Reproductive Managements of Duroc, Landrace and Yorkshire Pig

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OUTLINE

Introduction
Selection of breeding stock
Gilt, boar/AI management
Mating management
Pregnancy, farrowing, lactation and weaning to estrus interval management
Introduction

No. of swine farmers : 9,965
Boar: 26,710 heads
Gilt and sow: 692,716 heads
Hog (<30kg): 1,576,580 heads
Hog (30-60kg): 1,522,158 heads
Hog (>60kg): 1,473,740 heads

Agricultural Statistics Annual Report, 2010
Exotic breeds (Landrace, Yorkshire, Duroc, Hampshire, Berkshire, Meishing) · native breeds (Lanyu, Taoyuan) and new breeds (Lee-Sung, Spotty, Mitsae, TLRI Black, Kao-Shi Balck)
selection of breeding stock

Major breeds in Taiwan
Growth performance
Selecting considerations
<table>
<thead>
<tr>
<th>Major breeds</th>
<th>Boar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Taiwan Duroc</strong></td>
<td>♂</td>
</tr>
<tr>
<td><strong>Taiwan Landrace</strong></td>
<td>♂</td>
</tr>
<tr>
<td><strong>Taiwan Yorkshire</strong></td>
<td>♂</td>
</tr>
<tr>
<td>Major breeds</td>
<td>Gilt</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td></td>
<td><img src="image1" alt="Taiwan Duroc sow" /></td>
</tr>
<tr>
<td>Taiwan Duroc</td>
<td><img src="image2" alt="Taiwan Landrace sow" /></td>
</tr>
<tr>
<td>Taiwan Landrace</td>
<td><img src="image3" alt="Taiwan Yorkshire sow" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Gilt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taiwan Duroc</td>
<td><img src="image4" alt="Taiwan Yorkshire sow" /></td>
</tr>
</tbody>
</table>

**Images:**
- Image1: [Taiwan Duroc sow](image1)
- Image2: [Taiwan Landrace sow](image2)
- Image3: [Taiwan Yorkshire sow](image3)
- Image4: [Taiwan Yorkshire sow](image4)
Growth Performance Test of Boars in Taiwan  
(from 40 to 110 kg of body weight)

Selection Index for L and Y =
100 + 140 (ADG-MADG) - 60(FE-MFE) - 30(BF-MBF)

Selection Index for D =
100 + 120 (ADG-MADG) - 55(FE-MFE) - 50(BF-MBF)

Halothane Test and DNA Typing of PSE in 1988

<table>
<thead>
<tr>
<th>L</th>
<th>Y</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG (Average daily gain), kg</td>
<td>1.114</td>
<td>1.145</td>
</tr>
<tr>
<td>FE (Feed efficiency, Feed/Gain)</td>
<td>2.082</td>
<td>2.083</td>
</tr>
<tr>
<td>BF (Backfat thickness), cm</td>
<td>1.309</td>
<td>1.325</td>
</tr>
</tbody>
</table>
Growth Performance Test of Gilts in Taiwan
(from 30 to 100 kg of body weight)

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>Y</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG (Average daily gain), kg</td>
<td>1.004</td>
<td>0.963</td>
<td>0.925</td>
</tr>
<tr>
<td>FE (Feed efficiency, Feed/Gain)</td>
<td>2.166</td>
<td>2.196</td>
<td>2.201</td>
</tr>
<tr>
<td>BF (Backfat thickness), cm</td>
<td>1.403</td>
<td>1.465</td>
<td>1.451</td>
</tr>
</tbody>
</table>

Halothane gene free in L and Y gilts of nucleus herds on 2000!
Selecting considerations

1. Healthy and without any genetic defects
2. Twelve or more functional teats
3. Comes from the litter which litter size is more than 6 piglets
4. Buy from reliable breedstock producers, pig performance testing station and on-farm testing swine stock farmer
Selecting considerations

5. Select from the top 50% based on the performance records

6. Select boars and gilts with sound feet and legs

7. Purchase boars and gilts (5.5 to 6 months old) at least 60 days before being used
Gilt and Boar/AI Management

- Gilt management
- Boar housing
- Semen collection, semen evaluation
- Artificial insemination
Sow Reproductive Time Line and Recommended Gestation Feeding Program

Boar
Good quality semen

Flushing (gilts only)

Reduce intake

Lb Feed/Day

Day of Gestation:
-10 10 12 26 50 90 112

Maternal recognition of pregnancy
Implantation of embryos
Key mammary development phase

Feed according to condition
Gilt Management

1. Exposed to an aggressive boar
2. Moving and mixing
3. Not be fat or slim
   Pin-bones, vertebrae and edge of transverse spinal processes only felt with firm pressure. No cavity around tail. Very difficult to feel any ribs.
4. Reduce heat stress
Boar housing
§ Housing boars individually eliminates fighting, riding and competition for feed
§ Keep boars comfortable during warm months (>85 °F). Provide sprinklers, shade or AC during the hot hours of the day
§ Keep boars not too fat or slim
§ Avoid slippery floor of mating room
semen collection
Semen evaluation
Binocular microscope
Phase contrast microscope

Micro-cuvettes
Semen evaluation

Plasma membrane integrity
Plasma membrane permeability and stability
Acrosome integrity
Mitochondrial status
Chromatin intactness
Apoptotic-like changes
Oxidative stress
Unmature sperm
Artificial insemination

*Advantages:*
- Allows for widespread use of superior boar
- More uniform pig crops
- Decreased problems
  -- Less risk of injury to boar, sows and stockman
  -- Isolation and testing of newly introduced boars
  -- Decreased housing and feed cost
- Reduced risk of disease transmission

*Disadvantages:*
- High level of management required
- Adequate facilities
Swine Liquid Semen Extender

Super Up II

BTS (Beltsville Thaw Solution)

Minitub Merk III

Kiev

• extended typically to create 50 mL aliquots containing 5.0 million cells

• Storied at 15-18°C, 3-5 days
Mating Management

- Individual-mating system
- Estrus detection
- Timing and frequency of mating/insemination
- *Determine boar power requirements*
Mating management

- **individual-mating system**
  - Breeding dates for each female are known
  - Boars can be penned and managed individually
  - Selective matings are possible
  - Mating frequency of boars can be controlled
  - Females can be double-mated
  - allow reproductive success or failure to be detected at an earlier date
  - Requires dependable, well-trained, and motivated labor
Estrus detection

- Estrus defined as the period of sexual receptivity to the boar. Also known as “heat”
- Average duration of estrus is 40-60 hours
- Ovulation occurs 36-48 hours after the onset of estrus
- The pig is polyestrous throughout the year
- Average estrous cycle length: 21 days
Estrus detection

1. The vulvar lips are swollen and red with a thin, mucous discharge
2. Other signs of estrus include: depressed appetite, restlessness, alertness, pacing, grunting, and chomping of the jaws
Estrus detection

“standing heat”
Sow or gilt will stand solidly when pressure is applied to her back
Timing of Mating

--Maximum ovulation (after the onset of standing heat)
  Gilt: 24-36 hours; Sow: 36-48 hours
-- Life span of the egg: 8-10 hours
-- Sperm arrive at the site of fertilization: 1 hour
-- Life span of the sperm: 24-50 hours
-- Sperm capacitation: 6 hours
### Timing and Frequency of Mating/Insemination

<table>
<thead>
<tr>
<th>Frequency of estrus detection</th>
<th>Gilts</th>
<th>Sows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once daily</td>
<td>0 and 24 hours</td>
<td>0 and 24 hours</td>
</tr>
<tr>
<td>Twice daily (12 hours apart)</td>
<td>12 and 24 hours</td>
<td>24 and 36 hours</td>
</tr>
</tbody>
</table>
**Determine boar power requirements**

<table>
<thead>
<tr>
<th>Boar</th>
<th>Individual mating system</th>
<th>Maximum mating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Daily</td>
</tr>
<tr>
<td>Young (8 –12 Mos)</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Mature (&gt; 12 Mos)</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>
A tube of semen is attached to the open end and allowed to drain into the cervix.

Before inseminating the female, use a paper towel to clean the vulva.

Backflow Stop type
Spiral type
Pregnancy, farrowing, lactation and weaning to estrus interval management

- pregnancy diagnosis and management
- Care of the sow during farrowing and lactation
- Weaning to estrus interval
Pregnancy diagnosis

1. If breeding data are known, one can check for the animal to *return to estrus*. If she does not return to estrus by her designated date, she is likely pregnant

2. If breeding dates are known, estrus detection can be backed up with *progesterone* data

3. *Ultrasonic* diagnosis
Ultrasonic Diagnosis
1. Ultrasonic detection is typically done at 30-45 days of gestation with 90-95% detection accuracy
2. The sow or gilt is checked in a standing position with the probe placed near the 2nd teat from the rear and pointed toward the middle of the back
Ultrasonic Diagnosis
Pregnancy management

- Average duration of gestation is 114 days (111-117 days)
- Two-thirds of growth of fetus is made in the last month of the gestation period
- Mature sows: 35-40 kg body weight gain; gilts: 45-55 kg body weight gain
- Avoid heat stress
Care of the sow during farrowing and lactation

A. Prefarrowing

1. Treat sows once (3 wk before farrowing) for internal and external parasites before moving to the farrowing facility
2. Record breeding dates, calculate farrowing dates, and observe sows closely during late gestation to assure that sows are moved to the farrowing unit by 107th day of gestation
3. Feed a ration with laxative effect (high fiber) from day 107 to prevent constipation
4. Remove bulky ingredients from the ration soon after farrowing
5. Avoid heat stress
B. Farrowing and Lactation

1. Knowing when a sow will farrow
   a. Presence of milk usually indicates that farrowing will occur within 24 h
   b. If milk is present, prepare the sow and move her immediately to the farrowing facility
2. Birth process

a. Normal farrowing may be completed in less than one hour, or may exceed five hours. The average interval between birth of piglets is approximately 15 min.

b. Attending sows at farrowing can prevent death of piglets caused by trauma, biting, suffocation inside membrane, and weakness.

c. Manual assistance in delivery of pigs should be undertaken only when signs indicate inability of the sow to deliver unassisted.

d. Clipping the navel cord leaving about 1 in of the cord (at birth).
3. Processing baby pigs
   a. Weighing body weight at birth
   b. Clipping needle teeth to prevent piglets from biting each other and the sow’s udder (within 24 hour after birth)
c. Recording teat number
d. Giving iron injection to prevent anemia (within 3 to 4 days after birth)
e. Warming up piglets by supplement heat lamps
f. Ear notching for immediate and permanent identification (soon after birth)
Ear notching

- Litter no.
- Ten-figure number
- Hundred-figure number
- Units
- Individual no.
4. Nutrition of newborn pigs

a. Each piglet should receive colostrum to provide immediate and temporary protection against bacterial infections

b. The sow’s milk does not contain nutrition for baby pigs at 3wks of age, therefore at 1 week of age, start feeding piglets with a prestarter (22% protein) in a shallow pan (creep feeding)

c. After pigs start to eat, switch to a starter (18% protein) and feed this until pigs’ weight reaches 25 to 30 kg
C. Feeding the sow during lactation

1. Sows nursing large litters need essentially full feeding during lactation (CP 15%, DE 3230 kcal/kg; offer 4.5 kg in summer; offer 5.5 kg in winter)

2. For sows that finishing lactation with excessive weight losses or in an energy-depleted condition, estrus will be delayed beyond the usual 3 to 7 days post weaning

3. Supplementing the sow’s diet with fat during late gestation and lactation may improve the sow and pig performance

4. Avoid heat stress
Weaning to estrus interval

<table>
<thead>
<tr>
<th>母豬授精適期的臨床繁殖學</th>
</tr>
</thead>
<tbody>
<tr>
<td>寫作：日本學士班楊 榮和先生</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>離乳當日</th>
<th>1-2日後</th>
<th>3日後</th>
<th>4日後</th>
<th>5日後</th>
<th>6日後</th>
</tr>
</thead>
<tbody>
<tr>
<td>乳房仍柔軟</td>
<td>乳房變硬</td>
<td>乳房上半部軟化</td>
<td>乳房開始萎縮</td>
<td>乳房更著萎縮</td>
<td>乾燥狀態</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>價小的陰戶</th>
<th>軟化</th>
<th>流出點液</th>
<th>輕度發炎</th>
<th>授精週期前半期</th>
<th>授精週期後半期</th>
<th>陰道纖毛</th>
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<td>正常的陰戶</td>
<td>軟化</td>
<td>流出點液</td>
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Weaning to estrus interval management

- Decreasing feed offer to sows at 3 or 4 days period to weaning day
- Increasing feed offer to sows after weaning day in order to flush estrus
- Most of the sows will begin cycling within four to seven days after weaning and remain in standing estrus for 60 hours
Thanks for your attention!

- [www.angrin.tlri.gov.tw/pig_all.htm](http://www.angrin.tlri.gov.tw/pig_all.htm)