Cow comfort assessments and their implications

Our Mission
To develop practical solutions to improve the health, longevity, productivity and welfare of dairy cattle

The Science Behind the Dairy Cow
- Focus on nutrition/reproduction/genetics
- Metabolic profiling
- Despite tremendous advances, the incidence of post calving disease (including lameness) remains high
  - Cow comfort?

The Art (& Science) of Cow Comfort
- Careful observation combined with experience!

The Science of Cow Comfort
- Detailed analysis of behavior
- Measures of injury and disease

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- Measures of injury and disease
- Preference tests
  - I’ll take this one, thanks!
The Science of Cow Comfort

- Detailed analysis of behavior
- Measures of injury and disease
- Preference tests
- Measures of usage

Designing suitable environments for the dairy cow

Lying Standing areas (not feeding)

Feeding

Design and management of the lying area: Bedding

Time lying (h/d)

Cows familiar with sawdust spend less time lying on sand...

Tucker et al., 2003. J. Dairy Sci. 86:521-529

Time lying (h/d)

...but cows familiar with sand show adequate lying times on this surface.

Tucker et al., 2003. J. Dairy Sci. 86:521-529

Design and management of the lying area: Bedding

Adding bedding to mattresses improves lying times

Lying time (h/24h)

Amount of sawdust bedding (kg)

Tucker & Whaery, JDS, J. Dairy Sci. 87:2889-2895

Bedding in deep-bedded stalls
Days after sand bedding was added and leveled

Design and management of the lying area: Bedding

Cows spend less time lying down in stalls that have not been maintained

Strong preference for dry lying areas

Dry lying areas = longer lying times
Design and management of the lying area: Stall surface

Hock injuries?

- Prop. with lesions
- Hock joint

- sawdust
- mattress
- sand

Lesions develop rapidly when moved to free stalls from pasture

- Hair loss (cm²)
- Time (weeks)

Mowbray et al., 2003. 5th International Dairy Housing Conference, pp 288-295

Adding bedding to mattresses prevents development of hock lesions

- Bedded mattresses (+ curb)
- Deep bedding

Wider stalls = longer lying times

- Lying time (h/24)
- Stall width (in)

44 (112 cm)
48 (122 cm)
52 (132 cm)

Mowbray et al., 2003. 5th International Dairy Housing Conference, pp 288-295

Lying times increase when brisket board is absent

- Lying time (h/24)
- Brisket board

Tucker et al. 2006, J. Dairy Sci. 89: 2603-2607

Design and management of the lying area: Stall design

- Neck-rail distance from curb (cm)

Design and management of the lying area: Stall management

Cows spend about half their time lying down - but this time is synchronized

Number of stalls per group of 12 cows

Design and management of the feeding area

Feeding management – once vs twice a day feed delivery?
Cows with more feed bunk space spent 24% more time at the bunk during peak feeding times.

DeVries et al. 2004; J. Dairy Sci. 87:1432-1438

...and 60% fewer displacements

DeVries et al. 2004; J. Dairy Sci. 87:1432-1438

Design and management of the feeding area: Overstocking

DMI reduced, particularly pre partum when cows are overstocked at the feeding area

Proudfoot et al., 2009 J. Dairy Sci. 92:3116-3123
Assignment of cows to illness categories

- Healthy (n = 23)
- Mildly metritic (n = 27)
- Severely metritic (n = 12)
- No evidence of any other disease.

- Cows assigned to treatment and then behaviors looked at retrospectively.

Healthy cows show declines in DMI the day before calving

Sick cows show declines in DMI in the week before calving

Very sick cows (after calving) showed the greatest drops in DMI before calving

Cows that get sick ate less during peak feeding times prepartum
Healthy cows tended to displace other cows more often

Healthy cows spend time at the bunk eating but also standing and not eating

Healthy Cows

$y = 9.3792x + 56.387$

$R^2 = 0.3643$

Healthy cows produce less milk!

Sick cows produce less milk!

Long term consequences of metritis!

Cows with metritis are more likely to be culled...
Long term consequences of metritis!

likely because they produce less milk and are not pregnant

Culled Cows

Adapted from Wittrock et al. 2011. J. Dairy Sci. 94: 2408-2412

Standing behavior and lameness

8 to 15 wk  High incidence of claw horn lesions

Week Relative to Calving

Recorded standing behavior

Recorded claw horn lesions

Cows diagnosed with hoof lesions (at peak lactation) stood long during transition

Proudfoot et al., 2010, J. Dairy Sci. 93: 3970-3978

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What are they doing?

Period relative to calving

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Managing your herd to reduce lameness

Design and management of the lying area: Stall design

Effects of stall design on lameness: neck rail
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- Standing time (h)
  - Neck rail
  - No neck rail

Number of hooves in stall

Effects of stall design on lameness vs. udder health

<table>
<thead>
<tr>
<th>New cases of disease</th>
<th>neck rail</th>
<th>no neck rail</th>
<th>P Value</th>
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<tbody>
<tr>
<td>Lameness</td>
<td>11</td>
<td>2</td>
<td>0.01</td>
</tr>
<tr>
<td>Mastitis</td>
<td>0</td>
<td>0</td>
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<tr>
<td>SCC&gt;100,000 cells/ml</td>
<td>2</td>
<td>1</td>
<td>N.S.</td>
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Take Home Messages

- For stalls, use more bedding and less hardware.
- In stalls and at the feed bunk, lower stocking densities will increase usage and reduce competition.
- Softer, drier flooring reduces hoof injuries leading to lameness.
- Solutions should be win-win (e.g. increased welfare and profit) and practical.
- If you don’t measure it you can’t manage it!
- Good science helps lead to change.

Thanks!