## FARROWING HOUSE MANAGEMENT

### GENERAL

#### Potential of Females

<table>
<thead>
<tr>
<th>Item</th>
<th>Expectation</th>
<th>Reality</th>
<th>How to improve? (e.g.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at puberty</td>
<td>&lt; 7 - 8 months</td>
<td>Gilts farrow at = 14 mo of age</td>
<td>Correct stimulation, Environ, Nutrition, . . .</td>
</tr>
<tr>
<td>Pregnancy rate</td>
<td>90-95%</td>
<td>May be?</td>
<td>Estrus detection, Timing of mating, . . .</td>
</tr>
<tr>
<td>Farrowing rate*</td>
<td>85-90%</td>
<td>Gilts - only 50-60%</td>
<td>Handling, Environ, Nutrition . . .</td>
</tr>
<tr>
<td>Litter size</td>
<td>10 - 12 strong pigs</td>
<td>≤ 6 - 7 common &amp; varies from 1 - 16</td>
<td>Above + Selection of females (&amp; boars) . . .</td>
</tr>
<tr>
<td>Birth weight</td>
<td>≤ 3 - 3.5 lb &amp; uniform</td>
<td>&lt; 2 to &gt; 4 lb &amp; varies within a litter</td>
<td>Nutrition during late gestation . . .</td>
</tr>
<tr>
<td>Teats/milk production</td>
<td>≥12 functional/ productive teats</td>
<td>Not equally productive</td>
<td>Selection, . . .</td>
</tr>
<tr>
<td>Rearing capacity</td>
<td>All newborn pigs</td>
<td>Varies from 0 to 16</td>
<td>Environ, . . .</td>
</tr>
<tr>
<td>At weaning</td>
<td>Uniform weaning weight</td>
<td>&lt; 10 lb to &gt; 20 lb with 4-wk weaning</td>
<td>Nutrition, . . .</td>
</tr>
<tr>
<td>Survival rate</td>
<td>100% at weaning</td>
<td>Lose = 25-30% before weaning</td>
<td>Environ, Husbandry, . . .</td>
</tr>
<tr>
<td>Return to estrus after weaning</td>
<td>≥85% within 3- 7 days</td>
<td>Gilts - Only 55-60% Days -Who knows!</td>
<td>Nutrition, Environ, . . .</td>
</tr>
</tbody>
</table>

* (No. of ♀farrowed/No. of ♀serviced) x 100.

Can improve reproductive performance by managing females (& boars) properly!

### FARROWING UNITS

1. **Introduction**

   - To accommodate “farrowing,” must consider: 1) well-being of both sows and piglets, 2) ease of observation and management, 3) labor economy, and 4) self-cleaning characteristics.
   
   - Regardless of the type (i.e., from an A-frame portable building to an environmentally controlled, central farrowing unit), need to satisfy four basic farrowing unit requirements: 1) comfort, 2) protection, 3) sanitation, and 4) efficiency!

2. **Environment & Protection**

   A. Comfort ( . . . for both sows and piglets!)
1) Optimum temperatures? - 60 to 65°F for sows (Higher temp? - ↓ feed intake, which can ↓ milk production & also deplete body reserves), and 85 to 90°F (dry & draft-free) for baby pigs.

   ✷ Thus, a challenge is to "keep sows cool & keep baby pigs warm!"

2) Can be handled by maintaining a room temperature at 65 to 75°F, and provide a supplemental heat for pigs.

3) How to keep sows cool?

   a) For the confinement system, use a mechanical ventilation system:

      (1) Positive pressure systems that can introduce a fresh “outside-air” into the building via air distribution tube.
      (2) Negative pressure systems that can remove “inside-air” by fans, and a fresh outside air is drawn into the building through “inlets.”
      (3) The use of “natural” ventilation system has been increasing in recent years, even for the farrowing unit.

   b) For the outdoors/semi-confinement, provide a shade and(or) a sprinkler system (. . . important to keep sprinkler systems away from pigs).

4) How to keep piglets warm?

   ✷ Important to remember that pigs may need supplemental heat even when sows are heat stressed!

   a) For the confinement:

      (1) Floor heating systems - “Hot water pipes” or “electrical floor heating cables” in the creep area.
      (2) Creep area heaters - Electrical heat lamps or gas-fired radiation heaters.

   b) For the outdoor/semi-confinement - Creep area heaters and(or) bedding (. . . need about 750 kg of straw/sow place/year & the cost & disposal can cause problems).

c) Creep boxes (made from plywood, plastic, etc.) can provide a better environment for both piglets & sows because they can: (1) provide a draft-free, warm environment, (2) require less heat, (3) heat only the “inside” of the box, and (4) provide protection. (See a picture!)

B. Protection

1) Causes of baby pig losses (%):

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillbirths</td>
<td>38</td>
</tr>
<tr>
<td>Crushing or injury</td>
<td>14*</td>
</tr>
<tr>
<td>Starvation</td>
<td>12</td>
</tr>
</tbody>
</table>

*Based on the number of pigs born alive, can be > 40%!
2) For the protection, can/should use (e.g.): a) farrowing crates in the total confinement, b) guard rails in the outdoors, semi-confinement & farrowing pen, and c) creep boxes ("effective" in providing both the protection & optimum environment).

C. Sanitation

- Obviously, "sanitation" is important & the farrowing unit should be: a) easy to clean, b) no "rough" surface to prevent retention of manure, moisture, microorganisms, and c) sloped (= ½” per foot) if a solid floor is used, and, if bedding is used, d) should be changed frequently.

5. Use of Stalls/Crates vs Pens?

A. In “stalls/crates,” sows are completely restrained, thus (-) less exercise for sows ( . . . weaning at 3-4 wk, less problems though!), but the stall/crate can (+) protect pigs better, (+) reduce labor in cleaning/handling, (+) economize utilization of the space, (+) assist sows/pigs easily, and (+) eliminate or reduce the use of bedding.

B. Pens require (-) more cleaning labor & (-) more space, and (-) sows must be restrained for any physical treatment, but they (+) allow more sow movement & (+) pens can be converted into nursery or growing pens.

6. **Floor Plans (Confinement)**

A. Various floor types can be used for handling wastes:

1) Totally slotted floor under the stall or totally slotted building floor (with pits).
2) Partly slotted floor with rear gutter, or with front and rear gutters.
3) Partly slotted floor with shallow gutter with a “scraper system.”
4) Elevated stalls with pit(s), gutter(s), etc.
5) Flushing system - Can be used for totally or partially slotted floor.
6) Solid floor (often with bedding) & solid manure handling system.

B. Solid vs slotted floors (confinement)

1) Solid floors - Have (+) less drafts at the floor level (especially with bedding or floor heat), but (-) need to clean pens daily & (-) can not mix bedding with a “liquid” manure handling system.
2) Slotted floors - Can (+) reduce labor to remove manure, (+) result in drier floors & (+) separate pigs from manure (i.e., pigs stay clean & reduce potential parasite/disease problems), but (-) require more environmental control.

   a) Slotted floor arrangements:

      (1) Totally slotted floor.
      (2) Partly slotted floor.

   b) Materials for slotted floors: (Brent, 1986)

<table>
<thead>
<tr>
<th>Material</th>
<th>Price</th>
<th>Pig comfort</th>
<th>Sow comfort</th>
<th>Cleanliness</th>
<th>Life?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welded mesh</td>
<td>100</td>
<td>Fair</td>
<td>Good</td>
<td>Excellent</td>
<td>&lt; 5 yr</td>
</tr>
<tr>
<td>Expanded mesh</td>
<td>110</td>
<td>Not good</td>
<td>Damage teats?</td>
<td>Good</td>
<td>&lt; 5 yr</td>
</tr>
<tr>
<td>Woven wire</td>
<td>210</td>
<td>Good</td>
<td>Satisfactory</td>
<td>Very good</td>
<td>Excellent</td>
</tr>
<tr>
<td>Aluminum</td>
<td>360</td>
<td>Good</td>
<td>Slippery</td>
<td>Very good</td>
<td>Poor?</td>
</tr>
<tr>
<td>Cast iron</td>
<td>210</td>
<td>Good</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Plastic coated mesh</td>
<td>370</td>
<td>Excellent</td>
<td>Slippery</td>
<td>Fair</td>
<td>= 5 yr</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>420</td>
<td>Excellent</td>
<td>Slippery?</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Concrete</td>
<td>170</td>
<td>Good</td>
<td>Unacceptable</td>
<td>Good</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

CARE OF THE SOW BEFORE & DURING FARROWING

1. **Pre-farrowing**

   A. Deworm sows = two weeks before parturition.
   B. Thoroughly clean & disinfect farrowing unit, and should be left unused for 5 to 7 days if possible.
   C. Move sows into the farrowing unit by day 110 of gestation:
1) Common to moving sows in 4 to 6 days in advance because of the gestation length & acclimation.
2) Why not much earlier? The efficiency of facility utilization & welfare of sows!
3) Wash sows before moving in, which can ↓ chance of exposing pigs to microorganisms, ascaris eggs, etc.

D. Once in the farrowing unit (before parturition):

1) Restrict feed intake (4-6 lb/day).
2) May want to feed laxative ingredients such as beet pulp, oats, wheat bran & alfalfa to prevent constipation. (Some chemical agents can be used for this purpose, but . . .?)
3) Adequate & clean water supply - very important!

2. Symptoms/Signs of Imminent Farrowing

A. Importance of knowing signs?

1) Attended vs unattended farrowing: (Reese, 1986. HFM/Nov. pp 30-33)

<table>
<thead>
<tr>
<th></th>
<th>Unattended</th>
<th>Attended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigs born</td>
<td>9.8</td>
<td>10.2</td>
</tr>
<tr>
<td>Pigs born alive</td>
<td>9.1</td>
<td>10.0</td>
</tr>
<tr>
<td>Stillborn rate, %</td>
<td>6.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

2) Can ↓ survival rate by assisting smaller, weak piglets after they were born.

B. Signs? (Enlarged abdomen area, swollen vulva & filled teats? Getting close!)

1) Increase restlessness or nervousness.
2) Chew on anything available.
3) Urinate frequently.
4) Show nest building behavior.
5) Vaginal discharge (blood, meconium, etc.).
6) Twitching of the tail.
7) Change in the texture of udder.
8) Presence of milk indicates that the farrowing is < 24 hours . . . usually!

3. Farrowing Process

A. Duration of labor? Two hours to more than 5 hours. (Some, only 30 min!)
B. Normal positions? Head first or rear feet first is normal for pigs.
C. Average interval? Fifteen to 20 min between pigs, but varies considerably.
D. “After-birth” is expelled several times during the delivery, but a large amount at the end.
E. Can use of oxytocin to induce labor/contraction of the uterus, but Not to use:

1) Until one or two pigs are born. [No pig(s)? Check the sow's birth canal before oxytocin administration.]
2) When a pig is blocking the birth canal.
3) May be useful in normal, but slow farrowing. For instance, had some pigs, but no pig for more than 30 min. (Also, oxytocin can be used to “induce farrowing” in combination with prostaglandin F₂α or PGF₂α.)
F. Few considerations:

1) The risk of fetal suffocation is greatest for the “last 3 pigs” farrowed.
2) “Stillbirths”↑ in older sows (> 5th parity) probably because of a poor muscle tone?
3) “Obese” sows/gilts tend to have prolonged labor.

4. **Dystocia** [Can be faults of sows/gilts and(or) pigs!]

A. Faults of sows/gilts? 1) Contraction failure, 2) loss of contraction (too fat/thin, a large litter, anemic, heat-stressed, etc.), 3) twisted uterine horn, and 4) uterine abnormality.
B. Faults of pigs? 1) Breech position, 2) two pigs at the same time, and 3) siamese twins.
C. When to interfere or assist? 1) Seen signs of labor, but no pig within 1-2 hr, and 2) had some pigs, but passed 1-2 hr without an another pig or afterbirth.

1) Wash sow’s vulval area thoroughly using warm water and antiseptic soap.
2) Wash hands thoroughly. (Also clip fingernails short).
3) Use a plastic sleeve & lubricate well.
4) Place two fingers very gently into the vulva - check for any pigs near the end of the birth canal.
5) No pigs? Shape a hand like a cone, and proceed into the vagina very gently. (Do not reach any further than you have to!)
6) If a pig is coming head first, a) wrap thumb and forefinger around behind ears and jaw, and b) if the canal is too tight, grasp the lower jaw or nose.
7) If a pig is coming hind legs first, grasp both legs.
8) Malpresentation - correct the position first!
9) Withdraw very gently & re-examine the sow (be sure to lubricate well).

- May deliver the rest of pigs without problem once an “obstruction” is relieved, thus “Don’t overdo it!”

5 **Induced Farrowing** [Again, can use PGF$_2$α and(or) oxytocin!]

A. Introduction:

1) “Pregnancy” is maintained by progesterone produced by corpora lutea/ovaries.
2) PGF$_2$α or its synthetic analogue causes regression of corpora lutea (↓ progesterone) and stimulates uterine contractions, thus essentially inducing a premature birth.
3) PGF$_2$α has been approved for use (e.g., Lutalyze, UpJohn Co.).
4) Why? Concentrate farrowing activities on certain day(s) of the week!

B. Possible benefits:

1) More efficient use of farrowing facilities and labor.
2) Able to avoid farrowing on weekends, holidays or at late hour of the night.
3) More efficient cross-fostering of pigs.
4) More uniform age and weight of pigs at weaning.
5) More uniform return to estrus in sows after weaning.
6) ↓ incidence of stillbirths & ↑ baby pig survival by attending farrowing.

- Assume that all sows were weaned on Thursday (this would be “day 0”).

D. Effective in inducing parturition (see a figure):

1) About 70% of sows between = 20 & 30 h after the treatment.
2) Over 90% of sows between = 16 and 35 h after the treatment.

Can expect over 90% of sows within 1 to 2 h after injection with a combination of PGF$_2$α & oxytocin (15 to 20 h after injection of PGF$_2$α).

E. Any adverse effects?

1) Induced vs natural farrowing: (Kopf & Zimmerman, 1986. NE Swine Rep.)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. sows</th>
<th>Birth wt, lb</th>
<th>% born alive</th>
<th>Weaning wt, lb</th>
<th>Weaning %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>21</td>
<td>3.26</td>
<td>93</td>
<td>13.53</td>
<td>91</td>
</tr>
<tr>
<td>PG-oxytocin</td>
<td>22</td>
<td>3.21</td>
<td>93</td>
<td>13.02</td>
<td>92</td>
</tr>
</tbody>
</table>

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2) In general:
   a) Slight ↓ in birth wt depending on the day of gestation/administration.
   b) Similar No. of pigs born alive, pre-weaning survival rate and weaning wt.

E. To induce farrowing:
   1) To determine the expected farrowing date, must know “exact breeding dates” & the
      “average gestation length” of the herd.
   2) Important “NOT” to induce more than 3 days before the average day of “natural
      parturition!”

**NUTRITION OF SOWS DURING LACTATION**

1. Lactation Phase
   A. Probably the most important feeding period in the sow’s life because most problems in
      reproduction develop during this phase.
   
      1) Problems? e.g., Lactation failure, downer sows, anestrus, delayed return to estrus,
         and fewer pigs in the subsequent litter.
      2) Why? “Milk production” - A sudden increase in the demand for various nutrients,
         especially for so called “high-producing” sows!
         a) No strict standard, but gilts nursing ≥ 9-10 pigs and sows nursing ≥ 10-11 pigs
            can be considered as “high-producing” sows.
         b) Today’s sows are more productive because of: (1) improved genetics, and (2) the
            use of “white-line, crossbred” sows.
         c) Some females can produce 18-20 lb of milk per day, thus yielding = 1.25 lb fat &
            1.0 lb of protein per day ( . . . = 6.8% fat & 5.0% protein in milk).
   
   B. Especially important for primiparous sows (or gilts just had pigs) because they need
      nutrients for both their own growth & milk production.

   C. Unless adequate nutrients are consumed, can result in a depletion of body stores (mostly
      energy/fat & protein) because sows often use their body reserves to produce milk for
      pigs.

2. Body Condition of Sows
   
   - Various visual condition scoring schemes with diagrammatic standards
     have been used, but generally
     (Whittemore, 1987):
       1) “Too thin” - Hips & backbone are somewhat prominent.
       2) “Good” - Hips & backbone are not visible.
       3) “Too fat” - Hips & backbone cannot be felt.
3. Requirements During Lactation

A. Daily requirements (based on sow wt. change & pig wt. gain): (NRC, 1998)

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed intake, kg</td>
<td>3.56-6.40 (5.25)</td>
</tr>
<tr>
<td>Digestible energy, Mcal</td>
<td>12.1-2.2</td>
</tr>
<tr>
<td>Crude protein, g</td>
<td>612-1.178</td>
</tr>
<tr>
<td>Lysine, g</td>
<td>31.6-61.9</td>
</tr>
<tr>
<td>Calcium, g</td>
<td>39.4</td>
</tr>
<tr>
<td>Phosphorus, g</td>
<td>31.5</td>
</tr>
</tbody>
</table>

B. The requirements change according to: 1) body size & reserves at the beginning of lactation, 2) the number of pigs nursing, 3) milking ability, 4) feed intake capacity, and 5) environment, especially the temperature.

C. An example of changes in the requirement: (Stahly et al., 1990)

Effect of dietary lysine levels during lactation on sows producing ≈ 16 lb milk/day and nursing > 10.5 pigs: (1988 NRC’s Lys requirement = 31.8 g/day)

<table>
<thead>
<tr>
<th>Item</th>
<th>Lysine, g/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>20</td>
</tr>
<tr>
<td>ME intake, Mcal/d</td>
<td>17.4</td>
</tr>
<tr>
<td>Sow wt. loss, lb</td>
<td>43.1</td>
</tr>
<tr>
<td>Litter size at weaning</td>
<td>10.5</td>
</tr>
<tr>
<td>Avg. weaning wt., lb</td>
<td>12.5</td>
</tr>
<tr>
<td>Litter wt. gain, lb</td>
<td>88.2</td>
</tr>
</tbody>
</table>

D. For the optimum performance, nutrient levels must be adjusted for various factors to ensure adequate intakes! For instance, to achieve about 40 g lysine/d at various feed intakes, dietary Lys must be 0.63, 0.73 & 0.88% for sows consuming 14, 12 & 10 lb of feed per day, respectively.

4. Inadequate Intakes During Lactation

A. Energy/protein intake & return to estrus: [Nebraska studies: Reese et al.(1982), Nelssen et al. (1985a,b), and Brendemuhl et al. (1987)]

<table>
<thead>
<tr>
<th>Energy intake, Mcal ME/d</th>
<th>Feed intake, lb/d(^b)</th>
<th>Litter size born</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 12</td>
<td>&lt; 8</td>
<td>10.2</td>
</tr>
<tr>
<td>12-14</td>
<td>8-10</td>
<td>11.2</td>
</tr>
<tr>
<td>&gt; 14</td>
<td>&gt; 10</td>
<td>10.9</td>
</tr>
</tbody>
</table>

\(^a\)Parity ranged from 1-4 & lactation length ranged from 4-8 wk.
\(^b\)Corn-soy based diet.

C. Inadequate energy and(or) protein intake during lactation:

1) Sows mobilize fat and protein stores for milk production.
2) Results in excessive body weight loss, which can be detrimental to reproductive performance and longevity of sows!

D. Calcium & phosphorus (also vitamin D):

1) Effect of Ca & P intakes during gestation: (Nimmo et al., 1981. JAS 52:1330)

<table>
<thead>
<tr>
<th>Item</th>
<th>Ca/P, 13.0/10.0 g/d</th>
<th>Ca/P, 19.5/15.0 g/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of sows</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>Leg problem (gestation)</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Leg problem (lactation)</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

2) Lactating sows:
   a) Rely heavily on their skeleton to supply Ca & P for milk production regardless of their intakes. - weakening bones!
   b) Possible to weaken bones, and become susceptible to posterior paralysis (fractured pelvis or vertebrae), lameness (fractured femur) or stiffness, which are commonly seen within 1-4 days after weaning because of excessive fighting, exercise or activities associated with estrus.

\(\equiv\) “Repletion” or building-up Ca & P in the bone during gestation is very important!

E. “The Bottom Line?” For the optimum reproductive performance (in both short- and long-term), important to maximize feed intake during lactation!

5. How to Feed Sows During Lactation?

A. A practical feeding scheme during the first few days following the farrowing (many sows have limited appetite):

<table>
<thead>
<tr>
<th>Farrowing</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 lb/day</td>
<td>4 lb/day</td>
<td>8 lb/day</td>
<td>12 lb/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12+ (full-feed)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(\circ\) However, should be allowed to consume more if they want to do so!
B. After few days:

1) Should be on a "full-feed" by the end of the first week.
2) Important to provide fresh water (ad libitum).
3) For sows nursing 8 pigs or less, may want to feed 6 lb/day + 0.5 lb/pig.

6. Factors Affecting Feed Intake During Lactation


<table>
<thead>
<tr>
<th></th>
<th>Lynch et al., 1977</th>
<th>Drip*</th>
<th>Contr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>80°F</td>
<td>70°F</td>
<td></td>
</tr>
<tr>
<td>Feed, lb/d</td>
<td>10.1</td>
<td>11.4</td>
<td></td>
</tr>
<tr>
<td>Sow wt loss, lb</td>
<td>46.9</td>
<td>29.7</td>
<td></td>
</tr>
<tr>
<td>Pig weaning wt, lb</td>
<td>14.9</td>
<td>17.1</td>
<td></td>
</tr>
<tr>
<td>Lit weaning wt, lb</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Respiration, No./min</td>
<td>-</td>
<td>-</td>
<td>123.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>112.2</td>
</tr>
</tbody>
</table>

\*"Drip" cooling system.

B. Feeding frequency? Sows consume more feed if hand-fed twice per day instead of once a day, and this is especially important during the first 3-4 d after parturition.

C. Physical form? Not eating ground feed well, then may want to switch to cubes or pellets to enhance feed intake.


<table>
<thead>
<tr>
<th>Item</th>
<th>Wet</th>
<th>Dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily feed, lb</td>
<td>9.8</td>
<td>8.9</td>
</tr>
<tr>
<td>Sow wt loss, lb</td>
<td>28.6</td>
<td>42.2</td>
</tr>
</tbody>
</table>

- Mix feed with water manually? Feasibility may depend on the number of sows!

E. Feed intake during gestation: (Weldon and Lewis, 1990. NE Swine Rep.)

- Feeding too generously during gestation: a) ↓ feed intake during lactation, b) ↓ feed costs, and c) can lead to various problems during the implantation (early phase) & parturition because of the obesity.

7. Other Nutritional Considerations?

A. "Bulky feed ingredients" such as alfalfa, what bran & bee pulp during lactation

1) Their use should be avoided because: a) Can limit the energy intake, and b) Can aggravate “heat-stress” situation because bulky, fibrous ingredients have a relatively higher heat production rate.
2) Exception? Can be used as a laxative!
a) Can prevent or alleviate constipation problems in sows, thus may want to include them in diets (= 10%) 3 to 4 days before & after farrowing. (Once sows are in a “full-feed,” cut the amount in half to avoid energy intake problem!)
b) Because they can limit energy intake, an alternative might be to “top-dress” diets with bulky feedstuffs.

B. “Dietary fat” & baby pig survival

1) Producers may lose more than 25% of piglets born before weaning, and majority of losses occur during the 1st few days mostly because of starvation & crushing.

2) Baby pigs:
   a) Contain only 2% body fat (mostly structural), ∴ have low energy reserves.
   b) Liver glycogen deplete rapidly within 12-24 h, which can lead to hypoglycemia & a chance of being crushed.
   c) Little hair and fat for insulation & not much energy reserves for heat production - piglets cannot maintain a “normal” body temperature.

3) To increase survival rate: a) ↑ body reserves of pigs and(or) b) improve the quality of their diet (i.e., milk)! (+ other management practices!)

4) Fats & oils are highly palatable and contain 2.25 times energy vs carbohydrates, and generally ↑ energy intake during lactation.

5) Dietary fat and baby pig survival rate: [Moser & Lewis, 1980. Feedstuffs 52(9):36]

<table>
<thead>
<tr>
<th>Item</th>
<th>Cont.</th>
<th>Fat</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born alive</td>
<td>10.0</td>
<td>9.9</td>
<td>-0.1</td>
</tr>
<tr>
<td>No. weaned</td>
<td>8.1</td>
<td>8.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Survival, %</td>
<td>82.0</td>
<td>84.6</td>
<td>2.6</td>
</tr>
</tbody>
</table>

* Based on 677 to 938 litters; fats/oils during the late gestation & early lactation phases.

6) Respond to “dietary fat” better if:
   a) Survival rate of the herd is < 80% (< 80%, 4.1% ↑ & > 80%, 0.6% ↑).
   b) Pigs weighing < 1 kg (average) at birth.
   c) Sows consuming < 10 lb of feed/day.
   d) Used during the summer.

7) Possible reasons for the improvement:
   a) Increase the fat content of milk.
   b) Increase milk production.
   c) Slight increase in energy reserves of the newborn piglet.

8) For the best result, sows should consume at least 2.5 lb of fats before parturition, which can be done by feeding 10% dietary fat for a week or 5% dietary fat for 2 weeks before farrowing.

9) Drawbacks of using fat:
   a) Costly - e.g., Tallow, grease & others are usually, 2-3 times (12 to 20¢/lb) vs grains, and dried fat products (fats/oils with carriers) are usually more than 10 times vs grains (i.e., 60 to 80¢/lb).
b) Animal fats are solid at room temperature, must be melted before incorporating into the diets. (Dried fats are convenient but expensive!)

c) With more than 5% in the diet, feed tends to bridge in feeders and bins.

To make a decision (i.e., use fats or not), must weigh benefits and drawbacks!

C. Feeder Types - Various types of sow feeders available & considerable variations in feed intake and wastage, and considerations for selecting feeder include:

1) Comfort in eating stance - 1° adequate space?!
2) Injury-free, i.e., no sharp edges, protruding bolts, nuts, etc.
3) Less wastage of feed.

LACTATION FAILURE

1. MMA Syndrome? (Has been referred to as “MMA” syndrome in the past!)

A. Mastitis (inflammation of mammary gland caused by bacterial infection), Metritis (inflammation of reproductive tract or uterine infection), and Agalactia (no milk, or hypogalactia/milk production).

B. Can results in the loss of pigs due to starvation or susceptibility to various diseases.

2. Signs

- Include: no or low milk production/secreton, increased respiration rate, increased heart rate, swollen, discolored & hard mammary glands, elevated body temperature (fever), lethargic or depressed, loss of appetite and desire to drink, and reluctant to nurse.

3. Possible Causes (1° causes are still unknown!)

A. Factors blamed as causative agents?

1) E. Coli, Klebsiella or other similar microorganisms may cause agalactia.
2) Endotoxins (coliform bacteria) have been shown to decrease secretion of prolactin.
3) Others - Genetics, poor nutrition, constipation, mycotoxins, high environmental temperatures (stress), wet and dirty floors, etc.

4. Treatment - Aim is to reestablish a "normal" milk flow (some ♀ may not respond)!

A. Injection of 5-10 units of oxytocin, which causes milk (secreted into the alveoli) to flow down the milk duct to nipples.
B. Need to inject every 2-hours to simulate a nursing habit of piglets.

5. Preventive Programs

A. In the farrowing units, prevent sows from lying on wet, fecal-contaminated farrowing floors, and prevent high temperatures and relative humidity.
B. Prevent sows from becoming too thin (nutrition).
C. Reduce physical stress throughout gestation, especially near farrowing.
D. Immunize sows using a bacterin based on the actual sow herd's milk.
E. Select gilts with genetic capability and physical ability to produce milk.
PORCINE REPRODUCTIVE & RESPIRATORY SYNDROME (PRRS)

1. **Introduction**

   A. Recognized in Europe & N. America fairly recently (1980s):
      1) Can expect severe reproductive losses, which typically last for 2-3 months.
      2) May see increased post-weaning mortality, pneumonia, poor growth & increased number of unmarketable pigs. The problems often become endemic.

   B. Prevalence of PRRS virus in the U.S. breeding herds: (See a figure, USDA data)

   C. Causes?
      1) An organism involved in the European outbreak:
         a) Identified by a group of researchers at Central Veterinary Institute, Lelystad, Netherlands, and it was named "Lelystad" virus.
         b) Called “Porcine Reproductive and Respiratory Syndrome (PRRS)” in Europe.
      2) About the same time:
         a) An organism causing the U.S. outbreak was identified by researchers from Minnesota & S. Dakota, and it was similar to Lelystad virus (same virus?).
         b) It's initially called “Swine Infertility and Respiratory Syndrome (SIRS)” in the U.S. (Today, it's known as “PRRS” in the U.S. as well.)

2. **Signs/Effects**

   A. “Sows” - Abortion, stillborns, mummies, ↓ farrowing rate, poor appetite, etc. (Stillbirths & mummies can range from 30-70%).
   B. “Newborn pigs” - Weakness, rapid abdominal breathing, lethargy, impaired CNS, etc. (Preweaning mortality rate can be 50-70%).
   C. “Nursery pigs” - ↓ appetites & growth, rough hair coats, etc.
   D. “Growing-finishing pigs” - Slow growth rate, ↓ severity of other problems (e.g., rhinitis, dysentery).

3. **Transmission of PRRS**

   A. Primary method? Animal to animals . . . shed the virus primarily in oral-nasal secretions, but also in urine & feces.
   B. When infected, boars can shed the virus in semen and transmit PRRS to susceptible females.
   C. May be transmitted through air, but not likely?

4. **Treatment/Prevention?** To date, essentially none, but . . . :
A. Numerous combinations of feed grade, water soluble and injectable medications seem to have little effects, \( \therefore \) “aggressive medication programs” may be a waste of money!

B. All-in, all-out practice & a multiple-site production (separate pigs from breeding herd) might be useful.

C. Depopulation (& repopulation)? According to some, this might be a way to handle the virus in many herds.

Effect of nursery depopulation/clean-up: [Feedstuffs 67(36):12 (1995)]

<table>
<thead>
<tr>
<th>Farm</th>
<th>Mortality, %</th>
<th>Gain, lb/d</th>
<th>Seropositive at 8-10 wk, %</th>
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<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
</tr>
<tr>
<td>A</td>
<td>10.0</td>
<td>.28</td>
<td>.30</td>
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<tr>
<td>B</td>
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<td>.25</td>
</tr>
<tr>
<td>C</td>
<td>4.0</td>
<td>2.0</td>
<td>.90</td>
</tr>
</tbody>
</table>

D. Try to handle all secondary problems!

E. Keep extra ♀ for breeding?

F. Immunity/vaccines:

1) Inconsistent immunity in the breeding herd following natural infection, i.e., some pigs become protected while at the same time others may not.

2) Modified-live vaccine - now available for commercial use:

   a) Supposedly provides a full 16 weeks of protection - vaccinate pigs 3-18 weeks of age depending on PRRS infection signs.

   b) In one report, vaccinated pigs had lower clinical scores & higher weight gain with no death losses.