Grazing behaviour and intake of two Holstein cow types in a pasture-based production system

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Overview

• Introduction
• Grass intake
• Grazing behaviour
• Physical activity
• Conclusions
• Questions
Why study grazing behaviour?

- Pasture-based production systems are generally significant in Switzerland.
- Of particular interest in organic milk production.
- Continuous increase of the milk production per cow and lactation.
- Holstein: 8313 kg milk (3.97% fat & 3.26% protein / www.holstein.ch)
- Dairy cows eat less on pasture compared to TMR

<table>
<thead>
<tr>
<th></th>
<th>Full-grazing</th>
<th>TMR</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NZ</td>
<td>OS</td>
<td>NZ</td>
</tr>
<tr>
<td>Cows</td>
<td>14</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Liveweight [kg]</td>
<td>470</td>
<td>512</td>
<td>536</td>
</tr>
<tr>
<td>Intake* [kg DM/d]</td>
<td>16.6</td>
<td>17.3</td>
<td>20.4</td>
</tr>
</tbody>
</table>

*at early lactation
NZ = New Zealand Holstein Friesians, OS = overseas Holstein Friesians
G = genotype, D = diet, GxD = Interaction genotype x diet
Significant: t P<0.10 * P<0.05, ** P<0.01, ***P<0.001

(Kolver et al. 2002)
Why study grazing behaviour?

- Maximise intake decrease the use of biomass on pasture

Grass intake

Rate of utilisation

Offered grass (kg DM/d/cow)

(Delagarde et al. 2001)
Why study grazing behaviour?

- Grazing behaviour & intake are affected by Holstein strains
  \((McCarthy \text{ et } al. \ 2007)\)
  - NZ strain had the longest grazing time

- Knowledge about intake & grazing behaviour \Rightarrow improve utilisation of grown herbage \Rightarrow increase system efficiency
Grass intake: animals, materials & methods

- Organic farm “L’Abbaye” in Sorens (824 m a.s.l., Switzerland)
- 2 Holstein cow types
  - 11 New Zealand Holstein cows (H\textsubscript{NZ})
  - 11 Farm-bred “Swiss” Holstein cows (H\textsubscript{CH})
- Intake was estimated twice during first & second lactation
- Double marker method with n-alkanes (Mayes et al. 1986)
Grass intake: results

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>H_{CH}</th>
<th>H_{NZ}</th>
<th>se</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days in milk [d]</td>
<td>80</td>
<td>113</td>
<td>134</td>
<td>3.0</td>
<td>***</td>
</tr>
<tr>
<td>Energy corrected milk [kg]</td>
<td>80</td>
<td>21.0</td>
<td>18.1</td>
<td>0.5</td>
<td>***</td>
</tr>
<tr>
<td>Live weight [kg]</td>
<td>80</td>
<td>605</td>
<td>506</td>
<td>6</td>
<td>***</td>
</tr>
<tr>
<td>Grass intake [kg DM]</td>
<td>80</td>
<td>17.5</td>
<td>15.5</td>
<td>0.4</td>
<td>**</td>
</tr>
<tr>
<td>Total intake [kg DM]</td>
<td>80</td>
<td>18.8</td>
<td>16.1</td>
<td>0.4</td>
<td>***</td>
</tr>
<tr>
<td>Grass intake/BW^{0.75} [kg 100kg^{-1}]</td>
<td>80</td>
<td>14.3</td>
<td>14.5</td>
<td>0.3</td>
<td>-</td>
</tr>
<tr>
<td>Total intake/ BW^{0.75} [kg 100kg^{-1}]</td>
<td>80</td>
<td>15.4</td>
<td>15.0</td>
<td>0.3</td>
<td>-</td>
</tr>
<tr>
<td>ECM/total intake[kg kg^{-1}]</td>
<td>80</td>
<td>1.14</td>
<td>1.15</td>
<td>0.03</td>
<td>-</td>
</tr>
</tbody>
</table>

p>0.1; ** p<0.01, ***p<0.001; standard error (se); metabolic body weight (BW^{0.75}); energy-corrected milk (ECM).

- H_{NZ} had lower grass and total DM intake per cow
- No intake difference per kg of metabolic body weight
- No difference in milk yield per kg of DM intake
Grazing behaviour: animals, materials & methods

IGER Behaviour Recorder
(Rutter et al. 1997)

- Grazing
- Ruminating
- Idling

• Same measurement period as intake, but 2 weeks
  • per week 3 cow pairs were equipped during 4 days
Grazing behaviour: results

Grazing behaviour and intake of two Holstein cow types
F. Schori
Grazing behaviour: results

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<th>H_{NZ}</th>
<th>se</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. ruminating mastications d^{-1}</td>
<td>46</td>
<td>33138</td>
<td>35364</td>
<td>620</td>
<td>*</td>
</tr>
<tr>
<td>No. of boli d^{-1}</td>
<td>46</td>
<td>571</td>
<td>595</td>
<td>19</td>
<td>-</td>
</tr>
<tr>
<td>No. ruminating mast. boli^{-1}</td>
<td>46</td>
<td>60</td>
<td>61</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>No. prehension bites d^{-1}</td>
<td>46</td>
<td>37680</td>
<td>33317</td>
<td>1024</td>
<td>**</td>
</tr>
<tr>
<td>No. prehension mast. d^{-1}</td>
<td>46</td>
<td>6708</td>
<td>8872</td>
<td>579</td>
<td>*</td>
</tr>
<tr>
<td>Total no. prehension d^{-1}</td>
<td>46</td>
<td>44389</td>
<td>42190</td>
<td>725</td>
<td>*</td>
</tr>
</tbody>
</table>

- p>0.1; * p<0.05; ** p<0.01; standard error (se)

- H_{NZ} longer rumination time & no. ruminating mastications d^{-1}
- H_{NZ} fewer prehension bites & more mastications per d^{-1}
- No differences related to grazing and idling time
Physical activity: materials, methods & results

- Pedometer simultaneously with behaviour recorder
- Data collected only 2008

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>( \text{H}_{\text{CH}} )</th>
<th>( \text{H}_{\text{NZ}} )</th>
<th>se</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. steps ( \text{d}^{-1} )</td>
<td>22</td>
<td>4035</td>
<td>4459</td>
<td>143</td>
<td>t</td>
</tr>
<tr>
<td>Standing &amp; walking [min ( \text{d}^{-1} )]</td>
<td>22</td>
<td>951</td>
<td>890</td>
<td>23</td>
<td>t</td>
</tr>
<tr>
<td>Walking [min ( \text{d}^{-1} )]</td>
<td>22</td>
<td>350</td>
<td>381</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td>Laying [min ( \text{d}^{-1} )]</td>
<td>22</td>
<td>489</td>
<td>551</td>
<td>23</td>
<td>t</td>
</tr>
</tbody>
</table>

- \( p > 0.1 \); \( t \) \( p < 0.1 \); standard error (se).
Conclusions

- $H_{NZ}$ compared to $H_{CH}$ behave slightly differently, with
  - longer rumination time
  - fewer prehension bites and more mastication during grazing

- No differences in intake per kg of $BW^{0.75}$ and in feed efficiency

- Differences in grazing behaviour might be of interest, if utilisation of grown herbage could be improved.
Thank you for your attention!