Foot pad health and mortality as part of ‘Controlling’ in commercial Turkey production

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Monitoring

- Collect data

- Parameters
  - Measurable
  - Several parameters linked to/ sustain one indicator

Controlling

- Collect and evaluate data ... of the current flock

- Parameters and Indicators
  ... detect a critical situation in time
  ... Signals: risk? no risk? measures required?
• Application of animal-welfare related indicators
  - demanded by German Animal Protection Act §11, 8 (2013)

➢ Few indicators
  - early stage information
  - act in time... prospectively
  - time frames
Aims of the study

• Identify **time frames of risk for mortality and foot pad health**
  – Under consideration of season, sex, age

• Both parameters indicate deviation from target value premature

• Suitability as indicators for animal health and welfare according to on-farm controlling
Animals, Material and Methods
Animals, Material and Methods

Farms

- One year period
  - Summer and winter cycle

- 13 Farms
  - Different number of flocks per farm

- B 85,000 and @ 18,500 per cycle

Mortality

- Farm record (2x daily, number, death or culled)
Animals, Material and Methods

Data collection

Mortality
- Farm record (2x daily, number, death or culled)

Foot pad health
- Macroscopic scoring
  - 5-Point scale, according to Hocking et al. 2008
- 60 animals/ flock
  - Cleaned right and left foot pad per animal, about 11,400 pairs
- 1., 4., 8., 12., 16. week of life (B and @) and p.m. (B)
- Data about litter management, e.g. material, quantity, dispersing frequency
Statistical analysis

Mortality

@ and B rearing: time frames of risk
• Correlation between various points of time
• Twotail Spearman correlation

B fattening: time frames of risk
• Merging of weekly mortality data of all flocks
• Results were calculated in 1\textsuperscript{st}, 2\textsuperscript{nd}, 3\textsuperscript{rd} and 4\textsuperscript{th} quartile
Foot pad health (FPD)

Influence of litter management

• stepwise multiple regression analysis (SPSS Vs.23)

\[ y_{1,2} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 \]

• \( y_1 = \) FPD 16th week of life
• \( y_2 = \) FPD 20th week of life

• \( x_1 = \) litter dispersing interval during fattening (0-1, 2-3, 4-6 times/week)
• \( x_2 = \) time of starting litter dispersing in fattening period (5., 7.-8. or 11. week of life)
• \( x_3 = \) litter amount rearing period (0.8-3.8, 3.9-5.9, 6.0-8.4 kg/m²)
• \( x_4 = \) litter amount fattening period (0-8, 8.1-16, 16.1-24 kg/m²)
• \( x_5 = \) litter material (straw pellet, wood shaving, straw)

• U-test FPD 16th week of life
in winter cycle 2 categories of litter dispersing interval during fattening (2-3, 4-6 times/week)
Results and Discussion
## Mortality - rearing period

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>winter</td>
<td>summer</td>
</tr>
<tr>
<td>n (animals/ no. flocks)</td>
<td>21,800/4</td>
<td>17,500/3</td>
</tr>
<tr>
<td></td>
<td>86,600/16</td>
<td>82,100/14</td>
</tr>
<tr>
<td>7-day Mortality (% cumulative)</td>
<td>0.8 (±0.2)</td>
<td>1.2 (±0.9)</td>
</tr>
<tr>
<td></td>
<td>0.8 (±0.3)</td>
<td>1.3 (±1.0)</td>
</tr>
<tr>
<td>Median</td>
<td>0.90</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>0.70</td>
<td>1.00</td>
</tr>
<tr>
<td>1.-35. day of life (% cumulative)</td>
<td>1.9 (±0.5)</td>
<td>1.8 (±1.0)</td>
</tr>
<tr>
<td></td>
<td>1.8 (±1.5)</td>
<td>3.3 (±1.5)</td>
</tr>
<tr>
<td>Median</td>
<td>2.10</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>1.80</td>
<td>1.80</td>
</tr>
</tbody>
</table>

- Influence of age and season
- After first week adapt management measures
- Hatchery?
- Housing conditions?
## Results and Discussion

### Mortality - fattening period

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<td></td>
<td>21,800/4</td>
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</tr>
<tr>
<td><strong>6.-16./21. week of life (% , average per week)</strong></td>
<td>Mean (SD)</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td>0.23 (±0.1)</td>
<td>0.24 (±0.5)</td>
</tr>
<tr>
<td></td>
<td>0.19</td>
<td>0.16</td>
</tr>
</tbody>
</table>

### Influenced by

- **sex**  (RUDOLF 2008, CLARK and BAILEY 2014)

- **season**  (RUDOLF 2008, KRAUTWALD-JUNGHANNS and FEHLHABER 2009, DAMME 2015)
• Different time frames of risk for male mortality – depend on season and age (CLARK and BAILEY 2014)

♂ Mortality - fattening period

Results and Discussion

 Influence of age and season

 Heatstress?
 Vaccination?
 Onset of puberty?
## Results and Discussion

### Foot pad health – Score 0-4

<table>
<thead>
<tr>
<th>Week of life</th>
<th>Female</th>
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<th>Male</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>winter</td>
<td>summer</td>
<td>winter</td>
<td>summer</td>
</tr>
<tr>
<td>1</td>
<td>n 220</td>
<td>180</td>
<td>n 661</td>
<td>720</td>
</tr>
<tr>
<td>Median</td>
<td>0.75\textsuperscript{a}</td>
<td>0.00\textsuperscript{b}</td>
<td>Median</td>
<td>0.73\textsuperscript{a}</td>
</tr>
<tr>
<td>4</td>
<td>n 240</td>
<td>180</td>
<td>n 839</td>
<td>840</td>
</tr>
<tr>
<td>Median</td>
<td>0.55\textsuperscript{a}</td>
<td>0.42\textsuperscript{b}</td>
<td>Median</td>
<td>0.84\textsuperscript{a}</td>
</tr>
<tr>
<td>8</td>
<td>n 240</td>
<td>180</td>
<td>n 873</td>
<td>1140</td>
</tr>
<tr>
<td>Median</td>
<td>1.91\textsuperscript{a}</td>
<td>1.62\textsuperscript{b}</td>
<td>Median</td>
<td>1.68\textsuperscript{a}</td>
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<tr>
<td>12</td>
<td>n 240</td>
<td>180</td>
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<td>1040</td>
</tr>
<tr>
<td>Median</td>
<td>2.31\textsuperscript{a}</td>
<td>1.90\textsuperscript{b}</td>
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<tr>
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<td>120</td>
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<td>1080</td>
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<tr>
<td>Median</td>
<td>2.26\textsuperscript{a}</td>
<td>2.32\textsuperscript{a}</td>
<td>Median</td>
<td>2.29\textsuperscript{a}</td>
</tr>
<tr>
<td>p.m.</td>
<td>no evaluation</td>
<td></td>
<td>n 840</td>
<td>1173</td>
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\textsuperscript{a,b}: different superscripts (within a row and sex) indicate significant differences; \( p<0.05 \) (Mann-Whitney U-test)
## Results and Discussion

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- Influenced by season, sex and age (KRAUTWALD-JUNGHANNS et al. 2011; BERGMANN et al. 2013)
Results and Discussion

Foot pad health

FPD and litter management

(male, winter)

- **FPD 20\textsuperscript{th} week of life** = 1.505 + 0.052* litter amount fattening period, \(p<0.01\)

- **FPD 16\textsuperscript{th} week of life** = 0.420 + 0.766* fattening litter dispersing interval, \(p<0.001\)

2-3 times per week \(\rightarrow\) 11.2 - 14.2 kg straw/m\(^2\) \(\rightarrow\) FPD Score 2.2 (Median)

4-6 times per week \(\rightarrow\) 17.5 to 22.6 kg straw/m\(^2\) \(\rightarrow\) FPD Score 2.6 (Median)

U-test: \(U=0.000, p<0.001\)

cf. EKSTRAND et al. 1997
Evaluation of a farm requires data from more than one flock

**Mortality rearing period:**
- Focus on chicks -> 1st week mortality rate indicates mortality of rearing period

**Mortality fattening period:**
- Focus on week 12 to 15 and 20 to 21

**Foot pad health**
- Monitoring and evaluation of foot pad health already during rearing
  - Time frames of risk for FPD esp. 1st to 8th week of life
- Indicates husbandry conditions
  - To prevent foot pad lesions *variable litter dispersing frequency useful*
This study was mainly supported by the Turkey farmers, the Ministry of Agriculture and and the Ministry of Science and Culture in Lower Saxony within the PhD programme „Animal Welfare in Intensive Livestock Production Systems“

contact: k.toppel@hs-osnabrueck.de
**Boniturschlüssel für die Bewertung der Fußballengesundheit nach HOCKING et al. (2008)**

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No lesions</td>
<td>Small necrotic area</td>
<td>Hyperceratosis, necrotic area $d \frac{1}{4}$ of foot pad</td>
<td>Hyperceratosis, necrotic area $d \frac{1}{2}$ of foot pad</td>
<td>necrotic area $&gt; \frac{1}{2}$ of foot pad</td>
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*Score 0 1 2 3 4*
Foot pad health (FPD)

Influence of litter management

- stepwise multiple regression analysis (SPSS Vs.23)
- \[ y_{1,2} = \beta_0 + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + \beta_3 \cdot x_3 + \beta_4 \cdot x_4 + \beta_5 \cdot x_5 \]

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