Recent Advances in Turkey Welfare

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Animal welfare: why care?
Changes and Advances

Public/societal
- Public perceptions
- Legislative changes
- Technology
Massachusetts Minimum Size Requirements for Farm Animal Containment, Question 3 (2016)

The Massachusetts Minimum Size Requirements for Farm Animal Containment, also known as Question 3, was on the November 8, 2016, ballot in Massachusetts as an Indirect initiated state statute. It was approved.

A "yes" vote supported this proposal to prohibit the sale of eggs, veal, or pork of a farm animal confined in spaces that prevent the animal from lying down, standing up, extending its limbs, or turning around.

A "no" vote opposed this proposal.

Election results

<table>
<thead>
<tr>
<th>Result</th>
<th>Votes</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2,530,143</td>
<td>77.64%</td>
</tr>
<tr>
<td>No</td>
<td>728,654</td>
<td>22.36%</td>
</tr>
</tbody>
</table>

Election results from Massachusetts Secretary of the Commonwealth

Overview

This law prohibited breeding pigs, calves raised for veal, and egg-laying hens from being held in confined spaces. Question 3 defined confined as meaning that which "prevents the animal from lying down, standing up, fully extending its limbs, or turning around freely." This law also applied to business owners who knowingly sell pork, veal, or eggs from animals held in this way, even if the source is outside of Massachusetts.
Changes and Advances

Industry
- Certification programs
- Animal welfare standards
- Disease and disease management
Turkey production
Changes and Advances

Animal welfare risks and challenges
Welfare risks and challenges

• Space requirements/stocking density
• Injurious pecking
• Footpad dermatitis
• Leg weakness and skeletal health
• Disease and mass depopulation
• Stress, transportation and handling
Space and stocking density

Stocking density

- weight/unit area or birds/unit area
- Higher density (> 29.3 kg/m$^2$ or 6 lb/ft$^2$) associated with
  - Reduced body weight
  - Reduced feed efficiency
  - Increased mortality rates
  - May increase injurious pecking

Space and stocking density

Stocking density

• Higher density (> 29.3 kg/m² or 6 lb/ft²) associated with
  – Disturbances of resting birds
  – Higher risk of
    • Breast blisters
    • Respiratory problems
    • Footpad dermatitis

Injurious pecking

- Head pecking
- Feather pecking
- Cannibalism
Injurious pecking

• Injuries due to severe pecking responsible for 58% of culls and mortalities (commercial farm)
  – Mortalities 2.9 %, culls 2.4% (5.3% together)
  • Duggan et al., 2014.

The development of injurious pecking in a commercial turkey facility

G. Duggan,* T. Widowski,* M. Quinton,* and S. Torrey*†

http://dx.doi.org/10.3382/japr.2013-00860
Injurious pecking

• Pecking injuries > 3 mm depth or 1 cm$^2$ area associated with continued pecking
  – Almost always fatal
  • Moinard et al., 2001.

THE EFFECTS OF LIGHT INTENSITY AND LIGHT SOURCE ON INJURIES DUE TO PECKING OF MALE DOMESTIC TURKEYS (MELEAGRIS GALLOPAVO)

C Moinard†, P D Lewis, G C Perry and C M Sherwin

Animal Welfare 2001, 10: 131-139
Injurious Pecking

- Head pecking
  - Related to aggression
  - Problem in turkey toms
Injurious pecking

• Feather pecking
  – Genetic differences in feather damage
  – Male vs. female
  – Activity level
Feather pecking

• Feather pecking-related lesions correlated with other issues (Allain et al., 2013)
  – Leg problems
  – Footpad swelling
  – Deviated toes

Footpad dermatitis (FPD)

- Can develop by 3-5 days of age (Bergmann et al., 2013)
- Incidence as high as 95% of turkeys in US flocks (Da Costa et al., 2014)
- Females at higher risk than males (Bergmann et al., 2013; Vermette et al., 2016)
Footpad dermatitis (FPD)

- Multifactorial
  - Associated with stocking density, humidity, ventilation, litter moisture and other factors
- Changes in bird behavior indicate FPD is painful
  - Less walking, standing and environmental pecking (Sinclair et al., 2015)
  - Turkeys with FPD and analgesics behave the same as turkeys without FPD (Sinclair et al., 2015)
Advances in understanding stocking density effects

• Effect of bird density and bedding source on the behavior of heavy turkey hens
  – M. Erasmus, K. VanDeWater, D. Karcher, R. M. Hulet and S. Noll

Many thanks to Lisa Kitto, Gabrielle House, Brianna Elliott and Yiru Dong

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Objective and hypothesis

• Objective
  – Examine the effects of stocking density and bedding source on behavior of female turkeys

• Hypothesis
  – Stocking density adversely affects feather pecking behavior and the number of disturbances
Turkeys and housing

Female commercial turkeys (Hybrid Converter)

• 3 x 2 factorial (4 pens/treatment)

• Stocking density

<table>
<thead>
<tr>
<th>Density</th>
<th>Birds/m²</th>
<th>m²/bird</th>
<th>kg/m²</th>
<th>ft²/bird</th>
<th>lb/ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>7.1</td>
<td>0.14</td>
<td>71</td>
<td>1.50</td>
<td>14.54</td>
</tr>
<tr>
<td>MED</td>
<td>5.3</td>
<td>0.19</td>
<td>56</td>
<td>2.05</td>
<td>11.50</td>
</tr>
<tr>
<td>LOW</td>
<td>4.2</td>
<td>0.24</td>
<td>46</td>
<td>2.58</td>
<td>9.42</td>
</tr>
</tbody>
</table>

• Bedding type
  – Pine shavings (PS)
  – Giant miscanthus grass (MG)
# Stocking density comparison

<table>
<thead>
<tr>
<th>Source</th>
<th>Category</th>
<th>lb/ft²</th>
<th>kg/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Turkey Federation</td>
<td>“measurable standard”</td>
<td>15</td>
<td>73.2</td>
</tr>
<tr>
<td>Global Animal Partnership</td>
<td>Step 1</td>
<td>10</td>
<td>48.8</td>
</tr>
<tr>
<td></td>
<td>Step 2</td>
<td>7.5</td>
<td>36.6</td>
</tr>
<tr>
<td></td>
<td>Step 3</td>
<td>6.5</td>
<td>31.7</td>
</tr>
<tr>
<td></td>
<td>Steps 4 &amp; 5</td>
<td>6</td>
<td>29.3</td>
</tr>
<tr>
<td>Certified Humane</td>
<td>Maximum</td>
<td>7.5</td>
<td>36.6</td>
</tr>
<tr>
<td>Canadian Codes of Practice</td>
<td>Hens (13.7-23.8 lb, 6.2-10.8 kg)</td>
<td>9.2</td>
<td>45</td>
</tr>
<tr>
<td>Ag Guide</td>
<td>13.2-26.4 lb (6.0-12.0 kg)</td>
<td>8.8</td>
<td>42.7</td>
</tr>
</tbody>
</table>

## Density

<table>
<thead>
<tr>
<th>Density</th>
<th>lb/ft²</th>
<th>kg/m²</th>
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</thead>
<tbody>
<tr>
<td>LOW</td>
<td>9.4</td>
<td>46</td>
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<td>HIGH</td>
<td>14.5</td>
<td>71.0</td>
</tr>
</tbody>
</table>
Behavioral observations

• Focal animal sampling
• 5 randomly selected birds/pen
• 1 day at each of 13 and 14 wk (2 days total)
  – 9-9:15 am
  – 3-3:15 pm

• Duration
  – Sitting
  – Standing
  – Drinking
  – Eating
  – Walking
  – Preening

• Frequency
  • Sitting
  • Standing
  • Drinking
  • Eating
  • Walking
  • Preening
  • Feather pecking
  • Aggression
  • Disturbances
Effect of density on duration of behavior

![Graph showing the effect of density on the duration of various behaviors (Sit, Stand, Eat, Drink, Preen, Walk). The graph displays the mean (± SE) duration (s) for each behavior at different density levels (LOW, MED, HIGH). The densities are 1.5, 2.05, and 2.58 ft²/bird. The graph highlights significant differences between the densities for certain behaviors.]
Effect of density on frequency of behavior

![Bar chart showing the effect of density on frequency of various behaviors. The chart includes behaviors such as Sit, Stand, Eat, Drink, Preen, Walk, Peck, and disturb. The chart indicates that Stand has the highest frequency, followed by Peck and Walk. The chart also shows that the frequency of behavior increases with increasing density.]
Effect of bedding on duration of behavior

Pine shavings or miscanthus grass
Effect of bedding on frequency of behavior

Mean (± SE) Number of Observations

<table>
<thead>
<tr>
<th>Behavior</th>
<th>PS</th>
<th>MG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Stand</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Eat</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Drink</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Preen</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Walk</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

Pine shavings or miscanthus grass
Summary of results

<table>
<thead>
<tr>
<th>Main Effect</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of day</td>
<td>• Longer duration of sitting and standing in pm</td>
</tr>
<tr>
<td></td>
<td>• Longer duration and greater frequency of eating in am</td>
</tr>
<tr>
<td>Bedding</td>
<td>• Longer duration of sitting on miscanthus grass</td>
</tr>
<tr>
<td></td>
<td>• Longer duration of eating, drinking and walking on pine shavings</td>
</tr>
<tr>
<td></td>
<td>• Greater frequency of standing, drinking, walking and feather pecking on pine shavings</td>
</tr>
<tr>
<td>Density</td>
<td>• Duration and frequency of walking highest at lowest density</td>
</tr>
</tbody>
</table>
Objectives and hypothesis revisited

• Examine the effects of stocking density and bedding type on behavior of female turkeys

• Hypothesis
  – Stocking density will negatively affect feather pecking behavior and the number of disturbances
Discussion

• Previous research: feather damage worse at higher density
  – 0.74 vs. 1.86 m²/bird (Gill and Leighton, 1984)

• Stocking density (0.14, 0.19, 0.24 m²/bird) did not influence feather pecking behavior
  – Did not examine feather damage
Discussion

• Previous research: duration of resting time without being disturbed lower when stocking density higher (Martrenchar et al., 1999)

• Stocking density (0.14, 0.19, 0.24 m²/bird) did not influence number of disturbances
  – Densities differ from Martrenchar et al. (1999)
    • 0.40, 0.31, 0.25 m²/bird
Conclusions

• Behavior affected by bedding source
  – More active, including more feather pecking, on pine shavings than miscanthus grass

• For the densities studied (0.14, 0.19, 0.24 m²/bird)
  – Birds walked less often and for shorter periods of time at the higher densities
    • Corresponds to results for footpad dermatitis (Dr. Sally Noll’s lab)
Thank you!
References