Dealing with Aggression and Best Mixing Practices

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Outline

• Aggression in sows
  – When, How and Why?

• Reducing aggression in pens
  – Feeding system
  – Space allowance, pen design

• Reducing aggression at mixing
  – Timing, social groupings
  – Physical barriers

• Relief/Hospital pens
Aggression in Sows

Two main periods where aggression occurs:

**Mixing Aggression**
- Fighting when sows are mixed
- First 48 hrs; establishment of group social order
- Regardless of management system

**Ongoing Aggression**
- After social order is established
- Competition for resources - eg food, feeder access, lying areas
- Varies greatly with management
Why do they fight?

- **At mixing** - to establish social status/dominance hierarchy
- **What happens in the wild?**

Management tools:

- Familiarity, Previous experience, Genetics
- Pen design, feeding, odour, group size/composition
Why do they fight?

• **During gestation** - competition for resources (space, food, drinker)

• *What happens in the wild?*

• **Management tools** -
  - Feeding system
  - Space allowance, Pen layout/design,
  - Group size
Feeding system

Floor Feeding

ESF

Shoulder Stalls

Free-Access Stalls
Feeding System

**Competitive:** gain feed by fighting/aggression

- **Floor feeding**
- **Short stalls** (drop feed or trickle)
Feeding system

- **Non-competitive:** *Cannot* gain feed by fighting
- Competition for entry to *feeding space*
- Individual feeding

Electronic sow feeder

Free-access or Gated feeding stalls
Feeding System

- New option: Free-access ESF- eg. Gestal
Media Reports

• Beware of system & management differences...

• Eg. National Hog farmer- Transitioning Staff to Pen Gestation
  http://nationalhogfarmer.com/facilities/transitioning-staff-pen-gestation

Before a farm transitions to group housing, it is best for all employees to mentally prepare that it will be different.
National Hog farmer - Transitioning Staff to Pen Gestation

Tips for selecting and managing groups:

- It is important to know which sows not to put into pens
- No exception: Gilts go with gilts
- Group the animals by body condition, and keep younger parity sows together
- It is necessary to take into consideration breed dates and gestation lengths
- Watch older parity sows that are going into pens for the first time carefully, because you cannot backfill pens or remix pens

• **Use caution when seeking information & advice!**
Space Allowance

- **Important consideration:** what can be achieved with existing barn space?

- **Experience shows:** do not provide too little space

- **Science is lacking:** 16 sqft is too small, 24 sq ft is sufficient
  - *What happens in between??*

- **EU guidelines:** Gilts: 1.64m² (18 sqft) Sows: 2.25m² (24 sqft)
  - Groups of < 6 sows; 10% more space
  - Groups of > 40 sows; 10% less space

- **Code of Practice** gives similar recommendations...
# Space Allowance

**Code of Practice Recommendation:** Minimum floor space allowances for gilts and sows

<table>
<thead>
<tr>
<th>Group type</th>
<th>Partial slats</th>
<th>Bedded floor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>m²</td>
<td>ft²</td>
</tr>
<tr>
<td>Gilts</td>
<td>1.4 - 1.7</td>
<td>15 - 18</td>
</tr>
<tr>
<td>Sows</td>
<td>1.8 – 2.2</td>
<td>19 - 24</td>
</tr>
<tr>
<td>Mixed</td>
<td>1.7 – 2.1</td>
<td>18 - 23</td>
</tr>
</tbody>
</table>

**Small groups:** larger allowances  
**Large groups:** smaller allowances
Space Allowance - Research

Example: Johnstone and Li, 2013

- Documented sow production comparing stalls to floor feeding (815 sows; parities 1-8)

Methods:

- Same floor space 'footprint' as stalls
  - 1.5 m² (16.1 sq ft)/sow
- Stalls: standard 24” stall (326 sows)
- Large pens: 26 sows (13 pens; 338 sows)
- Small pens: 6 sows (26 pens; 156 sows)
Space Allowance - Research

- **Results**: Large pens gave poorest performance, stalls were best
- No effects on litter size

<table>
<thead>
<tr>
<th></th>
<th>Stalls</th>
<th>Large pens</th>
<th>Small pens</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight gain (kg)</strong></td>
<td>41.5</td>
<td>33.4</td>
<td>39.5</td>
</tr>
<tr>
<td><strong>Farrowing rate (%)</strong></td>
<td>98</td>
<td>92</td>
<td>95</td>
</tr>
<tr>
<td><strong>Removal rate (%)</strong></td>
<td>9.2</td>
<td>15.8</td>
<td>11.7</td>
</tr>
</tbody>
</table>

*Removals: due to reproduction (NIP) or mortality*
Space Allowance

• Conclusions:
  • Sow welfare and performance were reduced in groups
  • Inadequate floor space (16 sq ft/sow)
    – Code recommends minimum: 19 sq ft
  • High drop-outs/removal rate
    – Competitive feeding, sows were not sorted by size/parity
  • Staff were unfamiliar with group management- skeptical and unprepared

• A good example of What NOT TO DO!!!
Space Allowance: ideal vs real

• Science considers more space is better than less
  – Concept of physical & social space
  – Space to move out of the way when required
  – Space to actively avoid bully sows

• Individually fed sows
  – Less aggression and injury occurred when sows kept at 26, than 21 ft²/sow (Weng et al. 1998)
Space Allowance: ideal vs real

- **Commercial setting** - space costs $$$
- important to find **break point** above which sows experience adverse effects
  - Increased aggression
  - Increased drop outs: Sows failing to maintain condition
  - Sows not maintaining pregnancy to term.
Pen Design

The Basics...

• Space allowance
• Feeders and drinkers- ratio, placement
• Layout- avoidance distance, partitions
• Separation of dunging, feeding, resting areas

• **Quality** of space is as important as **quantity**
• **Pen design** is as important for **reducing** **aggression** as pen space (Barnett et al. 1992)
Pen Design - for quality

- **Partitions**
  - Divide pen space to provide options and isolation

- **Flooring - solid areas for lying (sloped)**
  - Encourage correct use of alleys, lying areas
  - Alternative flooring - rubber mats, slat gap covers

- **Enrichment and satiety**
  - Encourage positive behaviours & reduce negative behaviours
  - Wood on chain, in holder, fibrous feeds
Pen Design

- Short partition wall, straw rack enrichment
Pen Design

- Solid flooring
Pen Design

- Enrichment & satiety
Group Size

Small groups

- More common with competitive feeding
- From 10 to 30 sows

- Static groups - same stage of gestation
- Smaller groups - allow formation of more uniform groups (similar size, parity, backfat)

- Uniformity important - sows have similar needs, can compete equally for feed
Group Size

Large groups

- Common with ESF (not possible with competitive feeding)
- From 45 to >300 sows
- In large groups - animals adopt more tolerant behaviours (Samarakone and Gonyou, 2009)
  - Dynamic groups can be formed, adding new sub-groups periodically
- Individual feeding - for different parities
  - Keeping gilts separate is still recommended!
Mixing Aggression

- **Known effects on sow welfare & productivity**
  (Einarrson et al, 2008; Soede et al, 2007)
  - Injury & lameness
  - Disruption of estrus expression
  - Impact of stress on conception rate, litter size

- **Implantation (1-4 weeks)**
  - Sensitive time for mixing
Reducing Aggression at Mixing

- Timing of mixing
- Group formation - social
  - Social experience: Gilt development
  - Static vs dynamic groups
  - Uniform vs diverse parities
- Management - physical
  - Mixing pens, pen design
  - Full feeding, odours, boars, time of day
When to mix?

• Aggression commonly occurs when sows are mixed

Most successful times to mix:

• At weaning
• After insemination
• After implantation (approx. 28 days)
  – sensitive time for mixing
  – Following pregnancy check in stalls
Mixing- four weeks after breeding

• Sows commonly mixed at confirmation of pregnancy (21-35 days)
  - Stalls allow close management from breeding to implantation
  - Monitor estrus, feed consumption, BCS, breeding, preg checking
  - Mixing aggression is delayed until after implantation

But:

• Potential for impact on pigs in the pre-natal environment?
• What if stall use becomes more restricted?
Mixing- at Weaning

• At weaning
  - Mixing aggression resolved before estrus/implantation
  - Evidence that early mixing helps to bring sows onto heat (Pearce and Hughes, 1992)
  - Sow-to-sow contact may help to synchronize estrus

**Concerns:**
• Estrus behaviour (mounting) may lead to injury & lameness
• Mixing aggression may disrupt return to estrus, or inhibit estrus expression (eg in subordinate sows)
• **Added work**- handling sows at breeding, preg checking in groups
Mixing- after insemination

• After insemination
  - Mixing aggression is resolved before implantation
  - Saves on space: Renovations- fewer stalls needed

**Concerns:**
• Mixing must take place shortly after breeding (eg 5 days)
• Li and Gonyou (2013) - mixed at 8 days after insemination
• Farrowing rate was reduced by 5%
• Added work- preg checking in pens
• Solved by adding heat detection units (Eg ESF systems)
Methods:

- **Early Mixing (EM):** Sows mixed *directly at weaning*
- **Late Mixing (LM):** Sows mixed *35 d after breeding* (Control treatment)
- **Pre-socialization (PS):** Sows *mixed at weaning for 48hrs*, then put in stalls for breeding
- **Remixed at 35 d**

• Collaboration with Dr. Y. Li, University of Minnesota
PSC Mixing Study

- Free-access stalls- 14 sows/pen
- Gilts and mixed parity sows
- 24 ft²/sow (in loafing area)
- Stalls used for feeding- otherwise locked out
Mixing Study: Conception rate (%)

- LM sows had significantly lower conception
- No difference in returns or sow removals
### Mixing Study: Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Early Mixing</th>
<th>Pre Socialization</th>
<th>Late Mixing</th>
<th>P val</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total born</td>
<td>15.2 ± 0.4</td>
<td>15.6 ± 0.4</td>
<td>15.5 ± 0.4</td>
<td>0.700</td>
</tr>
<tr>
<td>Born Alive</td>
<td>13.7 ± 0.4</td>
<td>13.3 ± 0.4</td>
<td>13.2 ± 0.5</td>
<td>0.691</td>
</tr>
<tr>
<td>Stillborn</td>
<td>0.95ᵃ ± 0.12</td>
<td>1.54ᵇ ± 0.16</td>
<td>1.58ᵇ ± 0.16</td>
<td>0.003</td>
</tr>
<tr>
<td>Mummies</td>
<td>0.47 ± 0.09</td>
<td>0.44 ± 0.09</td>
<td>0.53 ± 0.09</td>
<td>0.766</td>
</tr>
</tbody>
</table>

n = 84 sows/ treatment

- Fewer stillborn piglets in EM treatment
Mixing Study - Conclusions

• Under PSC conditions (adequate space, controlled feeding)
• Early mixing did not affect sow performance
• Better conception and reduced stillborns in EM sows
  – Clearer estrus expression/more pronounced heat?
  – Benefit of early mixing/placental development?

Take-home message:
• Producers can select the option that suits their system
• Early mixing can reduce space requirements for barn conversions
• Mixing post-insemination: is becoming more common, esp. combined with heat detection (Research ongoing)
**Mixing**

- **Group formation - social**
  - Social experience: gilt development
  - Static vs dynamic groups
  - Uniform vs diverse parities

- **Management - physical**
  - Mixing pens, pen design
  - Full feeding, odours, boars, time of day
Social Experience

Considerations for gilt development:

- **Genetic selection** for low aggression, and passive temperament
- **Socialized**
  with other litters by 12 days
- **Multiple**
  movements and mixing events
Static groups

- Beneficial to reduce competition between sows
- Sows of unequal size show less aggression (Arey and Edwards, 1998)

However....

- Smaller and thinner sows more risk to be disadvantaged (Brouns and Edwards, 1994)

- Group by age, size & body condition
- Use time in breeding stalls to even out sow condition
- Be prepared to remove timid/injured/thin sows
Group formation

Breeding cohort

2,400 sow herd
120 sow breeding cohort

Divide on nutritional requirements

Gilts
Low nutrition
High nutrition

Groups of 40

Small
Large
Small
Large
Small
Large

Each group sub-divided into groups of 20 animals for better control
Physical management

- Dividers to separate pen into multiple feeding zones
- Distribute feed widely in the pen
- Bulkier diets slow eating and can increase aggression (Whittaker et al., 1999)
- Provide ad lib (low nutrient) diets
  - Provides ability for low ranking sows to increase intake (Brouns and Edwards, 1994)
- Or, more frequent feed drops
  - Sows fed 6 x per day, lower body lesions, fewer leg, feet and hoof problems (Schneider et al., 2007)
Hospital pens/Relief pens

- Secure place for animals not coping with group
  - Thin, bullied, injured sows

- Pens should provide:
  - Individual feeding
  - Ensure sow comfort

- Individual or group pens
  - Including stalls

i) Relief pen: sow needing extra feed/bullied but well.
ii) Hospital pen: Sow requiring medical attention, recovery
Location of hospital pens – close to the gestation pen
Hospital pens - recommendations

- 10%
- 5%
- 3-5%
Hospital and Relief pens

- Recommended 1 – 3% of established gestation place units are used for relief pens
  - i.e. 900 dry sow places, 9 – 27 relief pens

- Hospital pens: 2% extra gestation place units
  - i.e. 900 dry sow places require 18 hospital pens

- Herd with concern for high drop out recommends:
  - 5% allowance for relief pens
  - 5% allowance for hospital pens
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Questions?