A dairy cow well adapted to once daily-milking (ODM) has:

- **Low** relative milk yield loss when: TDM (twice daily-milking) → ODM (once daily-milking)
- **Strong** milk recovery when: ODM (once daily-milking) → TDM (twice daily-milking)

The aim of the study was to investigate:

- Genetic variability of relative milk yield loss and recovery
- And their genetic relationships with previous milk fat and protein contents (before switching cows to ODM and back to TDM) in order to evaluate predictive ability of milk composition

**Materials and methods**

- **Experimental design:**
  - 368 Holstein x Normande dairy cows in 2nd lactation
  - Stage of lactation: <80 DIM (n=111); 80 – 90 DIM (n=148); >90 DIM (n=109)
  - Age at first calving: 2 years (n=199); 3 years (n=169)
  - 19 groups for 7 years (n=7 to 26)

- **Treatment:** 3 periods
  - 1 week TDM1, 3 weeks - ODM, 2 weeks TDM2

- **Measurements:**
  - Milk yield at each milking
  - Milk fat and protein contents at each milking for:
    - TDM1: d-5; ODM: 4d/wk (from Monday to Thursday); TDM2: d30

- **Analysed traits:**
  - Relative milk loss: \( RML = \frac{(\text{Milk}_{ODM} - \text{Milk}_{TDM1})}{\text{Milk}_{TDM1}} \times 100 \)
  - Relative milk recovery: \( RMR = \frac{(\text{Milk}_{TDM2} - \text{Milk}_{ODM})}{\text{Milk}_{ODM}} \times 100 \)

- **Genetic parameters:**
  - Performed by REML using VCE6.0; statistical model for each trait:
    \[\mathbf{y} = \mathbf{X}\beta + \mathbf{Za} + \mathbf{e}\]
    - \(\beta\): vector of fixed effects: stage at lactation, age at first calving, group
    - \(\mathbf{Z}\): incidence matrices

**Results**

- **Phenotypic results:** Milk yield averaged 28.3 kg/d during TDM1 (±5.4); it decreased by 8 kg/d (±2.9) during ODM and increased by 4.0 Kg/d (±2.5) when switched back to TDM

- **Heritability (\(h^2\)) of relative milk loss and recovery, and genetic correlation:**

<table>
<thead>
<tr>
<th></th>
<th>RML</th>
<th>RMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>RML</td>
<td>0.26 (±0.08)</td>
<td>-0.43 (±0.13)</td>
</tr>
<tr>
<td>RMR</td>
<td>0.43 (±0.06)</td>
<td></td>
</tr>
</tbody>
</table>

- **Genetic correlations with milk composition during control periods:**

<table>
<thead>
<tr>
<th></th>
<th>RML</th>
<th>RMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC_{TDM1}</td>
<td>0.28 (±0.15)</td>
<td>FC_{ODM}</td>
</tr>
<tr>
<td>PC_{TDM1}</td>
<td>0.50 (±0.13)</td>
<td>PC_{ODM}</td>
</tr>
</tbody>
</table>

**Conclusion**

- Although based on a small crossbred population, this study has shown that the 2 components of the ability to ODM are under genetic control:
  - Heritability: moderate for relative milk loss and high for relative milk recovery
  - Partial genetic relationship between them: cows with higher milk yield loss enable to recover more milk
  - Milk composition (especially PC) is partially genetically related to the ability to ODM: a high PC during TDM1 or ODM is respectively associated with a lower relative milk loss, and a lower relative milk recovery