No dry period: consequences for dairy cows, cash flows, and climate.

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Dry period: what and why?

- Period without milking before next calving
- Treat subclinical mastitis
- Rest period
- Maximise milk yield
High milk yield - negative energy balance

Reduced lying time: reduced welfare?

Metabolic diseases & reduced fertility

Based on Van Knegsel et al., 2014; Maselyne et al., 2017
Solution to NEB: **no dry period**

No dry period reduces duration and severity NEB

Based on Van Knegsel et al., 2014
Trade-offs? Solution to NEB, but ...

1. Reduced milk yield
2. No rest period
**Aim**: assess impacts of continuous milking

- Greenhouse gas emissions
- Animal welfare
- Net partial cash flows
Impact on milk yield

No dry period *versus* standard dry period (8wk)

Milk yield of the herd is reduced by 3.5%

Kok et al. 2016b, 2017a, 2017b
Simulation model at herd level

- 100 cows with standard/ no dry period

- No dry period
  - reduces peak milk yield
  - improves fertility:
    - shorter calving interval
    - reduced fertility culling
Other model inputs

Net partial cash flows/ year

- Milk revenues
- Calves sold
- Cows culled
- Feed
- Replacement heifers

Greenhouse gas emissions/ t milk*

- Life cycle analysis
- $\text{CO}_2$, $\text{CH}_4$, $\text{N}_2\text{O}$ as $\text{CO}_2$-equivalents

* Fat-and-protein-corrected milk
Net partial cash flow & GHG emissions

No dry period, relative to 8wk dry period

<table>
<thead>
<tr>
<th>Ref. model</th>
<th>€ cow$^{-1}$ y$^{-1}$</th>
<th>-€16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CO$_2$-e/ t milk</td>
<td>+4 kg (+0.4%)</td>
</tr>
</tbody>
</table>

Improved health could reduce disease costs$^1$

Small negative impact that may be compensated

Kok et al. 2017b; $^1$Köpf et al., 2014
Effects on the cow: lying and feeding

- 81 cows: 28 dry period (30 days)
  53 no dry period

- Feed intake: continuously
- Lying: week -4 and 4 relative to calving
Effects on the cow

**Dry period (30days)**
**No dry period**

Still a rest period; increased adaptation to lactation

Kok et al. 2016a
Discussion

- Cow welfare seems improved by no dry period

- Small effect on net partial cash flows and GHG emissions
  - Variation between farms
  - Farmers: ease of labour, healthier cows

- Effect on health and disease remains unclear
  - *Trend* increased mastitis\(^1\)

\(^1\)Van Hoeij et al. 2017
Take home message

No dry period can contribute to sustainable milk production
Simulation model at herd level

- 100 cows with standard/ no dry period
- No dry period
  - reduces peak milk yield
  - improves fertility

<table>
<thead>
<tr>
<th>Parity</th>
<th>Days dry</th>
<th>Peak yield kg/ d</th>
<th>CI (median)</th>
<th>% fertility culling</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>-</td>
<td>374</td>
<td>8.0</td>
</tr>
<tr>
<td>2</td>
<td>56</td>
<td>-6.8</td>
<td>381</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>-6.8</td>
<td>359</td>
<td>3.9</td>
</tr>
<tr>
<td>&gt;2</td>
<td>56</td>
<td>-6.1/ -3.5</td>
<td>385</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>-6.1/ -3.5</td>
<td>370</td>
<td>3.7</td>
</tr>
</tbody>
</table>
## Input – economic data

### Net partial cash flow

<table>
<thead>
<tr>
<th></th>
<th>Value (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Milk</strong> revenues (per 100 kg solids)(^1)</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>576</td>
</tr>
<tr>
<td>Fat</td>
<td>288</td>
</tr>
<tr>
<td>Lactose</td>
<td>58</td>
</tr>
<tr>
<td><strong>Calves</strong> revenues (per animal)(^2)</td>
<td></td>
</tr>
<tr>
<td>Female / Male</td>
<td>51 / 109</td>
</tr>
<tr>
<td><strong>Culled cows</strong> (per kg meat)(^2)</td>
<td>2.32</td>
</tr>
<tr>
<td><strong>Replacement</strong> heifer (per animal)(^2)</td>
<td>969</td>
</tr>
<tr>
<td><strong>Feed</strong> costs (per t DM)(^3)</td>
<td></td>
</tr>
<tr>
<td>Summer ration</td>
<td>168</td>
</tr>
<tr>
<td>Winter ration</td>
<td>202</td>
</tr>
</tbody>
</table>

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1: milk price 2008:2016, FrieslandCampina
2: 2008:2016, Wageningen Economic Research (LEI)
3: KWIN-V, 2014
Input – GHG emissions

- GHG emissions in kg CO\(_2\) equivalents/ t FPCM

Diagram showing the flow of GHG emissions from various sources such as feed, land, manure, cows, calves, and milk (FPCM), leading to the production of white veal, replacing other meat. The emissions include CO\(_2\), N\(_2\)O, and CH\(_4\).
Impact on the dairy cow

Cows with no dry period:
- Higher feed intake, before and after calving
- Shorter feeding time before calving