Identification of strategies increasing the trade-off between N balance and income in dairy farms

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Introduction

Dairy sector challenges
- Price volatility
- Environment legislations
- Social requirement

An Interreg project: Dairyman (2009-2013)
- To enhance the sustainability of dairy sector in NWE
- Increase the delivery of key environmental services

Methods
- Follow up of a dairy pilot farms network
- Transfer of knowledge

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The Dairyman pilot farms networks

- 126 farms in 10 regions
  - Flandres: BF
  - Wallonia: BW
  - Brittany: FB
  - Pays de la Loire: FL
  - Nord-Pas de Calais: FN
  - Ireland: IR
  - Northern Ireland: IN
  - Germany: GE
  - Luxemburg: LU
  - The Netherlands: NL

Based not on their regional representativeness but on their wishes to improve the performance of their system.

[Map of Europe showing regions with farm codes]

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Objective

Possibilities to conciliate Economic and Environmental performances ➔ based on farms results from 2009 and 2010
Pilot farm characteristics

Proportion of mixed and specialised pilot farms in the different regions (2010)

- Specialised dairy farms
- Mixed dairy farms (milk-commercial crops)
- Mixed dairy farms (milk-beef cattle)
- Mixed dairy farms (milk-commercial crops-beef cattle)
- Mixed dairy farms (milk-other)

In this study => focus on 76 specialized dairy farms as N balance was quantified at farm and not at the dairy production scale
Farms performances

- **Economical performance (€/labour unit):**

  \[
  \text{Farm Income per labour unit} = \frac{\text{Receipts} - \text{Annual Expenses} - \text{Depreciation} - \text{Interest}}{\text{Family Labour Units}}
  \]

- **Environmental performances:**

  \[
  \text{Mineral balance} = \sum \text{Input} - \sum \text{Output} - \sum \text{Stock variation}
  \]

- Surplus (losses) in kg/ha and in kg/1000 kg of milk
Results: Efficient systems in 2009

Identification of 2 groups P+ and P-

- **P+ (14)**
  - Sample, average losses (2009)
    - 17 N kg / T of milk
    - 165 N kg / ha
  - Sample, average gains (2009)
    - 30 195 €
  - LOSSES
    - 8.6 (±2.3) kg N/Ton of milk
    - 98 (±54) kg N/ha
  - GAIN
    - 48 600 (±14705) €

- **P- (13)**
  - Sample, average losses (2009)
    - -21 000 (±37280) €
    - -13.2 (±4.8) kg N/Ton of milk
    - -241 (±54) kg N/ha

BF, BW, FB, GE, IR, LU, NL
Efficient systems in 2009

Production (1000 milk kg / cow):
- P-: 6, 7, 8, 9, 10
- P+: 10, 9, 8, 7, 6

Production (1000 milk kg / ha):
- P-: 15, 20, 25
- P+: 25, 20, 15

Stocking rate (Livestock unit/ha):
- P-: 1.5, 2.0, 2.5
- P+: 2.5, 3.0, 3.5

Concentrates (tons/cow/year):
- P-: 2.5, 3.0, 3.5
- P+: 3.5, 4.0, 4.5

*** Significant difference

* Significant difference

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Efficient systems in 2009

- **Productivity** (1000 milk kg / labour unit)
- **Milk price** (€/100 milk kg)
- **Production costs** (€/100 milk kg)
- **Total revenue** (€/100 milk kg)

**Statistical Significance**
- **P-** and **P+** indicate performance levels before and after an intervention.
- ******* and **** denote statistical significance levels.
Efficient systems in 2010

Evolution of P+ farms en 2010

- Perf. Eco (€/LU)
- Perf. Env. (N kg / T of milk)
- Perf. Env. (N kg / ha)

LOSSES

B(9)
- 53700
- 11.6
- 88

Q(5)
- 120 900
- 11.7
- 217

Sample, average losses (2010)
- 17 N kg / T of milk
- 180 N kg / ha

GAIN

Sample, average gains (2010)
- 63 400 €
Efficient systems in 2010

Production (1000 milk kg / cow)

- Others (62)
- B (9)
- O (5)

Production (1000 milk kg / ha)

- Others (62)
- B (9)
- O (5)

Concentrates (Tons/cow/year)

- Others (62)
- B (9)
- O (5)

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Conclusions / hypothesis to be tested

High diversity in farming systems in Europe

Environmental and economic performances are compatibles but different strategies lead to different responses to market signal:

- Self sufficient systems = more robust and resistant with few flexibility if they become fully dependant of global market (importance of milk valorisation scheme with added value). Now, such systems need flexible animals able to adapt to ressource quality and quantity variability.

- Input based systems = need flexibility and even plasticity in their management, in order to respond to economical context evolution. They also need flexible animal able to adapt to these evolutions of the management rules. Inputs management is a key-issues, but how will dairy cows answer to such solicitation on the long term?
Perspectives

- Analyse mixed systems performances (allocation of the environmental performances is not easy)

- Economic resilience at longer term (inclusion of 2011 data): how does systems react to input cost increase instead of milk prize decrease?

- Take into account others environment indicators (biodiversity, energy, GES,...) synthesis of Martin Elsaesser (session 17) and of Sylvain Foray & Thomas Bechu (IDELE) (Rencontre Recherches Ruminants – 4 and 5 décembre Paris) – some job for a ‘DAIRYMAN II’?
Increase environmental performances of farming systems with very high economic results?

- Link between volume and Income/Working Unit: increase till 600,000 l (T. Lebacq et al., 2013 – 381 specialised Walloon dairy farms – Session 35) to 800,000 l (DAIRYMAN), thereafter Income/WU is marginal.
- How to intensify the LFS to reach such level of production without a huge environmental impact?

Thresholds specific to regional carrying capacity!
Perspectives & reflections
(to be debated)

Compatible with economical performances?

- One cow and its heifers/ha ➔ ‘ of autonomy level of the system (resistance) but there is a need for a herd with a good genetic potential to be able to respond to market signal (flexibility) ?

- No antagonism with the obtention of low production costs!

(T. Lebacq et al., 2013 – Session 35 - Wednesday)
Any questions!