (Crenshaw & Danielson, 1985; JAS 60:163).

- Will moldy feed interfere with normal reproduction?
  
  A. Do not feed moldy grain or feed to the breeding herd because it can reduce litter size and pig vitality at birth! Also, it can cause abnormal estrous cycle & lower conception rate.
  
  B. Many molds are not harmful, but difficult to identify ones that are harmful, thus too risky to feed!

- When should we switch from a gestation diet to a lactation diet?
  
  A. Start sows on a lactation diet after moving into the farrowing unit.
  
  B. Feed the same amount as in the gestation phase until parturition.
  
  C. Having constipation problems? Feed beet pulp (10%), wheat bran (15%) & other “natural laxative,” but should be removed from the diet by the end of the 1st wk. An alternative is “top dressing” the diet with bulky feed ingredient.