Resource use efficiency and management optimization in dairy farming


Background

- Key trends on dairy farms in the Atlantic region (incl. Northern GER, Southern DK):
  - larger average herd size
  - higher yields per cow
  - increased use of fertilizers
  - fewer, but larger, dairy farms
- Environmental burdens of the dairy sector:
  - Nutrient losses (Carbon, Nitrogen, Phosphate)
    - Gaseous losses (e.g. enteric fermentation, field fluxes)
    - Leaching
    - Run-Off
  - Global warming [Globally, the dairy sector contributes 4% to the total anthropogenic GHG emissions (FAO 2010)]
  - Depletion of non-renewable resources
  - Eutrophication
  - Soil erosion
- Variations between production systems and agro-ecological zones:
  - high VS low input systems
  - site-specific management (local, regional, and global scale)

Joint research project (funded by the EU, INTERREG 4a)

How to improve resource use efficiency in dairy farming systems in the Syddanmark-Schleswig-K.E.R.N. region?

Analysis of forage production systems (typical dairy farms)

<table>
<thead>
<tr>
<th>Working Packages</th>
<th>Working step</th>
<th>Institute of Crop Science and Plant Breeding - Grass &amp; Forage Science/Organic Agriculture - (University of Kiel, Germany)</th>
<th>Faculty of Agricultural Science (University of Aarhus, Denmark)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conception &amp; management</td>
<td>N-loss (N₂O emission, nitrate leaching) (PERMANENT) GRASSLAND</td>
<td>N-loss (Nitrate leaching) (SILAGE) MAIZE</td>
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<td>2 &amp; 3</td>
<td>Field experiments (dairy farms) Factors:</td>
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</tbody>
</table>
|                  |   | - Production system (high vs. low input)  
|                  |   | - Management system (pasture, cutting)  
|                  |   | - Site specifications (soil type, …)  
|                  |   | - age of grassland sward (e.g. permanent)  
|                  |   | - Yield  
|                  |   | - Forage quality  
|                  |   | - N loss (N₂O, leaching)  
|                  |   | - Soil C seq.  |
| 4                | System analysis | Analysis and comparison of dairy farming systems (North-Germany vs. South-Denmark) environmental impacts (LCA-approach) | |
| 5                | Information transfer | Transfer of knowledge and joint analysis \(\rightarrow\) modelling | |

Environmental life-cycle-assessment (LCA) of regional dairy farming systems (site- and management-specific) \(\rightarrow\) e.g. carbon footprint milk

Model development / modelling ecological footprints milk (e.g. GHGs) \(\rightarrow\) using existing model approaches [i.e. Maisprog (GER), Fasset (DK), Farm-N (DK), FoProQ (GER)]

GFO

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