THE BREEDING HERD
What you should learn in this section:

- Targets for reproductive performance.
- What types of recording systems exist.
- What are the key indices to measure reproductive performance.
- How to manage replacement breeding stock (particularly gilts) to optimise their performance.
- Best practice mating (natural and AI) management.
- How to manage sows in gestation for best performance.
Basic records that should be kept include:

• number sows mated & farrow each week
• number of sows returning on heat and preg-test-negative (to determine conception rates & pregnancy failure rates)
• number piglets born per litter (alive & dead)
• number piglets weaned each week
• feed usage (to determine feed efficiency)
• deaths (by reason) in each stage of production
• sale weight, P2 backfat & age (to calculate growth rate)
## Physical performance-targets & actuals

### Breeding herd

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean</th>
<th>Range</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farrowing rate</td>
<td>80</td>
<td>61-90</td>
<td>&gt;80%</td>
</tr>
<tr>
<td>Total Born</td>
<td>11</td>
<td>10-13</td>
<td>&gt;11.5</td>
</tr>
<tr>
<td>PBA</td>
<td>10</td>
<td>9.5-11.5</td>
<td>&gt;10.5</td>
</tr>
<tr>
<td>Stillborn %</td>
<td>8</td>
<td>4.3-11.6</td>
<td>&lt;8%</td>
</tr>
<tr>
<td>Pigs weaned/litter</td>
<td>9</td>
<td>7.4-10.3</td>
<td>&gt;9.5</td>
</tr>
<tr>
<td>Preweaning mortality %</td>
<td>13</td>
<td>6.2-31</td>
<td>&lt;1.5</td>
</tr>
<tr>
<td>Pigs weaned/sow/yr</td>
<td>18.4</td>
<td>15-23.9</td>
<td>&gt;20</td>
</tr>
</tbody>
</table>
# Physical performance - actuals

## Breeding herd

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaning age</td>
<td>21</td>
<td>14- 29</td>
</tr>
<tr>
<td>Litters per sow</td>
<td>2.14</td>
<td>1.8-2.43</td>
</tr>
<tr>
<td>Weaning 1(^{st}) Service</td>
<td>8</td>
<td>5-10.2</td>
</tr>
<tr>
<td>Sow death rate %</td>
<td>9.6</td>
<td>1.5-18</td>
</tr>
<tr>
<td>Culling rate %</td>
<td>62</td>
<td>26-88</td>
</tr>
</tbody>
</table>
Recording systems

- Manual records
- Computer-based records
  - Excel spreadsheets
  - Software programs
    - PigWin/PigChamp
    - MIPs
    - PigTales
    - PrimePulse
Uses for the software

- Action lists
- Performance reports
- Printing of sow cards etc.
- Problem solving
Displaying data using Excel

December SEW pre-weaning deaths

Note large increase in deaths on this farm
Fine tuning with PrimePulse—are the changes significant?

Note the slight rise in PWD is only significant in gilt progeny.
Note—a slight increase in gilt PWD + large increase in gilt litters born led to a large increase in total PWD.
## 2 minute quizz

<table>
<thead>
<tr>
<th>Parity</th>
<th>% of farrowings</th>
<th>PBA</th>
<th>SB(%)</th>
<th>PWD (%)</th>
<th>FR</th>
<th># weaned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34</td>
<td>9.9</td>
<td>4.6</td>
<td>11.4</td>
<td>77.8</td>
<td>9.2</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>10.8</td>
<td>4</td>
<td>9</td>
<td>78.1</td>
<td>9.7</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
<td>10.7</td>
<td>5.9</td>
<td>8.8</td>
<td>73.9</td>
<td>9.6</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>10.6</td>
<td>8.3</td>
<td>9.3</td>
<td>70.3</td>
<td>9.4</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>9.9</td>
<td>10.1</td>
<td>13.7</td>
<td>68.4</td>
<td>9.1</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>9.1</td>
<td>12.5</td>
<td>12.4</td>
<td>65.7</td>
<td>9</td>
</tr>
</tbody>
</table>

Q1. Which parities are performing best in terms of # pigs weaned/litter?  
Q2. With the information you have, why are these parities performing the best?  
Q3. Give 3 possible reasons why stillbirths are increasing with parity?
What determines where replacement stock are purchased?

- Genetics - carcass traits (P2, lean gain), genetic markers for PSE, E coli resistance, coat colour, litter size
- Health status
- Proximity
- Cost
- Availability
- Technical support
How can you determine health status?

- Clinical observation
- Performance records (esp. deaths & growth rate)
- Post mortem results
- Herd health checks at processing
- Medication records
- Lab records
<table>
<thead>
<tr>
<th>Diseases to watch out for</th>
<th>Diseases that you can't avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swine dysentery</td>
<td>Glassers disease</td>
</tr>
<tr>
<td>Mange</td>
<td>Ileitis</td>
</tr>
<tr>
<td>Mycoplasma pneumonia</td>
<td>Colibacillosis</td>
</tr>
<tr>
<td>Pleuropneumonia</td>
<td>Greasy pig disease</td>
</tr>
<tr>
<td>Atrophic rhinitis</td>
<td>Strep. Meningitis</td>
</tr>
<tr>
<td>Worms</td>
<td>Erysipelas</td>
</tr>
<tr>
<td></td>
<td>Leptospirosis</td>
</tr>
</tbody>
</table>
Quarantine

- Health matching between “herds”
- Allows time for vaccination (erysipelas, leptospirosis, parvovirus)
- Biosecurity - 2 km away, AIAO
- Separate shed/pen/drainage/clothing
Acclimatisation

- Adjust to health status, feed, housing & management
- Vaccination
- Feedback***
Targets for gilts

* % Gilts in the herd 10%
* Gilts cycling within 3 weeks of joining herd >70%
* Average time taken to reach puberty 1-3 weeks
* Average age at puberty 27 weeks
* Gilts non-cyclic by 30-32 weeks less than 5%
* Average age at first service 30 weeks
* Weight at first service > 125kg
* First litter size (born alive) 10.0
Best practice for gilt puberty stimulation

- Quarantine & acclimatisation
- Space allowance 1.5-2m²/gilt
- Expose to mature boar 20 minutes daily (v-boars?)
- Feed 3kg+ of good quality diet (eg. Grower or lactation diet)
- Ventilation!!
- Good stockpeople to detect heat
- Adequate cooling systems
# Gilt management schedule

<table>
<thead>
<tr>
<th>Age wk</th>
<th>Puberty stimulation (Selection)</th>
<th>Feeding</th>
<th>Health</th>
<th>Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td><strong>Commence</strong> boar stimulation 20 minutes+ daily</td>
<td>Ad lib (3kg+) grower or lac sow diet</td>
<td>Acclimatisation</td>
<td>1.0 sq M</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td>2.0 sq M</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>27</td>
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</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Matings (125+Kg)</td>
<td>1.8 – 2.3 kg/day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Post-puberty

- Do not house pubertal gilts next to boars
- Do not over-stock
- Ensure adequate ventilation (esp ammonia)
- Flooring is important—avoid slats
What is wrong with this picture?
Mating management
Endocrine control of ovulation

Higher brain centres

Hypothalamus

GnRH

Anterior Pituitary Gland

FSH

LH

Ovary

Follicles

CL

Inhibin

Oestrogens

Progesterone
The Ovary in the Oestrous Cycle

- Oestrus
- CLs
- Follicles
- Follicle growth
- CL formation
- CL maintenance
- CL regression
- Follicle growth
- Ovulation
Hormone profiles in the Oestrous Cycle

- **Progesterone**
- **Oestrogens**
- **FSH**
- **LH**

Day of cycle:
- Oestrus
- Oestrus
Oestrus (end of the follicular phase of the cycle)

The high oestrogen levels also prepare the uterus for conception, stimulate release of male-attracting pheromones from vaginal glands, raise vaginal mucus secretion rate to aid mating & change the physical appearance of the vulva (swelling, colour) to attract the male & again, to facilitate mating.
## Mating targets

<table>
<thead>
<tr>
<th>Metric</th>
<th>Target</th>
<th>PigStats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conception rate (3 week non-returns)</td>
<td>91%</td>
<td>89%</td>
</tr>
<tr>
<td>Farrowing rate</td>
<td>87%</td>
<td>85%</td>
</tr>
<tr>
<td>Litter size (born alive)</td>
<td>11.5</td>
<td>10.5</td>
</tr>
</tbody>
</table>
Quick quizz

- How long is the oestrus cycle of a sow?
- How long is she on standing heat?
- What 2 methods can you use to detect sows on heat?
- List 3 signs of oestrus in sows.
Oestrus in sows: Natural mating & *Fresh AI

**M Phase**

Stands for the boar

(Vulva red and swollen before heat)

Sows ears erect, vocal, rigid stance, responds to backpressure, sticky vaginal discharge. (Responsive for 15-30 minutes.)

Max fertility

12-72 hrs

Ovulation

Stands for the boar

B Phase

I Phase

B Phase

*
Best practice mating management

- Good heat detection-use the back pressure test in the presence of a boar
- Mate twice 24 hours apart
- Mature boars (> 10 months)
- Supervise matings
- 3 minute ejaculation
- Provide non-slip flooring
Artificial insemination

- Collection:
  - Gloved hand technique
  - Boar ejaculates 80-300 ml
  - 20-120 $\times 10^9$ sperm in the ejaculate (frequency)

- Insemination:
  - need min 80 ml
  - 2-4 billion sperm

- Extender:
  - Stored for 5-7 days at 15-18°C
  - (AI) Semen survives 24 hours, eggs 8hrs
Extenders

- Provide nutrition, buffering, regulate osmotic pressure
- Glucose, trisodium citrate, EDTA, Sodium bicarb, KCL, antibiotics - 3 days
- Add polyvinyl alcohol, citric acids amino acids, (Cys, Methyamine) - 5 days
AI Technique

- Sow on heat!- place her in head to head contact with boars
- Insert catheter gently into the cervix
- Invert semen to mix and attach semen bottle and let the sow “suck” in the semen
- Keep sow stimulated
- Avoid back-flow
- Don’t rush!
AI troubleshooting

- Sow not in heat or sub-fertile
- Operator error & fatigue
- Dud semen
  - Sterile/sub-fertile boar
  - Old semen (> 3 days)
  - Storage temperature >15-18°C
  - Collection procedure (temp and hygiene)
  - “Shocked” semen- addition of extender slowly (45 mins) at 35°C
  - Dose probably not a big deal
“Fertility in a bottle”

- Avoid where possible
- Induction of farrowing
- Heat stimulation
- Heat synchronisation
Induction of farrowing

- Prostaglandins
  - Used to induce farrowing or abortion
  - Lutalyse, Estrumate
  - Can be given IM or half dose in the vulva
  - Do not induce farrowing before 112 days gestation
  - Recommended to split dose and give @ 24 hr intervals to induce abortion
Heat stimulation

- PG600
  - PMSG/HCG = FSH/LH
  - 80% on heat within 5 days
  - Induction of puberty in pre-pubertal gilts
  - Reduced weaning-to-re-mating interval in weaned sows-treat on day of weaning
  - Treatment of anoestrus in “stale” sows-ensure they are not cycling!!!
Heat synchronisation

- Regumate
  - oral progestagen
  - 90% on heat within 4 days of withdrawal-normal fertility
  - 15-20 g/day
  - Synchronise gilts-top-dress feed for 18 days
  - Synchronise sows post-weaning for batch farrowing systems
Gestation management
Gestation management

- Individual housing
- Combats aggression
- Allows sows equal access to feed
- Better for seasonal infertility
Gestation management

- Group housing
- Perceived welfare improved
- Able to exercise
- Able to huddle if cold
- May be bedded or not
- Poorer reproductive performance
Gestation management

- Avoid mixing or moving mated sows in the first 1-3 weeks post-mating (during implantation)
- Aim to keep stable groups throughout
- Beware of “bully” sows in groups
- Beware of lean sows in stalls in winter
- Feed 2.2-2.5 kg/day-increase in the 3 weeks before farrowing
- Diet specs: 12.5 MJDE/Kg, 0.35 lysine/MJDE, Ca 0.9%, P 0.4%, Fibre 5%
Pregnancy detection

- Oestrous detection 18-24 days post mating is best
- Doppler ultrasound is reliable from about 28 days (foetal heartbeat or uterine artery blood flow) but may be hard to hear
- Real time ultrasound now the norm-best at 25 days+
Real time ultrasound
Real time ultrasound

22 days post-insemination
These stalls have been designed to allow AI to be conducted in them. Regular return rates on this farm are 20%.

Q1. Name 5 reasons why AI can give poor results.
Q2. What is 1 advantage and 1 disadvantage of doing AIs in stalls.
Q3. What component of AI do you consider to be most crucial and why?
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