Enhancing mixed crop-livestock systems sustainability:
A partnership evaluation of innovative scenarios.
Study rationales

- Worldwide regain of interest in mixed crop-livestock systems:
  - Way to produce efficiently
  - While limiting environmental impacts

- Drastic regression of MCLS in Europe:
  - Agricultural prices & CAP
  - Lack of agricultural work forces

Objective: Evaluating scenarios including technical innovations that could enhance sustainability of MCLS.
The French ‘Coteaux de Gascogne’

- Less favoured area:
  - many slops
  - frequent summer droughts

→ Low specialization of agriculture
  (50% MCLS)

- ELTER Network
- Partnership working with local actors
A participatory elaboration of scenarios

- Definition of innovative scenarios:
  - through a participatory process with farmers & actors
  - In line with farmers long term strategies to maintain MCLS (Ryschawy et al., 2013)

- Computer-based simulations (with individual farmer)

**Methodology**

*CalculRation*
Feeding need per type of animal

*CalculFerti*
Fertilisation need per type of crops

Farmer feedback

**Crop-Livestock Farm Simulator (CLIFS)**
Supply-Demand balances at the farm scale
Focus on ‘forage intercropping’

- Innovative scenario in line with the strategy “maximizing farm autonomy”

- Based on sowing forage intercropping between two cash crops to:
  - achieve autonomy in herd feeding
  - while maintaining soil fertility

Farm selected
- 133 ha - 50% crops & 50 % grasslands
- 43 suckler cows – Limousine breed
- 1 Working Unit
Scenario specification with farmer

- Two types of intercropping to insert in the rotation
  - « Short » : between two winter crops
  - « Long » : before a summer crop

- Major constraints identified:
  - Periods of sowing and harvesting/ work organisation
  - Feeding quality of intercropping species
  - Seeds and phytosanitary costs

Legumes intercropping : pure or mixed

- **S1** : Violet clover as short intercropping to stock and oat-vescia as long intercropping to bury
- **S2** : Premium on violet clover
## Simulations

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Overall Gross Margin</th>
<th>Nitrogen balance</th>
<th>Feed inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S0 : Control</strong></td>
<td>683 euros/ha</td>
<td>+ 6,2 kgN/ha</td>
<td>8,91t /an (3118 euros/an)</td>
</tr>
<tr>
<td><strong>S1: Stocks of violet clover</strong></td>
<td>704 euros/ha (+21 euros/ha)</td>
<td>- 0,3 kgN/ha</td>
<td>0 t</td>
</tr>
<tr>
<td><strong>S2: CAP premium on violet clover</strong></td>
<td>744 euros/ha (+61 euros/ha)</td>
<td>- 0,75 kgN/ha</td>
<td>0 t</td>
</tr>
</tbody>
</table>

- Innovations tested into two contrasted political and economic futures: (Agrimonde, 2010)
  - i) heightening of the current globalisation trends
  - ii) political and market incentives for a relocation of production

➡ Technical innovations did not offset drastic shocks
➡ Political support would also be needed
Strong involvement of local actors

- Interest in local adapted study
  - Relevance of real cases
    «For once, it was concrete and corresponded to our ideas»
  - Discussion about technical routines and work organisation

- Importance of collective meetings
  - Posture of researchers
    «We have been listened and have expressed our views.»
  - Interactions research/local actors
    «It is really interesting to share views with other core works»
Improvements through technical innovations:

- Relevance of participatory methodology
- «Old wine in new bottles?»
- Marginal improvements through local lever for action

Political lever to mobilise:

- Premiums on maximisation of interactions between crops and livestock
- Larger scales to be considered (regional, ...)