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

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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
Hypothesis

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

AMS

Farm Yard

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

Way Grazing (ABC) System

8 hours

Farm Layout
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
  Scale: 1 → 5
- Dermatitis
  Scale: 1 → 5
- White line disease
  Scale: 1 → 4
- Sole bruising
  Scale: 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
<table>
<thead>
<tr>
<th></th>
<th>G1</th>
<th>G2</th>
<th>p value</th>
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</thead>
<tbody>
<tr>
<td>Milking Frequency/Day</td>
<td>1.5</td>
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<td>Milking Interval/Visit</td>
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<td>Milk Yield/Visit (kg)</td>
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<td>Milk Duration/Visit (mins)</td>
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<tr>
<td>Milk Duration/Day (mins)</td>
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<td>Return Time/Visit (hours)</td>
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<tr>
<td>Wait Time/Day (hours)</td>
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<td>2.5</td>
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</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
  • $G_1 - 5\% > than G_2$
<table>
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<tr>
<th>Exam</th>
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<th>P-value</th>
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<th>Exam</th>
<th>Trt*Ex</th>
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<tr>
<td>Sole Bruising</td>
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### Results - Locomotion

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<td>Spine Curvature</td>
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<td>1.6</td>
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<td>Speed</td>
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</tr>
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<td>Head Carriage</td>
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<td>NS</td>
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<td>NS</td>
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<td>Abduction/Adduction</td>
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<td>Total Locomotion</td>
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<td>7.7</td>
<td>7.1</td>
<td>NS</td>
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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

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