Effect of milking frequency on hoof health and locomotion scores of cows milked in a pasture based AMS

John Shortall¹, ²,
K. O’Driscoll¹, C. Foley¹, R. Sleator², and B. O’Brien¹

¹Teagasc Moorepark, Fermoy, Co Cork, Ireland, ²Cork Institute of Technology
Introduction

• Lameness
  • Painful and debilitating condition
  • One of most important welfare issues for dairy cattle

• Costs associated with lameness
  • Reduced milk yield
  • Treatment
  • Increased risk of culling
  • Lower survival rate within herd
Introduction

- Successful operation of AMS requires cows to present at robot for milking on voluntary basis

- Effect of lameness on AMS
  - ↓ visits to AMS (Miguel-Pacheco et al., 2013)
  - ↓ milk production (Bach et al., 2006)
  - ↑ increased labour - fetching lame cows
  - ↓ efficiency of system
Introduction

• Milking frequency and lameness
  • CM pasture based systems
  • OAD milking vs TAD milking (O’Driscoll et al., 2009)
  • No adverse effect of OAD milking
  • Reduced sole bruising /lesions
    • Less time on roadways and holding yards
Investigate the effect of reducing milking frequency on hoof health and locomotion scores of cows milked in a pasture based AMS
Materials and Methods
Materials and Methods

- Cows were randomised into two groups balanced for:
  - Breed,
  - Parity,
  - Days in milk,
  - Previous 25 days milk production and milking frequency

**Group 1**
- $n = 34$
- Milking permission 2 times per day

**Group 2**
- $n = 34$
- Milking permission 3 times per day
Materials and Methods

• Treatments were imposed from 60 – 160 DIM

• Diet
  • Grazed grass (17kg DM/cow/day)
  • Concentrate (0.8kg DM/cow/day)

• Grazing
  • Pre grazing herbage mass 1600kg DM/ha
  • Post grazing sward height 5cm
3-Way Grazing (ABC) System

Farm Layout

Section A
8 hours

Section B
8 hours

Section C
8 hours

Block A = 7.7 ha
Block B = 9.0 ha
Block C = 8.5 ha
Farm Total = 25.2 ha
Hoof Scores

• Subsample: 41 cows

• Cows scored on 3 occasions
  • 44, 85, 167 DIM

• Scored by lifting hind feet
  • Each claw examined individually
Hoof Health Scoring System

- Heel erosion
- Dermatitis
- White line disease
- Sole bruising

Scale

1 ➔ 5
1 ➔ 5
1 ➔ 4
1 ➔ 8
Locomotion Scores

• 67 cows scored

• Cows scored on 3 occasions
  • 64, 85, 113 DIM

• Level, clean, concrete surface

• Observed from side and behind
Locomotion Scoring System

• Spine Curvature
• Speed
• Tracking
• Head Carriage
• Ab/Adduction
Statistical Analysis

• Hoof scores
  • Proc Mixed in SAS

• Locomotion scores
  • Proc Glimmix in SAS

• Fixed effects
  • Milking frequency, breed, parity, DIM, exam and interactions
  • Exam included as random or repeated effect
  • Initial exam included as covariate
Results
## Results - Milk Production & Cow Traffic

<table>
<thead>
<tr>
<th></th>
<th>G1</th>
<th>G2</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milking Frequency/Day</td>
<td>1.5</td>
<td>1.8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Milking Interval/Visit</td>
<td>15.1</td>
<td>12.6</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Milk Yield/Visit (kg)</td>
<td>12.7</td>
<td>10.4</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Milk Yield/Day (kg)</td>
<td>18.4</td>
<td>19</td>
<td>NS</td>
</tr>
<tr>
<td>Milk Duration/Visit (mins)</td>
<td>7.3</td>
<td>6.6</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Milk Duration/Day (mins)</td>
<td>10.7</td>
<td>12.3</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Return Time/Visit (hours)</td>
<td>4.3</td>
<td>5</td>
<td>0.001</td>
</tr>
<tr>
<td>Wait Time/Day (hours)</td>
<td>1.8</td>
<td>2.5</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Results

• Clinical Lameness
  • Based on farm managers assessment
  • Cow had to require treatment
  • 10/68 cows (14%) clinically lame once
  • 3/10 cows (30%) clinically lame > once

• Activity
  • G1 - 5% > than G2
## Results - Hoof Health

<table>
<thead>
<tr>
<th>Exam</th>
<th>G1</th>
<th>G2</th>
<th>P-value</th>
<th>Trt.</th>
<th>Exam</th>
<th>Trt*Ex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heel Erosion</td>
<td>4.4</td>
<td>3.7</td>
<td>4.2</td>
<td>5.2</td>
<td>3.7</td>
<td>4.7</td>
</tr>
<tr>
<td>Dermatitis</td>
<td>0.9</td>
<td>1.2</td>
<td>1.2</td>
<td>1.0</td>
<td>1.3</td>
<td>1.4</td>
</tr>
<tr>
<td>White Line Disease</td>
<td>2.1</td>
<td>1.9</td>
<td>1.3</td>
<td>2.2</td>
<td>2.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Sole Bruising</td>
<td>3.6</td>
<td>4.6</td>
<td>1.8</td>
<td>3.6</td>
<td>3.3</td>
<td>1.8</td>
</tr>
</tbody>
</table>
## Results - Locomotion

<table>
<thead>
<tr>
<th>Exam</th>
<th>G1</th>
<th>G2</th>
<th>P-value</th>
<th>Trt.</th>
<th>Exam</th>
<th>Trt*Ex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spine Curvature</td>
<td>1.9</td>
<td>1.8</td>
<td>1.6</td>
<td>NS</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Speed</td>
<td>1.3</td>
<td>1.1</td>
<td>1.0</td>
<td>NS</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Speed</td>
<td>1.3</td>
<td>1.2</td>
<td>1.3</td>
<td>NS</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>
Conclusions
Conclusions

• Reducing milking frequency
  • No significant effect
  • Up to 160 days in milk

• Exam had a significant effect
  • 5/6 aspects of locomotion & bruising

• Reduced waiting time for G1 cows
  • Showed no benefit for sole bruising
  • G1 cows had > activity level than G2
We wish to acknowledge our funding partners

Thank you

The Irish Agriculture and Food Development Authority