Grassland in Pays de Caux (France): balancing trade-off between livestock feeding and decreasing runoff

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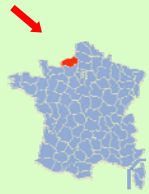

INTRODUCTION AND CONTEXT

How can livestock farmers manage grassland in order to decrease runoff while cattle production remains profitable?

- Pays de Caux (Haute-Normandie): agriculture in competition for land with industry, tourism and urbanization
- Most farmers breed dairy or suckler cows: focus on dairy farms
- Main forage resources for dairy cows: maize silage, concentrate, with grassland

Loamy soils and high rainfall (oceanic climate)

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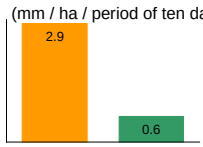
Muddy flows in cultivated catchments
Possible damage downstream:
roads and houses flooded, water pollution



Simulated average runoff
DIAR model (Martin et al., 2009)

Environmental service of **grassland**: **decreasing** and slowing down **erosive runoff**

METHODS

Study of farm global functioning and forage system

On-farm **survey** in 2009 and analysis (Capillon, 1993): 17 farms covering the **diversity** of mixed cropping-livestock systems

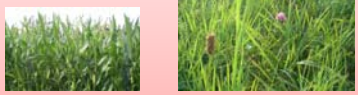
➡ Data
- Farmer's objectives and strategic choices
- Means of production (workforce, equipment)
- Combination of farm productions
- Social and economic environment

➡ Economical simulation of a modified forage system
OLYMPE ® software (Michaud et Bourgain, 2005)

RESULTS

Different ways to combine productive and environmental performances

Different balances between maize silage and grassland uses according to farmers' choices

Two types of forage systems	Dominant type	Innovative type
FARMER'S CHOICES		
Priorities	**High productive performance** per cow	**Forage self-sufficiency**
Strategies – strength	**Security, regularity = maize silage** +	**Diversity of fodder plants** +
Strategies – weakness	**Dependence on market** -	**Difficulty of grassland management** -
CHARACTERISTICS OF THE FORAGE SYSTEM		
Relative part of maize (**M**) and grassland (**G**) in Principal Forage Area	M G 	M G 
Grassland type and use	**Permanent grassland** (on slopes) Mainly used for **grazing** (heifers)	Permanent grassland (more productive) and **sown pastures in crop rotation** **Grazing** and **hay** making (heifers - cows)
TRENDS		
Potential evolution of total grassland area	= or ➚	➚ or ➘
Risk of erosive runoff	= or ➚	

Suggesting and testing a modified forage system

Productive and environmental trade-off

OLYMPE ® simulation applied to a dairy farm of dominant type		Initial state (year n)	Simulated state (year n+4)
Margins (€)	Global	193 000	194 100
	Dairy unit / 1000 L	**218**	**230**
Feeding costs (€ / 1000 L)	Concentrates	73	42
	Fodder area	42	60

Economic results for introduction of Italian rye-grass as catch crop and horse bean in cropping plan and forage system

Hypothesis: no changes for prices of milk and inputs
DIAR estimation of runoff

➡ **Slightly higher margin for dairy unit** (cut in feeding cost) **+ runoff decrease** (of 27 %)

CONCLUSION AND OUTLOOK

Forage self-sufficiency leads to a better trade-off between dairy production and runoff mitigation

- Cultivated **high quality grass**: a way to increase grass contribution in dairy cows diet
- Better forage self-sufficiency based on grassland: **lower dependence** on uncertain prices of inputs and milk
- … but which **technical advice** about integration of sown grasslands into a cropping plan ?