Simple and operational measures for assessment of welfare of finishing pigs on the day of slaughter

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Background

Increasing demands for documentation from the market and the EU (EU regulation 1099/2009)


On-site tools for continuous monitoring
Aim

- To investigate the relationship between an overall assessment of welfare based on the WQ® protocol and selected post mortem physiological measures (glucose, lactate, creatine kinase activity, albumin and total protein).
The day of slaughter

Brandt and Aaslyng, Meat Science 103, pp. 13-23, 2015
Materials and methods - single welfare measures

- 80 pigs from 4 four herds
- Commercial 3-deck lorries
- Danish commercial abattoir
- 1 hour lairage, 15 pigs/pen
- Automatic race to stunning
- CO₂ stunning in groups
- Sticking 820 pigs/hour

Unloading ➔ Lairage ➔ Race to stunning
Results – single welfare measures

- ↑ Slipping in the race → ↑ Glucose
- ↑ Slipping in the race → ↑ Lactate
- ↑ Skin damage → ↑ Creatine kinase

-> relevant indicators for assessing welfare on the day of slaughter

Brandt et al., Livestock Science 157, pp 535-544, 2013
Materials and methods – aggregated welfare assessment

- 480 pigs from 12 herds

0. Home pen
Skin damage
Duration

1. Pick-up pen
Skin damage
Duration

2. Loading
Handling
Turning back
Falling

3. Transport
Duration of transport
Duration of breaks
Outdoor temperature

4. Unloading
Handling
Turning back
Falling

5. Lairage
Skin damage
Duration
Aggression

6. Race
Slipping
Falling
Moved by gate

7. Sticking
Blood sample

8. Slaughter line
Skin damage
pH45
Results - aggregated welfare assessment
## Results - aggregated welfare assessment

<table>
<thead>
<tr>
<th>Stage</th>
<th>LS means</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pick-up pen</td>
<td>3.93&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>1.08</td>
</tr>
<tr>
<td>Loading</td>
<td>4.46&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.22</td>
</tr>
<tr>
<td>Transport</td>
<td>3.65&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.00</td>
</tr>
<tr>
<td>Unloading</td>
<td>4.15&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>1.14</td>
</tr>
<tr>
<td>Lairage</td>
<td>3.94&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>1.08</td>
</tr>
<tr>
<td>Race</td>
<td>4.11&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>1.13</td>
</tr>
</tbody>
</table>

**Stage** | **Measure** | **LS means** | **Weight**
---|---|---|---|
**Loading** | Duration | 2.7<sup>a</sup> | 1.0 |
|           | Handling  | 4.5<sup>c</sup> | 1.7 |
|           | Reluctance to move | 2.7<sup>a</sup> | 1.0 |
|           | Turning back | 2.8<sup>a</sup> | 1.0 |
|           | Slipping  | 3.3<sup>b</sup> | 1.2 |
|           | Falling   | 4.0<sup>c</sup> | 1.5 |
|           | Overlapping | 3.4<sup>b</sup> | 1.3 |

→ Animal Welfare Index (AWI)

Submitted to Animal Welfare
## Results - aggregated welfare assessment

<table>
<thead>
<tr>
<th>AWI_{Stage}</th>
<th>n</th>
<th>Lactate - fatigue</th>
<th>Glucose - fatigue</th>
<th>Creatine kinase - skin damage</th>
<th>T-protein - dehydration</th>
<th>Albumin - dehydration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pick-up</td>
<td>287</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>positive**</td>
<td>NS</td>
</tr>
<tr>
<td>Loading</td>
<td>320</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>positive*</td>
<td>NS</td>
</tr>
<tr>
<td>Transport</td>
<td>311</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>negative***</td>
<td>NS</td>
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<tr>
<td>Unloading</td>
<td>365</td>
<td>NS</td>
<td>positive***</td>
<td>positive***</td>
<td>negative*</td>
<td>NS</td>
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<tr>
<td>Lairage</td>
<td>279</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Race</td>
<td>341</td>
<td>positive*</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>positive**</td>
</tr>
<tr>
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<td>NS</td>
<td>negative*</td>
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<td>NS</td>
</tr>
</tbody>
</table>

### Correlations between skin damage score and creatine kinase

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Correlations between skin damage score and creatine kinase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home pen</td>
<td>411</td>
<td>0, NS</td>
</tr>
<tr>
<td>Pick-up pen</td>
<td>327</td>
<td>0.34, P &lt; 0.00001</td>
</tr>
<tr>
<td>After lairage</td>
<td>377</td>
<td>0.45, P &lt; 0.00001</td>
</tr>
<tr>
<td>Post-mortem</td>
<td>361</td>
<td>0.43, P &lt; 0.00001</td>
</tr>
</tbody>
</table>
Conclusion

- Fatigue (measured by lactate),
- Damages (measured by creatine kinase),
- Dehydration (measured by either albumin or total protein or both)

**Potential candidates** for the development of a future on-line monitoring of animal welfare on commercial abattoirs to document the level of welfare (e.g. above vs. below a certain threshold).
Thank you!