Sow housing: Is it as simple as changing lanes?

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Is the STALL (a.k.a. a Crate) issue really about WELFARE?
Contentious welfare issue

● 1960’s & 1970’s moved indoors, good reason
  – Typically crates and tethers (majority 1990’s)

● Pressure to change, promoted by
  – Humane activists and Niche-market

● Resistance, thus
  – State-by-state referenda (FL, AZ, OR); Voluntarily phasing out (CO)
  – Market-savvy producers

* Smithfield – started a “phenomenon”
Contentious welfare issue

- Major public issue – 2 x 7 ind. crate
  - Can’t turn around or socially interact
  - Causes compulsive behaviors

- Driven by perception, not science
  - Based on opinion (1997) – exercise & investigatory
  - Activists are motivated

- No alternatives improve well-being
  - “No one system is clearly better than others ...” (McGlone et al., 2004; Rhodes et al., 2005)
**Individual Stall System - Why? Issues?**

- Feed management
- Reduced aggression
- Ease of management
- Better asset utilization, more sows

**Issues**
- Most sows do not “fit”
- Limits socialization
- Limits movement
If it is about welfare, then

- Optimized stall system (as well as group) would be an acceptable choice

- Today’s sows...
  - Can not turn around
  - Can not lie down in full recumbence
  - Limited social interaction

- Provide
  - Space to turn around
  - Move freely and socialize
It’s not about Emotion it’s about Obligation?
What is meant by welfare?

- Welfare ≠ Rights (vice versa); Welfare ≠ Behavior (vice versa)
- Addresses the concern for the well being of individual animals
- Unrelated to perceived rights of the animal
- Animal welfare should be concerned with
  - Physical and mental state of being
  - Proper treatment of animals
Animals may be kept if cared for appropriately (i.e., good husbandry practices [humanely])
- Thirst, hunger and malnutrition
- Discomfort due to environment
- Pain, injury, and disease
- Fear and distress
- To express normal behavior for species

Morally obligated to ensure an animal’s high state-of-well being
It's about ethical and moral obligations

• Provide environments and care
  – Minimizes negative effects on well being and improve adaptability

• Base decisions and changes on scientific principles
  – NOT on perceptions
  – NOT on emotions
  – NOT on disinformation

• Base decisions and changes on species-specific “WANTS and NEEDS”
What does the SCIENCE indicate?
Without science consequences may be greater

- Lack of knowledge and understanding
  - Wrong conclusion
  - Wrong decision

- Potentially leads to law banning the use of stalls
  - Behavioral measures only
  - Public perceptions and emotions
  - May create greater welfare problems
Science support the change?

- **Stalls vs. Groups**
  - Shorter wean-to-estrus;
  - Greater farrowing rate;
  - Reduced reproductive failure;
    (Den Hartog et al., 1993; Backus et al., 1997; Barbari et al., 2000; Karlen et al., 2006)
  - Lower mortality rate;
  - Improved no. born alive and weaned;
  - Heavier litter WW;
    (Cronin et al., 1996; Barbari, 2000; Bates et al., 2003)
Stalls vs. Groups

- Greater farrowing rate;
- Similar reproductive efficiency;
  
  (Friend et al., 1995; Langendijk et al., 2000; Harris et al., 2003; Salak-Johnson et al. 2007)

- More piglets born alive;
- Reduced piglet BW;
- Similar or improved;
- No differences;

  (Friend et al., 1995; Backus et al., 1997; Bates et al., 2000; Salak-Johnson et al., 2007)
Main effect of TRT (mean± SE) on productivity and litter-related traits for sows kept in pens at various floor-space allowances or stalls (FLOOR FED)

<table>
<thead>
<tr>
<th>Measure1</th>
<th>1.4 m²</th>
<th>2.3 m²</th>
<th>3.3 m²</th>
<th>Stall</th>
</tr>
</thead>
<tbody>
<tr>
<td>BW d110, kg</td>
<td>238 ± 4.8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>245 ± 4.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>252 ± 8.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>233 ± 5.5&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>BW d131, kg</td>
<td>226 ± 5.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>238 ± 5.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>234 ± 8.4&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>226 ± 6.4&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Mean BW, kg</td>
<td>224 ± 3.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>231 ± 3.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>234 ± 4.5</td>
<td>223 ± 3.7&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Mean BF, cm</td>
<td>2.01 ± .08&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.34 ± .05&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.16 ± .05&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.06 ± .05&lt;sup&gt;b,c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Litter size, No.</td>
<td>12.4 ± .57&lt;sup&gt;b&lt;/sup&gt;</td>
<td>12.0 ± .60&lt;sup&gt;b&lt;/sup&gt;</td>
<td>14.2 ± .56&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11.1 ± .52&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Litter wean BW, kg</td>
<td>50.2 ± 1.8&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>45.5 ± 1.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>49.5 ± 1.8&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>52.4 ± 1.4&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>BW gain, kg</td>
<td>xx ± .14</td>
<td>3.8 ± .13&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.7 ± .11</td>
<td>4.1 ± .14</td>
</tr>
</tbody>
</table>

Salak-Johnson et al., 2007 JAS 85:1758-1769
Means (± SE) for TRT × parity interaction for performance & litter-related traits for parity 2, 3 & 4 sows in pens at various floor-space allowances or stalls (FLOOR FED)

<table>
<thead>
<tr>
<th>Measure¹</th>
<th>Gestation Treatment</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.4 m²</td>
<td>2.3 m²</td>
</tr>
<tr>
<td>BW d 110, kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>229 ± 6.8&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>216 ± 7.4&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>P3</td>
<td>241 ± 5.1&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>244 ± 6.2&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>P4</td>
<td>256 ± 7.3&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>264 ± 5.9&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Litter size, no.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>11.5 ± 0.8&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>9.6 ± 1.2&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>P3</td>
<td>14.3 ± 1.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10.4 ± 1.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>P4</td>
<td>11.6 ± 1.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>13.6 ± 1.9&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Litter wean BW, kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P3</td>
<td>47.4 ± 3.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>50.1 ± 4.6&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>P4</td>
<td>50.5 ± 2.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>45.3 ± 3.1&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
Pre- vs. Post-implantation effects on percent farrowing rate (6 cycles) (Gonyou – Prairie swine center)

<table>
<thead>
<tr>
<th></th>
<th>Stall Dynamic</th>
<th>Static pre</th>
<th>Dynamic pre</th>
<th>Static post</th>
<th>Dynamic post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity 1</td>
<td>84.7</td>
<td>81.7</td>
<td>85.6</td>
<td>87.6</td>
<td>86.7</td>
</tr>
<tr>
<td>Parity 2</td>
<td>83.8</td>
<td>81.4</td>
<td>81.7</td>
<td>80.0</td>
<td>89.2</td>
</tr>
<tr>
<td>Mature</td>
<td>87.8</td>
<td>83.7</td>
<td>79.5</td>
<td>86.1</td>
<td>88.3</td>
</tr>
<tr>
<td>Adjusted</td>
<td>86.0</td>
<td>82.6</td>
<td>81.6</td>
<td>85.1</td>
<td>88.1</td>
</tr>
</tbody>
</table>

Modified from Noel Williams, PhD; CVS 17th Annual Proceedings, 2007
**Trickle feeding on commercial farm**

- **Early (35-50) and Mid (50-80)**
  - Fighting, minor lameness, few “returns”
  - Some aggression, minor lameness, leg injuries

- **Late**
  - Put out lame and leg injuries ~3.5%

- **Production-similar**
  - 88.7 vs. 87.3, except death rate (7 vs. 8.5)

- **Lesson**
  - No mixing/static
  - High level of husbandry – observational skills
Is it as SIMPLE as removing STALLS and making PENS?
# System Comparison

(Ref: Uwe Weddlge, Futterkamp Research Station; Modified: Noel Williams, PhD; CVS 17th Annual Proceedings, 2007)

<table>
<thead>
<tr>
<th>System</th>
<th>Ease of management</th>
<th>Management training</th>
<th>Protection for sow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stall</td>
<td>****</td>
<td>X</td>
<td>****</td>
</tr>
<tr>
<td>Trickle</td>
<td>***</td>
<td>XX</td>
<td>**</td>
</tr>
<tr>
<td>Drop w/stalls</td>
<td>***</td>
<td>XX</td>
<td>***</td>
</tr>
<tr>
<td>Free Access</td>
<td>***</td>
<td>X</td>
<td>****</td>
</tr>
<tr>
<td>ESF (static)</td>
<td>****</td>
<td>XXX</td>
<td>**</td>
</tr>
<tr>
<td>ESF (dynamic)</td>
<td>***</td>
<td>XXX</td>
<td>**</td>
</tr>
</tbody>
</table>

*Poor, **Acceptable, ***Good, ****Very Good

X Moderate, XX High, XXX Intensive
Group housing, not a jigsaw puzzle!

- Extremely complex, many factors
- Not all fit perfectly or acceptably
- Pieces include, but not limited too
  - Indoors or outdoors, drylot or pasture
  - Group size, floor space allowance
  - Static vs. dynamic
  - Feeding system (group, individual)
  - Other physical and management components
How should group-kept sows be managed?

● AVMA
  – Min. aggression & competition
  – Protection from env’t extremes & hazards
  – Provide feed/water; observation
  – Allow to express normal behaviors

● Additional management strategies
  – Small groups (static)
  – Larger groups (dynamic) and new pen
  – No feeding system, sort and establish groups based on eating
What do we switch to?
What are the alternatives?
What do we change to, based on experience?

● European perspective
  – Germany (Reproductive efficiency reduced)
  – “Group ESF is not the way to go, gestational stalls in the US is the way to go!”
  – Free access stall system (ind-grp)

  – Denmark (Hold on as long as possible)
    – Common genetics
    – Report ≥90% farrowing rate, ≥11 piglets weaned (fine-tuned system)

  – Long term consequences?
How do we keep gestating sows?

- Pork producers face dilemma
  - No guidelines
  - No optimized or alternative system
    - Enhances well-being
    - Sustain pork production

- How do we solve the problem?
  - Give in?
  - Take advantage of the opportunities
Floor, ground, or stall feeding

- **Floor**
  - Simplest, least costly
  - Effectively achieve avg. FI, but variable

- **Competitive in nature**
  - More space
  - Distribute feed across area
  - More feed based on BCS, regroup
  - Feeding stalls – minimizes, but it exists; still can not feed individual rations
One drop across wide area

Increased aggression
  • Eating time, stealing

Hulbert & McGlone, 2006
  • No effects

Jansen et al., 2007
  • Increase in threats, attacks, and fights
Trickle feeding system

- Groups 6 to 8 (most); Rec’d 1.5 kg over 15 min 2x/d
- Minimize “boss sow” – gets feed
- Constantly regrouping and BCS variable
- Solution
  - Vary rate = slowest animal can consume
  - Sort into groups based on feed requirements & speed
Electronic sow feeding system

- Groups of $\geq 30$; 1/\~40
- Control individual FI
- Feed 1x or more
- Fighting = lesions, vulva-biting
- Management
  - Most – 4 to 5 weeks
  - Immediately
  - Static or Dynamic
- Solution: feeder design, placement
Should the STALL go?
A case for the individual “pen”
Manage differently at different stages

- **Welfare challenges change** (Karlen et al., 2006)
  - Groups (early-gestation)
    - Increased scratches (again in late, Salak-Johnson et al., 2007)
    - Higher estrus return
    - Higher cortisol concentrations
  - Stalls (late-gestation)
    - Increased incidence in lameness
A case for a modified stall system

- Would enabling sow to turn around improve her welfare?
- Would increasing width and length provide better welfare environment for the sow?
- Would allowing sows to socially interact and/or move more freely provide better welfare environment for the sow?
Scientifically, we must improve

- May need it for period of time (e.g., post-breeding)

Problem, prevents freedom of movement and size

- 1989 > avg. sow (Curtis), but limited normal postural adjustments
- 2004 < 40% (McGlone), w/in groups and between; Majority contained, 95% ≤ 201 cm
- Body depth increase ~1.2 mm/d
A case for a modified stall system

- Freedom to turn around – w/out difficulty
  - Industry chose not to adopt

- Adjustable stall – accommodate the ever changing sow
  - Not developed?

- Free access stall – sow chooses
  - Freedom to socialize and move, but safe
We need to change, but are we READY to Change?
We haven’t optimized the important pieces

- Scientifically, haven’t evaluated specific aspects that truly meet the wants and needs
- Few differences directly correlate with improved well being
- Identified pieces that are most critical to an optimized housing system?
Are the so-called plusses and minuses

● So-called advantages
  – Some freedom of movement
  – Opportunity for social interaction
  – Choice among microenvironments

● So-called disadvantages
  – Early on – aggression
  – Duration – social tension
  – Variable BCS and injury

● Fails, sow welfare worse
  – Poor management = poor welfare (unethical)
Must learn from others, improved well being? better welfare?

It's the nature of the species at hand
When it goes bad, it goes bad!
Welfare better? Lesions, BCS, behavior problems

- Vulva biting
- Aggression
- High lesion score
- Abnormal behaviors
- Oral-nasal-facial behaviors
Conclusions
It’s not that simple, don’t abandon ship!
Learn from experience and optimize

- Some work (European experience)
  - Advantages and disadvantages
  - One factor goes bad – welfare worse?
  - Superior management, better training (skilled husbandry)

- Factors that enhance welfare
  - Identified, characterized, & optimized

- Not jigsaw puzzle
  - Pieces don’t fit, influence each other (e.g., feeding systems)
General Conclusions and considerations

- May be a domino effect
  - Dominance hierarchy
  - Group size, floor space allowance
  - Static or dynamic
  - Feeding system

- Individual & group-housed systems can perform equally
  - Management, equipment, others optimized
Must be careful transitioning to new systems!

- Few differences directly correlate with improved well being
- Housing systems are complex
- Don’t abandoned ship, it is not as simple as removing stalls and designing pens
General Conclusions and considerations

- No system identified
  - Improves sow well being
  - Perform similarly

- Thus not as simple as eliminating the stall!
  - Does the sow really need to or want to turn around?
  - Does the sow really need to or want to socially interact?
Thank you!