Individual feed intake during lactation as a trait to improve animal welfare

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Introduction

Biggest challenges during lactation:

• Litter size, number of teats and litter homogeneity = important selection traits

• Litter size and litter weight at weaning ↑

• Higher energy demand of lactating sows → feed intake has not increased equally → losses in backfat and body weight of sows increase (Eissen et al., 2000, 2003; Kruse at al., 2011)

Negative effects on animal health, wellbeing and performance
Aim

• Recording of individual feed intake of sows during lactation
• Recording of body condition of sows based on different traits:
  – Body weight (BW)
  – Backfat thickness (BFT)
  – Body Condition Score (BCS)

Relationship between feed intake and traits of body condition of lactating sows → animal welfare
Material and methods

• Nucleus farm BHZP GmbH Germany

• October 2016 until March 2018 (N=24 batches)

• Purebred landrace db.01 sows, kept in single free-movement pens
  – 905 litters
  – 562 sows (repeated)
  – 32 - 40 sows/batch

• Duration of lactation: ca. 4 weeks

Source: BHZP
Material and methods

- **Parity-groups (pg) of sows:**
  - pg1 (parity 1): 350 litters
  - pg2 (parity 2): 248 litters
  - pg3 (parity ≥ 3): 307 litters

- **Feeding of sows:**
  - automatic feeding system (Spotmix, Schauer Agrotronic GmbH)
  - according to good BHZP- farm management practices
  - monday after farrowing: 3 times/day, 13.4 MJ ME/kg feed
Material and methods

• Recording of individual feed intake FI (kg/day/sow) and energy intake EI (MJ ME/day/sow)
  – automatically via feeding system
  – correction of FI with FI-protocol/sow

• Traits of body condition of sows (12-36h p.p.; at weaning)
  – BW (kg)
  – BFT (mm): P2-Position-7 cm away from body midline at the last rib level
  – BCS: 1-emaciated, 2-thin, 3-optimal, 4-slightly overweight, 5-overweight
  – losses of BW, BFT, BCS

• Statistical analysis: 9.4 SAS
Results and Discussion

• Individual Feed and Energy intake of lactating sows by parity-group (*mean ± SD*)

<table>
<thead>
<tr>
<th>Trait</th>
<th>pg1</th>
<th>pg2</th>
<th>pg3</th>
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</thead>
<tbody>
<tr>
<td>FI (kg/day/sow)</td>
<td>4.6&lt;sup&gt;a&lt;/sup&gt; ± 0.4</td>
<td>5.4&lt;sup&gt;b&lt;/sup&gt; ± 0.5</td>
<td>5.3&lt;sup&gt;b&lt;/sup&gt; ± 0.5</td>
</tr>
<tr>
<td>EI (MJ ME/day/sow)</td>
<td>61.4&lt;sup&gt;a&lt;/sup&gt; ± 5.8</td>
<td>71.9&lt;sup&gt;b&lt;/sup&gt; ± 7.2</td>
<td>70.9&lt;sup&gt;b&lt;/sup&gt; ± 6.9</td>
</tr>
</tbody>
</table>

a:b-p<0.05

• Other studies:
  – Factors: genetics, feeding system, housing etc. (Eissen, 2000; Yoder et al., 2013)
  – 5.9 kg/day/sow (Kruse et al., 2011); 6.9 kg/day/sow (Kecman, 2016)
  – 4.2 kg milk for 1 kg litter weight gain (Kecman, 2016)
## Results and Discussion

### Traits of body condition of sows by parity-group (*mean ± SD*)

<table>
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<tbody>
<tr>
<td>BW 12-36h p.p., kg</td>
<td>219.8&lt;sup&gt;a&lt;/sup&gt; ± 15.2</td>
<td>259.3&lt;sup&gt;b&lt;/sup&gt; ± 18.0</td>
<td>288.3&lt;sup&gt;c&lt;/sup&gt; ± 23.89</td>
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<tr>
<td>BW at weaning, kg</td>
<td>196.5&lt;sup&gt;a&lt;/sup&gt; ± 16.9</td>
<td>235.1&lt;sup&gt;b&lt;/sup&gt; ± 20.3</td>
<td>263.6&lt;sup&gt;c&lt;/sup&gt; ± 25.5</td>
</tr>
<tr>
<td>Weight loss, kg</td>
<td>23.4 ± 11.6</td>
<td>24.2 ± 12.2</td>
<td>24.8 ± 12.9</td>
</tr>
<tr>
<td>BFT 12-36h p.p., mm</td>
<td>17.3 ± 3.0</td>
<td>17.7 ± 3.9</td>
<td>17.9 ± 4.5</td>
</tr>
<tr>
<td>BFT at weaning, mm</td>
<td>14.7 ± 3.3</td>
<td>15.2 ± 3.9</td>
<td>15.3 ± 4.5</td>
</tr>
<tr>
<td>BCS 12-36h p.p.</td>
<td>3.5 ± 0.6</td>
<td>3.1 ± 0.7</td>
<td>3.1 ± 0.8</td>
</tr>
<tr>
<td>BCS at weaning</td>
<td>2.6 ± 0.6</td>
<td>2.6 ± 0.7</td>
<td>2.7 ± 0.7</td>
</tr>
</tbody>
</table>

<sup>a:b:c</sup>-<em>p</em>&lt;0.05
Results and Discussion

**BW-loss (in %):**

- **pg1:** -11%
- **pg2:** -9%
- **pg3:** -9%

**BFT-loss (in mm):**

<table>
<thead>
<tr>
<th>Parity Groups</th>
<th>BFT Loss (mm)</th>
<th>BFT (mm) at weaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>pg1</td>
<td>-2.6 ± 1.6</td>
<td>14.7 ± 3.3</td>
</tr>
<tr>
<td>pg2</td>
<td>-2.5 ± 1.9</td>
<td>15.2 ± 3.9</td>
</tr>
<tr>
<td>pg3</td>
<td>-2.5 ± 1.7</td>
<td>15.3 ± 4.5</td>
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</tbody>
</table>

**Other studies:**

- 10% BW-loss pg1 → negative effect on productivity → smaller second litter size (Thaker and Bilkei, 2005; Schenkel et al., 2010)
- High BW-loss → negative effect on health and welfare
Results and Discussion

Correlations between daily FI and traits of body condition of sows

<table>
<thead>
<tr>
<th>Traits</th>
<th>BW-loss</th>
<th>Loss in BCS</th>
<th>Loss in BFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily FI (Daily EI)</td>
<td>0.22</td>
<td>0.21</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>(&lt;.0001)</td>
<td>(&lt;.0001)</td>
<td>(&lt;.0001)</td>
</tr>
<tr>
<td>BW-loss</td>
<td>0.34</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(&lt;.0001)</td>
<td>(&lt;.0001)</td>
<td></td>
</tr>
<tr>
<td>Loss in BCS</td>
<td></td>
<td></td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(&lt;.0001)</td>
</tr>
</tbody>
</table>

Other studies:
- BW-loss : Loss in BFT: \( r_p = 0.494 \) (Kecman, 2016)
Conclusions and Outlook

• Feed/energy intake correlated with traits of body condition
• Traits of body condition → indicators for animal welfare
• FI needs to be improved (breeding program) → + effect on body condition and animal welfare
  – Especially 1<sup>st</sup> parity sows need special attention
• **Outlook:**
  – Emphasis on free movement farrowing systems
  – Relationship between FI, traits of body condition, traits of litter and rearing performance → estimation of variance components → breeding program
Thank you for your attention!

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