Luxembourg FILL Pasture project 2003- 2009

with focus on Pasture ruler:
Tool to estimate and evaluate pasture intake with high merit dairy cows
**FILL- Pasture Project:**

promote pasture management with high merit dairy cows

**FILL:** “Fördergemeinschaft Integrierte Landbewirtschaftung Luxemburg”
Association promoting sustainable agriculture Luxembourg; member of the

*European Initiative for Sustainable Development in Agriculture (EISA)*


1. analyze causes (economic, pasture quality, animal factors) of insufficient grazing of dairy cows
2. optimize pasture quality
3. optimize pasture intake
4. identify the milk response to an increase of pasture intake.

**Partners:**

1. **ASTA** (Administration des services techniques de l'Agriculture): J. Bormann
2. **SER** (Service d'économie rural): G. Conter
3. **Lycée Technique Agricole Ettelbrück:** M. Hoffmann; C. Felten; M. Santer; H. Kohnen
4. **Convis** (Herdbook): D. Kloecker
5. **UNI Bonn:** J. Schellberg
FILL- Pasture Project ended 2009 and led to

"OPTIGRAS" (advisory service optimizing grass utilization; dairy board)

Since 2009 the LTA – section is a partner in

DAIRYMAN

INTERREG IVB North-West Europe
Sustainable dairy production
7 countries with 14 regions involved > 120 pilot farms

F: Brittany & Pays Loire & Nord Pas Calais;
B: Wallonia & Flanders;
D: Baden Württemberg;
GB: Northern Ireland
L; NL; I
50% of the agricultural surface is grassland

Grazing in Luxembourg is decreasing

Actual situation:

<table>
<thead>
<tr>
<th>Grazed Grass (DMI)</th>
<th></th>
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<tbody>
<tr>
<td>85%</td>
<td>cows have <strong>free outdoor access</strong></td>
</tr>
<tr>
<td>65%</td>
<td>( &gt;2 \text{ kg} ) DM grazed grass/cow/day grazing season</td>
</tr>
<tr>
<td>50%</td>
<td>( &gt;5 \text{ kg} ) DM grazed grass/cow/day grazing season</td>
</tr>
<tr>
<td>10%</td>
<td>( &gt;10 \text{ kg} ) DM grazed grass/cow/day grazing season</td>
</tr>
</tbody>
</table>
Reasons for decreasing

a) growing herd size $\rightarrow$ limited access to available pasture
b) misunderstood nutrition guidelines
   \textquotedblleft balanced ration\textquotedblright{} dogma: high merit cows will starve by grazing
c) Missing of knowledge on grazing
   1960, 100\% of Luxembourgish dairy farmers practiced intensive grazing. This knowledge disappeared more or less completely
d) Missing knowledge about the 2 dairy systems:
   a) \textit{“intensive Milk production system” (accepted and promoted):}
      maximum input with high output
      (high milk daily milk/cow/year is needed to make profit from the high invest/cow)
   b) \textit{“Low cost milk production system with grazing” (disregarded):}
      make profit of the low cost of grazed grass, but the whole system has to be \textit{“low cost”}
e) Grazing has no (economic) lobby  (Grazing does not sell)
   - harvesting, feeding and slurry machinery
   - purchased fodder concentrates and supplements
   - expensive “animal welfare” housing
   - breeding semen (artificial insemination bulls selection schemes do not fit to grazing)
f) NO financial subventions on grazing (subvention for everything else)
FILL Pasture Project

- On Farm Experiment:
  - 4 typical dairy farms
  - high merit Holsteins cows
  - all year calving
- Average herd size: 35-55 cows
- average milk yield: 8000-9000 kg milk cow\(^{-1}\) year\(^{-1}\).
- Pasture + supplementation:
  - silage (Grass and/or maize)
  - feed concentrate (mostly purchased)
- stocking rate: 1.5 - 3.5 cows ha\(^{-1}\) year\(^{-1}\)
- temperate (maritime) European climate
- average mean precipitation: 800 - 1000mm year\(^{-1}\)
Materials and Methods

Data collected during grazing season:
- daily milk produced (kg herd$^{-1}$)
- daily supplementation (kg herd$^{-1}$)
- daily milked cows (number)
- daily paddock allocated

**Pasture intake (pDMI):**
Calculated
Pasture = Total Intake - supplementation

\[
pDMI = DMI - sDMI
\]

\[
DMI = 0.0185 \cdot BW + 0.305 \ FCM \quad \text{(Chase and Sniffen)}
\]

\[
sDMI = DMI \text{ for supplementation}
\]
Evaluate performance

**Intensive dairy production**
- High merit dairy cows
- High nutritional requirements: Supplementation
  - High daily milk
  - Expensive supplementation
  - Confinement

**Intensive pasture**
- reduced supplementation to optimize pasture intake
  - lower daily milk
  - low-cost home grown forage
  - pasture

"Daily milk" is a bad criterion to evaluate pasture performance
- increases supplementation
- decreases grazing
Evaluate performance:
Review of published experiments

2 criteria: Daily milk + pasture intake (% DMI)

Criteria for selection (measured daily milk, measured pasture intake and measured supplementation) from a pool of 147 experiments

- Arriaga-Jordan and Holmes, 1986
- Bargo et al., 2002
- Berzaghi 1996
- Delaby 1997
- Delaby 2001
- Gibb 2002
- Dillon 1997
- Hoden 1991
- Kennedy, Dillon 2003
- Mathieu 2001
- O'Brien 1996
- O'Brien 1999
- Reis and Combs, 2000
- Robaina et al., 1998
- Rook 1994
- Sayers, 1999
- Wales 2001
- Walker et al., 2001
- Wilkins 1994
- Wilkins 1995
Pasture DMI (% DMI) = \frac{pDMI}{DMI}

sDMI (kg cow\(^{-1}\) day\(^{-1}\))

\[ y = \frac{100 \times pDMI}{0.305} - \frac{0.0185 \times BW}{0.305} \]

pDMI (kg cow\(^{-1}\) day\(^{-1}\))

\[ y = \frac{sDMI \times 100}{(100 - x) \times 0.305} - \frac{0.0185 \times BW}{0.305} \]
Pasture ruler: predict pasture intake

Example:
Average daily milk: 26 kg cow\(^{-1}\) day\(^{-1}\)
Average daily supplementation: 8 kg cow\(^{-1}\) day\(^{-1}\)

Pasture DMI (% DMI)

Daily milk (kg cow\(^{-1}\) day\(^{-1}\))

daily pasture intake (DM; kg cow\(^{-1}\) day\(^{-1}\))

daily supplementation (DM; kg cow\(^{-1}\) day\(^{-1}\))

Example:
Average daily milk: 26 kg cow\(^{-1}\) day\(^{-1}\)
Average daily supplementation: 8 kg cow\(^{-1}\) day\(^{-1}\)
Pasture ruler: Adapt supplementation to available pasture
(weekly FARMWALK with RISING PLATE METER and FEED WEDGE)

Example:
Average daily milk: 26 kg cow\(^{-1}\) day\(^{-1}\)
Available daily pasture: 11 kg cow\(^{-1}\) day\(^{-1}\)

Pasture ruler:
Adapt supplementation to available pasture
(weekly FARMWALK with RISING PLATE METER and FEED WEDGE)
Validation based on the pool of experiments selected (measured daily milk, pasture intake and supplementation)

**Validation for pDMI**

\[ y = 0.936x + 1.2301 \]

\[ R^2 = 0.877 \]

Standard deviation 1,57 kg /cow/day pDMI

pDMI prediction is good

**Validation for %pDMI**

\[ y = 0.9883x + 1.2101 \]

\[ R^2 = 0.99 \]

Standard deviation 2,56

%pDMI prediction is very good

Position of the farm in the chart is very precise
1. Evaluate pasture intake
2. Predict milk response to a change of the supplementation amount
“On Farm” Results: Pasture intake

NOTICED daily (+/- 10 minutes/day)
1. Daily Milk (bulk milk; kg/ herd/day)
2. Number Milked cows
3. Daily supplementation (kg/ herd/day)
4. Daily allocated pasture

Guidelines:
1. Start grazing early in spring (“pregrazing”) start grazing at 7-11 cm high
2. Graze tight (“Short herbage grazing”)
3. Reduce supplementation (reference balanced winter ration)
   • Avoid conserved grass (grazed grass is always of better quality)
   • Reduce maize silage by half
   • Limit concentrate 6 kg /cow/day
“On Farm” Results: Pasture intake

Pasture intake (2009; FARM A)

- cc3
- cc2
- Silage maize
- Hay
- Silage grass
- Pasture

DMI (kg DM/cow/h/day)
“On Farm” Results

Pasture intake Farm D (2003-2009)

DMI (kg DM cow\(^{-1}\) day\(^{-1}\))

- cc
- hay
- MS
- GS
- Pasture

1st Apr 03, 1st Jun 03, 1st Okt 03, 1st Dez 03, 1st Feb 04, 1st Apr 04, 1st Okt 04, 1st Dez 04, 1st Jan 05, 1st Apr 05, 1st Okt 05, 1st Dez 05, 1st Jan 06, 1st Apr 06, 1st Okt 06, 1st Dez 06, 1st Jan 07, 1st Apr 07, 1st Okt 07, 1st Dez 07, 1st Jan 08, 1st Apr 08, 1st Okt 08, 1st Dez 08, 1st Jan 09, 1st Apr 09, 1st Okt 09

EGF-Working Group Grazing: Research methodology of grazing
“On Farm” Results

FILL ON FARM Pasture project 2003-2008
Pasture intake related to daily milk and supplementation
(average/year; FARM A; B; C; D)
Utilized pasture: FARM D; 2009 (kg DM/ha/year)

“On Farm” Results
Pasture Ruler and Feed cost simulation

EGF-Working Group Grazing: Research methodology of grazing

KIEL 29 August 2010 Kohnen H
Thanks for your attention