High yielding Holstein cows have less lying time available for exchange to more eating time

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Increased milk yield

Energy density

Eating
Lying
Standing/walking

Time budget

Energy density↑
Lying time, how important is it?

- Deprivation of lying = increase the motivation to lie down
- Repeated deprivation of lying = stress responses
- Pregnant heifers work consistently with increasing workload for access to 12-13 hours lying time
- Time constraint on lying and eating behaviour = lying time higher priority than eating and feed intake
Experimental questions?

- How are **time budgets** of dairy cows affected by their yield?
- Are **individual cows** having **consistent time budgets** throughout lactation?
Design

• 243 First parity Holstein cows in one herd
• Known genetic structure – ancestry – MOET
• Free stall barn – Parlour milking
• TMR feeding – headlock gates
• Milk recording – 3 week intervals
Recording of Time Budgets

- Batches of 20 cows as focal animals
- Interval scans at 10 min intervals, 24 h = 144 points
- Early and Late lactation – 2X repeat scans
Time budget – activities during 24 h

Early:
- Eating: 5.2
- Lying: 10.4
- Stand_stall: 3.2
- Idle_feed gates: 2.8
- Aisles: 2.6
- Parlour: 0.5
- Away: 0.1

Late:
- Eating: 5.0
- Lying: 11.3
- Stand_stall: 2.8
- Idle_feed gates: 2.6
- Aisles: 0.5
- Parlour: 0.1
- Away: 0.1
## Consistency in time budget traits

Repeatability / correlation coefficients, 0.0 - 1.0

<table>
<thead>
<tr>
<th></th>
<th>Early</th>
<th>Late</th>
<th>Across stages</th>
<th>Correlation Early/Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating time</td>
<td>0.44</td>
<td>0.58</td>
<td>0.39</td>
<td>0.82</td>
</tr>
<tr>
<td>Lying time</td>
<td>0.25</td>
<td>0.44</td>
<td>0.24</td>
<td>0.97</td>
</tr>
<tr>
<td>Milk yield</td>
<td>0.72</td>
<td>0.80</td>
<td>0.65</td>
<td>0.86</td>
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</table>
Correlations of Eating, Lying and Stall time with milk yield

<table>
<thead>
<tr>
<th></th>
<th>Eating time</th>
<th>Lying time</th>
<th>Stall time</th>
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</thead>
<tbody>
<tr>
<td><strong>Milk yield</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</td>
<td>0.25</td>
<td>-0.13</td>
<td>-0.13</td>
</tr>
<tr>
<td>Late</td>
<td>0.29</td>
<td>-0.08</td>
<td>-0.12</td>
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</table>
## Correlations of Eating time with Lying and Stall time

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<td></td>
<td>Early</td>
<td>Late</td>
<td></td>
</tr>
<tr>
<td><strong>Lying time</strong></td>
<td>-0.32</td>
<td>-0.30</td>
<td></td>
</tr>
<tr>
<td><strong>Stall time</strong></td>
<td>-0.62</td>
<td>-0.63</td>
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</table>
Are substitution effects dependent on yield?

• Take cow deviations from herd mean as input

• Estimate correlations using sub-sampling of 40 cows – plot correlations against yield
The negative correlation between lying and eating time gets weaker at higher yield.
Again, the negative correlation between "Stall time" and eating time gets weaker at higher yield.
How are cows coping with higher yields?

• Some more eating time at the expense of less stall and lying time

• At high yields – less ”reserve time” is available – basic lying needs have greater priority than eating!

• Will cows eat quicker?

• Will they eat insufficient amounts?

• Will they extend duration of negative energy balance?
In conclusion …

Dairy cows need time –
  – time to lie down
  – time to eat

*With higher yield – help cows find more time to*

*important activities – including lying down!*
More on time budget traits:

Løvendahl P. and Munksgaard L., J Dairy Science (accepted): An investigation into genetic and phenotypic variation in time budgets and yield of dairy cows