REPLACEMENT BOAR & GILT MANAGEMENT

REPLACEMENT BOARS

1. Purchasing Replacement Boars?

A. Some considerations: [See “General Guidelines for Selection” (Section 9)]

1) Buy from reliable seedstock producers - known genetics and herd health!
2) Select from the top 50% based on the performance records.
3) Commercial producers:
   a) Effects of boars - See an e.g. (PIH-106).

   (Herd A: Seedstock herds - Selecting replacements based on performance records; Herd B: Commercial herds - Buying boars from Herd A and selecting gilts based on performance records; Herd C: Commercial herds - Buying boars from Herd A and randomly selecting gilts.)

   b) Most genetic changes are made through boar selection, thus should be willing to pay a premium for a superior boar?

4) Buy strong boars in a good body condition - “Thin” boars may lack the stamina, and “fat” boars tend to lack the vigor.
5) Buy boars with sound feet and legs (see PIH-101).
6) Purchase boars (5.5 to 6 months old) at least 60 days before being used.

2. Management of Boars (1st 60 Days After Purchase)

A. General:

1) Age of boars" - Do not use boars before they are 7.5 to 8 months old.
2) Before making a final purchasing decision, blood test for leptospirosis and(or) pseudorabies if the boar is not from a qualified herd.
3) Isolation - Isolate all new boars a minimum of 28 days. (Facility should be located several hundred feet from the rest of the herd.)

B. One to 7 days - Should be isolated, deworm, treat for lice and mange, vaccinate for Erysipelas, Lepto (6 species) and Parvovirus (& Pseudorabies?), watch for signs of illness, and use anti-dysentery drug in feed for 30 days or so if problems with dysentery or unknown.

C. Eight to 144 days - Still in isolation, again treat for lice and mange (≈ 10 days after first treatment), and place fecal materials from sow lots in the boar pen.

D. 15 to 21 days - Still in isolation, and again place fecal materials from sow lots in the boar pen.

E. 22 to 28 days - Still in isolation, retest for pseudorabies if necessary, and evaluate their “sexual behavior.”

F. 29 to 56 days - Provide a fence-line contact to nonpregnant sows and gilts to be bred, feed boar's fecal materials to females to be bred, and evaluate sexual behavior and possibly semen (36 to 42 days).

G. 57 to 63 days - Begin breeding (boars should be 7.5- to 8-month old by this time).
3. Why Expose to Females and Fecal Materials?

A. Reason? - To prevent infectious diseases formally known as “SMEDI (Stillborn, Mummified fetus, Early Embryonic Death and Infertility) syndrome.
B. Causes - Mostly due to parvovirus, but also due to one or more of 8 enteroviruses?
C. Try to build the immunity before a breeding time by exposing boars to possible carrier sows/gilts!

4. Evaluation of Boars for Sexual Behavior

A. How?

1) By placing a replacement boar and an estrous gilt or small sow in the pen by themselves.
2) Use a small pen (12’ x 12’) that provides excellent footing.
3) Evaluate four different times (2 consecutive days each week) for 15 to 20 min.

B. Sexual behavior of swine: [See a figure (Levis & Christenson, 1985)]

- Look for, e.g., a) head to head contact, b) sniffing, c) nosing flanks, d) mounting attempts, and e) standing reaction/copulation.

C. Boar behavior/criteria & rating:

| Satisfactory | If successfully mates at least 2 out of 4 ♀, but check to be sure that the penis doesn't fall out. |
| Questionable | Mounts ♀, thrusts, extends penis, but no copulation. May need assistance? Assist first two times, but not last two times! |
| Unsatisfactory | Mounts ♀, thrusts, but doesn't extend penis. Check anatomy for abnormality. |

* Assisted vs unassisted boars (Levis & Christenson, 1984):
  - No difference in the time to “first-mount” and time to copulation.
  - No difference in mounting activity.
  - Assisting boars did not improve their mating success later in life.

* Should have similar testes & epididymides, and free of any soft or firm masses, which may indicate pathogenesis. May want to check for: a tied penis (no extension of penis), a limp or infantile penis (unable to achieve or maintain an adequate erection), and bite wounds, irritation and abscesses on the penis.

Failure | No interest during four evaluations. Should replace!
5. **Should the Semen be Evaluated?**

   A. Optional because: 1) Does not provide a means of determining absolute fertility, and only provides an estimate of sperm number, motility, morphology and volume, and 2) Sperm number ↑ until the boars are 10-12 months old. (Thus, boars < 10 mo of age should not be culled based on marginal semen characteristics!)

   B. Semen characteristics: (7 to 10 mo-old ♂ ejaculating every 72 hr.)

      1) Change from day to day, ∴ need two or more ejaculates for evaluation!

      2) Characteristics: (Levis et al., 1989.)

      | Item                                      | Value       |
      |-------------------------------------------|-------------|
      | Gel-free volume, ml                       | 190 - 240   |
      | Sperm concentration, million/ml           | 151 - 241   |
      | Total sperm/ejaculate, billion            | 20 - 40     |
      | Motile sperm, %                           | 70 - 80     |
      | Morphologically normal sperm, %           | 70 - 80     |

6. **How Much Floor Space?**

   A. Confinement - Boars should be housed individually, and provide 35 to 50 ft²/pen or use 28 in. x 7 ft. stalls.

   B. Non-confinement - Should have 20 ft² of shelter and dry sleeping area, and desirable to house boars individually! If not possible then: 1) boars must be reared together, and 2) provide 20-24” of feed trough space/boar, and one waterer/3 boars.

7. **How Should We Feed?**

   A. The newly purchased boar has less appetite for the first few days due to changes in the environment & other factors, thus may want to obtain a bag of feed from a supplier!

   B. Feed sparingly, i.e., feed 2 lb on the first day & ↑ gradually, and feed to maintain a proper body condition, which can be done by feeding 4 lb/day.

   C. Requirements: (NRC, 1998)

<table>
<thead>
<tr>
<th>Item</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein, %</td>
<td>13.0</td>
</tr>
<tr>
<td>Lysine, %</td>
<td>0.60</td>
</tr>
<tr>
<td>Calcium, %</td>
<td>0.75</td>
</tr>
<tr>
<td>Phosphorus, %</td>
<td>0.60</td>
</tr>
</tbody>
</table>

**REPLACEMENT GILTS**

1. **Choosing Gilts?** - See “General Guidelines for Selection” (Section 9).

2. **How Should We Select Gilts?**

   A. At birth - Ear notch at least twice as many gilts as will be needed, and keep records (birth date, breed composition, etc.), and may want to foster barrows in large litters because there are some data indicating that gilts reared in a small group will produce larger litters. (But, it does not mean that gilts should be selected from small litters though!)

   B. At weaning - Remove gilts from a list if their sows did not milk well.
C. Finishing phase - Make a final selection at 175 to 200 lb based on growth rate, backfat, mammary & skeletal systems and vulva development:

1) Skeletal system - Should be able to move about freely.
2) Mammary system - Should have 12 (minimum!) or more (14?) evenly-spaced, well developed nipples.
3) Reproductive system - External genitalia should have normal appearances, even though most defects are not visible!

3. Early Puberty

A. Most gilts reach a puberty at 6-8 mo of age (avg., ≈ 200-220 days).
B. Gilts should reach puberty (1<sup>st</sup> estrus and ovulation) at an early age.
C. Early puberty and regular estrous cycle are important because of a limited breeding period!
D. Gilts should express one or more estrous cycles before the breeding age (7-9 months) because may be able to 1 = 2 pigs/litter by breeding at 2nd estrus vs 1st estrus!
E. Gilts that express 1st estrus at a young age (< 6 mo.) can be bred as long as they had one or more estrous periods, and earlier mating can reduce feed and other overhead costs associated with maintaining gilts.

4. Factors Affecting Puberty

A. Genetics - Crossbred gilts generally express 1st estrus earlier (1-4 weeks) than the average of parent breeds.
B. Season of the year:
   1) Winter- and spring-born gilts tend to have delayed expression of the 1st estrus ... the possible reason is not clear!
   2) The importance of photoperiod is unclear, but gilts should receive about 12 h of artificial light in the total confinement.
C. Confinement:
   1) Has some effect - e.g., Estrus by 250 days? 76 & 36% for the outside lot & confinement, respectively according to NE data!
   2) Some differences among breeds in their response to the confinement - e.g., Duroc & Yorkshire in the confinement tend to reach puberty later, and also may ↓ incidence of behavioral anestrus (i.e., ovulating, but no standing heat).
   3) Rearing intensity has some effect - 8 ft²/gilt may be adequate until selection, but should limit to 24 gilts/pen or less.
   4) Social isolation should be avoided during the developmental phase!

- Some of these factors also affect the development of boars!

5. A Practical Approach to “Stimulate” Gilts or Induce Estrus

- Gilts require social and sexual stimulations, as well as proper nutrition, housing, etc., and the stimulation should precede the intended breeding period by about 3 weeks.
- One example of “Step-by-step procedures.”
A. Again, stimulation should precede the breeding period by 3 to 4 wk.
B. Regrouping & relocation:

1) Gilts should weigh = 200 to 230 lb (5-5½ to 6 mo of age), but weight (or age) of gilts is dependent on the herd average of the age of puberty. (And, start restricting energy intake by feeding 5-6 lb/day?)
2) If possible, relocate to the outside.
   - “Transport phenomenon” - Mixing and(or) transporting unfamiliar gilts & relocating them to new environments has been known to trigger a synchronous 1st estrus in 15 to 30% of gilts!
     1) Relocation seems to be the most important component of this phenomenon.
     2) Relocation within the confinement is less effective vs moving to the outside.
3) The use of PMSG & HCG can be an alternative, or use a combination?
   - Use of gonadotropins in general?
     1) PMSG (Pregnant Mare Serum Gonadotropin) has a similar action to that of FSH, and stimulates follicles of gilt's ovary to produce mature ova, whereas HCG (Human Chorionic Gonadotropin) has a similar action to that of LH, and is involved in releasing mature ova from follicles (ovulation).
     2) Can induce estrus in gilts that have not cycled. (But, cannot override progesterone levels naturally present in “cycling” gilts.)
   - Use of P.G. 600 (Intervet America, Inc.), which contains 400 IU of PMSG & 200 IU of HCG, and approved for the use by the FDA - Effective in inducing & synchronizing estrus! (Cost effectiveness???)

C. Allow a fence-line contact or supervised direct mingling with sexually active, mature boars - 15-30 min/day & use different boars if possible!
   - Boar exposure - The most important & effective stimulus!
     a) Once daily (15-30 min/day) or continuous contact (fence line or supervised-physical contact).
     b) Need to use sexually active, mature boar (> 10 mo).
     c) The timing is important!
(1) If it's too early (< 125 days), may delay reaching puberty vs those exposed at 130-160 days.
(2) By withholding boar exposure until ≈ 160 days of age, can expect more rapid and synchronous estrous (30 to 90% in 3-10 days).

○ Effect of a combination?

“Estrous by 170 days (%):” (Treatments initiated at 160 days. NE data)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regrouping</td>
<td>7</td>
</tr>
<tr>
<td>Regrouping + transport</td>
<td>8</td>
</tr>
<tr>
<td>Regrouping + transport + relocation</td>
<td>28</td>
</tr>
<tr>
<td>Regrouping + transport + relocation + boar exposure</td>
<td>89</td>
</tr>
</tbody>
</table>

D. Check gilts for signs of estrus & record:

1) The main criterion is a standing reaction to the pressure applied to the back with the presence of a boar.
2) Avoid a continuous boar-stimulation because it is easier to detect estrus if gilts are exposed to the boar a short period of time each day.

E. What can we expect from “selected” gilts (%)?

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-breeders</td>
<td>5-10</td>
</tr>
<tr>
<td>No problem</td>
<td>60-70</td>
</tr>
<tr>
<td>Questionable</td>
<td>20-30</td>
</tr>
</tbody>
</table>

6. How Should We Feed?

A. Most gilts are developed to 175-200 lb by self-feeding growing-finishing diets.
B. Should restrict energy intake after 175-200 lb, which can save feed costs and avoid unneeded weight gain because the excess weight may ↓ longevity and also contribute to unsoundness!
C. Energy restriction can be accomplished by hand feeding 5-6 lb of balanced diet/day, but adjust feed allowance because

1) Require 10% less feed (= .5 lb less/day) in the confinement.
2) Require 25% more feed (= 1 lb more/day) during the cold weather.

D. Flushing or high-energy feeding - End “restricted-feeding” and increase feed intake (50 to 100%) 7-10 days before breeding, which can maximize the ovulation rate!

E. A practical feeding approach? 1) Feed a grower diet until making a final selection at 175-200 lb, and then 2) feed a lactation diet (5-6 lb/day) thereafter?

7. Health Programs

A. A minimum immunization program should include erysipelas, parvovirus and leptospirosis (6 species).
B. Include pseudorabies if the herd is infected, or there is pseudorabies in nearby herds.
C. For a natural immunization (e.g., for SMEDI), feed fecal materials from the adult breeding herd two or three times at least one month before breeding.
D. Vaccines:

1) Should be given at least two weeks before breeding to ensure development of the immunity.
2) Should not be given at the breeding time or during the first 30 days of pregnancy because the vaccination often causes \( \uparrow \) in body temperature for a few days, which may \( \downarrow \) embryonic death!


A. To Buy or Not to Buy!:

Example - “Annual comparative net return per 100 sows:”

<table>
<thead>
<tr>
<th>Item</th>
<th>Purchase</th>
<th>Grandparent(a)</th>
<th>Rotaterminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit(b)</td>
<td>15,880</td>
<td>15,368</td>
<td>14,224</td>
</tr>
<tr>
<td>Germplasm cost(c)</td>
<td>13,125</td>
<td>9,150</td>
<td>7,750</td>
</tr>
<tr>
<td>Management cost(d)</td>
<td>0</td>
<td>1,520</td>
<td>2,000</td>
</tr>
<tr>
<td>Lost market value(e)</td>
<td>0</td>
<td>1,644</td>
<td>1,495</td>
</tr>
<tr>
<td>Net</td>
<td>$2,755</td>
<td>$3,054</td>
<td>$2,979</td>
</tr>
</tbody>
</table>

\(\text{“15\%” of sow herd is set aside for the production of gilts.}\)

The Bottom Line - Only small differences in the net return, thus which system to use is primarily a management decision!

B. Thinking about raising own gilts? Consider the followings before making a final decision (e.g.):

1) Can you operate two production systems in one operation?
2) Are all of your breeding animals individually identified?
3) Do you have a systematic breeding plan?
4) Are the breeds or lines in your program readily available?
5) Can you manage a complete performance testing program?
6) Are your records computerized and current?
7) Do you have lifetime production records on each sow?
8) Do you enjoy selecting boars and gilts?
9) Do you take the time to locate genetically superior sires? And, are you willing to pay extra for grandparent stock?
10) Is your operation large enough to take full advantage of genetically superior sires?
11) Will your production schedule allow for timely production of replacements?