Lameness:
“Common” isn’t “Normal”

Lessons from the 2009 Foot Health Study
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On behalf of the Study committee

“Just because it’s common doesn’t mean it’s normal”:

- Introduction
- Foot Health study 2009-2010
- Lameness – Ontario perspectives
- Recommendations and solutions
Introduction – foot problems – are we like the rest of the dairy world?

Background:
Few Ontario surveys or studies of dairy cow lameness or foot lesions
Frequent surveys from other jurisdictions indicating lameness and foot problems are highly prevalent in housed dairy cattle
- Documented high prevalence of foot lesions and Digital Dermatitis
- Prevalence of foot lesions similar to other jurisdictions

New Initiative – Ontario Research Develops DHA (Omega 3) Feeding Program

- Research at U of G
  - Feeding of decosahexaenoic acid (DHA) to cows to enhance milk levels of DHA
    - Studies of cow rumen function, components, milk production
    - Predictable outcomes in production
    - No adverse effects in cows
- Program implemented in herds starting in 2003
- **Objective of the Ontario Foot Health study:**
  - to learn if there was a difference in foot health between DHA and conventionally fed herds
Ontario Foot Health Study 2009: Methods

- Study done March to October 2009.
- Herds recruited – 21 DHA and 29 control herds
- Matched on housing style (tie-stall, freestall)
- Herd visit: one visit by a veterinarian specializing in hoof health
  - 10 cows, 60 & 150 DIM, randomly selected from DHI records prior to the herd visit
  - 4 first lactation, 6 second and higher lactation
  - Cows examined for foot lesions in the trimming chute
  - Questionnaire done with herd owner
- Feed sampling done by herd nutritionist in the same month
  - Shaker box & dry matter analysis of TMR and main forages

Study looked at 6 main lesion types:

- Sole Hemorrhage
- Digital dermatitis ("strawberry foot")
- Sole ulcer
- Interdigital hyperplasia
- White line abscess
- White line separation
Sole ulcer…

Very, very specific location…
- Hind feet
- Inside (axial), lateral (outside) claw

Sole Hemorrhage

Picture courtesy of Dr. G. Cramer, 2011
### Ontario Foot Health Study 2009: Results
#### Overall Lesion Prevalence

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Prevalence</th>
<th>Overall</th>
<th>Control</th>
<th>DHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td>63.0</td>
<td>62.0</td>
<td>64.3</td>
<td></td>
</tr>
<tr>
<td>Ulcer</td>
<td>19.2</td>
<td>15.8</td>
<td>23.8</td>
<td></td>
</tr>
<tr>
<td>Digital Dermatitis</td>
<td>18.4</td>
<td>18.3</td>
<td>18.6</td>
<td></td>
</tr>
<tr>
<td>Interdigital Hyperplasia</td>
<td>6.4</td>
<td>7.6</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td>White Line Separations</td>
<td>5.2</td>
<td>6.2</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>White Line Abscess</td>
<td>3.4</td>
<td>2.4</td>
<td>4.8</td>
<td></td>
</tr>
</tbody>
</table>

50 herds – 29 Control, 21 DHA
Ontario Foot Health Study 2009: Results
DHA program vs Non-DHA program

Ulcer prevalence by herd

T test p = 0.046

Prevalence of ulcers for First Lac Group
(symbols show DHA or non-DHA)

p = 0.21 (NS)

Prevalence of ulcers for 2+ Lac Group
(symbols show DHA or non-DHA)

p = 0.15 (NS)
Ontario Foot Health Study 2009: Foot Lesions

- Sole hemorrhage most common followed by sole ulcers and digital dermatitis
- Difference detected in rate of sole ulcers between DHA and non-DHA in total herd analysis
- No difference in sole ulcers between DHA and non-DHA among the two lactation groups
- No difference in precursor problems (Sole Hemorrhage, White Line Abscesses and White Line Separation)
- Warrants further evaluation in research

Ontario Foot Health Study 2009: Conclusions

- Foot problems very prevalent in the 50 herds
- Big variation in herd rates of problems
- No reason to believe cows themselves are sufficiently different in groups in herds in a way that would predispose them to foot disease
- Herd factors (things that affect whole groups of cows) must account for the differences in the rates of foot problems between herds
Ontario Foot Health Study 2009: Analysis

Analysis - factors evaluated for impact on sole ulcers in the 50 herds
- DHI records - herd production levels,
- Nutritionist evaluation of ration characteristics - Penn shaker results, moisture tests, dry matter intakes.
- Questionnaire – hoof health programs, hoof trimmer use, footbath protocols
- Environment - bedding types, feed types, housing type……
  (9 page questionnaire)

Only herd factors found associated with ulcers were:
- Prevalence of white line abscesses (WLA) $(p = .007)$
- Amount of feed on middle tray of the Penn State shaker box $(p = .042)$

Ontario Foot Health Study 2009: Results
Tiestall vs Freestall

Ulcer prevalence by herd

T test $p = 0.62$

33 tiestall and 17 freestall herds
What other herd factors have been shown to impact on the development of sole ulcers in dairy cattle that we didn’t study?

Figure 1. The influence of environmental factors on the incidence of subacute ruminal acidosis, cow lying and standing behavior, and claw horn growth, wear and concussion believed to be involved in the development of laminitis and claw horn lesions. SARA = Subacute ruminal acidosis.
Factors affecting the development of sole ulcers

- Nutrition
- Foot care
- Standing time
  - Current research focus - Emphasis on factors affecting cow behaviour and its affect on standing time and ultimately foot health
  - 3 studies to illustrate
    1. Neck rail and standing
    2. Transition standing
    3. Stocking density and standing

The stall-design paradox: Neck rails increase lameness but improve udder and stall hygiene


*Animal Welfare Program, University of British Columbia, Vancouver

Neck rail study - method:

- 32 mid-lactation cows
- 2 x 5 week time periods
- Two neck rail locations from curb:
  - Short = 130 cm (52 in)
  - Long = 190 cm (76 in)
  - Height always 118 cm (47 in)
- Hoof lesions scored beginning and end of each 5 week period
- Behaviour video-taped
- Standing time and posture compared
Two feet in stall
“Perching”

Four feet in stall

The stall-design paradox: Neck rails increase lameness but improve udder and stall hygiene

Animal Welfare Program, University of British Columbia, Vancouver

Neck rail study – Results:
1. Cows changed standing behaviour.
   Perching was all they did in short stalls.
2. Gait scores were better in the longer stalls
3. 16 new cases of sole lesions occurred. 15 started during the short stall times.

Time standing in stall

[Graph showing time standing in stall with and without neck rail]
Behaviour during transition differs for cows diagnosed with claw horn lesions in mid lactation
Animal Welfare Program, University of British Columbia, Canada

Cow standing time during 2 weeks before and 3 weeks after calving.
(Lesion cows are those that developed sole ulcers or sole hemorrhage in mid-lactation.)

![Graph showing standing time](image)

J Dairy Sci, 2010

Figure 2. Standing location of cows that were diagnosed with severe sole hemorrhage and sole ulcers (n = 13) and those without lesions (n = 13) during the 2 wk before calving.

Behaviour during transition differs for cows diagnosed with claw horn lesions in mid lactation
Animal Welfare Program, University of British Columbia, Canada

![Graph showing standing time](image)
Overstocking Reduces Lying Time in Dairy Cows

J. A. Fregonesi, C. B. Tucker, and D. M. Weary
Animal Welfare Program, University of British Columbia, Vancouver

Table 1. Mean and SE for time spent lying down, standing with the front legs in the stall, and standing outside the stall, as well as latency to lie down after milking and number of competitive displacements from the freestalls

<table>
<thead>
<tr>
<th>Variable</th>
<th>100%</th>
<th>109%</th>
<th>120%</th>
<th>133%</th>
<th>150%</th>
<th>SE</th>
<th>P ≤²</th>
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</thead>
<tbody>
<tr>
<td>Lying in stall (h/24)</td>
<td>12.9</td>
<td>12.1</td>
<td>12.0</td>
<td>11.5</td>
<td>11.2</td>
<td>0.25</td>
<td>0.001</td>
</tr>
<tr>
<td>Front legs in stall (h/24)</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
<td>1.5</td>
<td>0.18</td>
<td>0.722</td>
</tr>
<tr>
<td>Outside stall (h/24)</td>
<td>8.4</td>
<td>8.9</td>
<td>9.1</td>
<td>9.6</td>
<td>9.9</td>
<td>0.40</td>
<td>0.004</td>
</tr>
<tr>
<td>Latency to lie (min)</td>
<td>39</td>
<td>34</td>
<td>38</td>
<td>28</td>
<td>26</td>
<td>4.2</td>
<td>0.025</td>
</tr>
<tr>
<td>Displacements (n/5 h)</td>
<td>0.7</td>
<td>0.9</td>
<td>1.6</td>
<td>2.1</td>
<td>1.9</td>
<td>0.21</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Pathways to claw horn lesions

FEED BUNK SPACE, OVERSTOCKING, HEADLOCKS

ACCESS TO FEED

INCIDENCE OF SARA

LYING TIME AND STANDING TIME

OVERLOAD AND STRESS ON THE CONNECTION BETWEEN THE THIRD PHALANX AND THE HORN CAPSULE OF THE CLAW LOOSENED BY THE ACTION OF GELATINASES TRIGGERED BY SARA OR BY CHANGES AT PARTURITION

LAMINITIS AND CLAW HORN LESIONS AT THE SOLE SURFACE

Figure 1. The influence of environmental factors on the incidence of subacute ruminal acidosis, cow lying and standing behavior, and claw horn growth, wear and concussion believed to be involved in the development of laminitis and claw horn lesions. SARA = Subacute ruminal acidosis.

Fregonesi et al, JDS 2009

Cook et al, JDS 2004
Timing - Important factors that cause sole ulcers occur throughout a cows life
- As heifers,
- As dry cows
- At transition
- During lactation

Not all factors occur to the same degree in all herds
Likely explains why the occurrence of sole ulcer varies so widely between herds.

Herd factors causing foot lesions:

A change in our understanding of the factors that cause of sole ulcers generally:

- Standing Time
- Ration Factors
1. This field study looked at cows, herds and feeding at only one point in time.
   - No information about any of the herd’s foot health prior to enrolling in DHA. We don’t know whether foot health got worse, better or stayed the same when they changed the feeding.
   - Only studied the herds on the program in 2009

   ➢ Need a longitudinal study to follow herds over time to determine if DHA feeding causes problems

2. We were not able to capture information on many important factors that affect sole ulcer development such as
   - Lying and standing time in the herd
   - Behaviour and housing at calving time
   - Housing methods of current cows as young stock
   - Herd history of foot lesions
     ➢ only 29% of herd owners recorded lameness or results of hoof trimming
Overall lesson:

- The prevalence of foot problems, notably sole ulcers and Digital Dermatitis, is very high in Ontario dairy herds:
  - Cramer survey 2002
    - Sole ulcer - 90% of freestall and 70% of tie-stall herds
    - Bovine digital dermatitis – 92% of freestall and 70% of tie-stall herds
  - This study, 2009:
    - Sole ulcer - 41/50 (82%) of all herds
    - Bovine digital dermatitis - 35/50 (70%) of all herds

Why aren’t lameness and foot problems improving?

- Is desensitization a "coping mechanism" that is occurring?
- Are producers and vets unknowingly coming to accept lameness and foot problems as "normal" because they are so common?
- Do some “live with” lameness because they don’t know the solutions?
  
  “Desensitization is the failure to respond compassionately to the suffering of an animal”
  “This happens if the overworked stockperson reduces part of the workload by becoming desensitized to the needs of the animals”
  “On both large and small farms, when labour is stretched to its maximum, it is difficult to justify spending time to treat or care for individuals”

Evidence for desensitization:

- Herd owners frequently underestimate the amount of lameness and foot lesions in their herd.
  - In this study owners estimated that 3 to 5% of cows were lame when trimming and examination revealed 30%.

DHA and foot problems:

- DHA feeding program drew attention to foot problems.
- DHA not a significant factor in the herds studied with regards to foot health.
- Herd owners need to address foot problems, especially before changing to a novel feeding program.
Many remedies are well known…

- **Sole ulcers**
  - Minimize standing time with suitable stall design, soft beds and reduced competition at feed bunk and water
  - Adequate delivery and consumption of effective fibre to provide rumenal buffering

- **Digital Dermatitis**
  - Strict adherence to effective foot bathing routines (proper footbath design, proper concentration of treatment solution, correct bath renewal times)
  - Improved housing hygiene (bedding, alley scraping, dryness)

…but not well implemented.

Still a role for education….

- New research continues to describe the specific impact that barn and stall design has on cow behaviour
- Evidence exists now that cow behaviour has a major impact on foot health
- Need to continually inform veterinarians, nutritionists, hoof trimmers and producers.
- Rapidly disseminate developments with consistent messaging to speed up changes
- Must emphasize **PREVENTION**
Prevention of foot problems

1. Formal foot health program as part of herd health, including:
   - Frequent professional hoof trimming tailored to suit the herd and cow
   - Accurate, correct diagnosis of foot problems
   - Records of diagnoses (DairyComp 305, Hoof Supervisor)
   - Early treatment of affected cows
     - Blocks applied early when sole ulcer suspected
   - Scheduled footbath program
   - Housing improved – reduce standing time, increase lying time
   - Alleys - better foot hygiene
   - Evaluation of heifer management and housing to detect heifer specific risk factors and prevent early foot damage

2. Herd owners – use the help available:
   - Have a trained professional assess your herd for lameness and foot lesions
   - Consult with OMAFRA staff and veterinary practitioners on barn design and foot bath programs to improve foot health
   - Use hoof trimmers more frequently to prevent foot problems
   - Have a nutritionist balance lactating AND dry cow rations for healthy rumens.
Prevention of foot problems

3. Get more information:

**Dairy Housing Courses, OMAFRA, Winter 2012**

Targeted towards New builds and Renovation

- Calf housing
  - Kemptville Feb 28, 2012
  - Stratford Mar 8, 2012
- Free stall housing
  - Kemptville Feb 29 & Mar 1, 2012
  - Woodstock Mar 21 & 22, 2012
- Tie stall housing
  - Milverton Mar 6, 2012

Prevention of foot problems

**OMAFRA Dairy Housing Info Sheets**
Remember

Just because lameness is common
Doesn’t mean it’s normal

There were herds on the study that had excellent foot health – it can be achieved!

Expecting a better deal
Questions?