



70<sup>th</sup> Annual Meeting of the  
European Federation of Animal Science  
City of Ghent (Belgium), 26 - 30 Aug 2019



# What prospective scenarios will be compatible with sustainable crop livestock system?

Claire Mosnier, Ikram Abdouftalib (INRA Auvergne-Rhones-Alpes, France ),

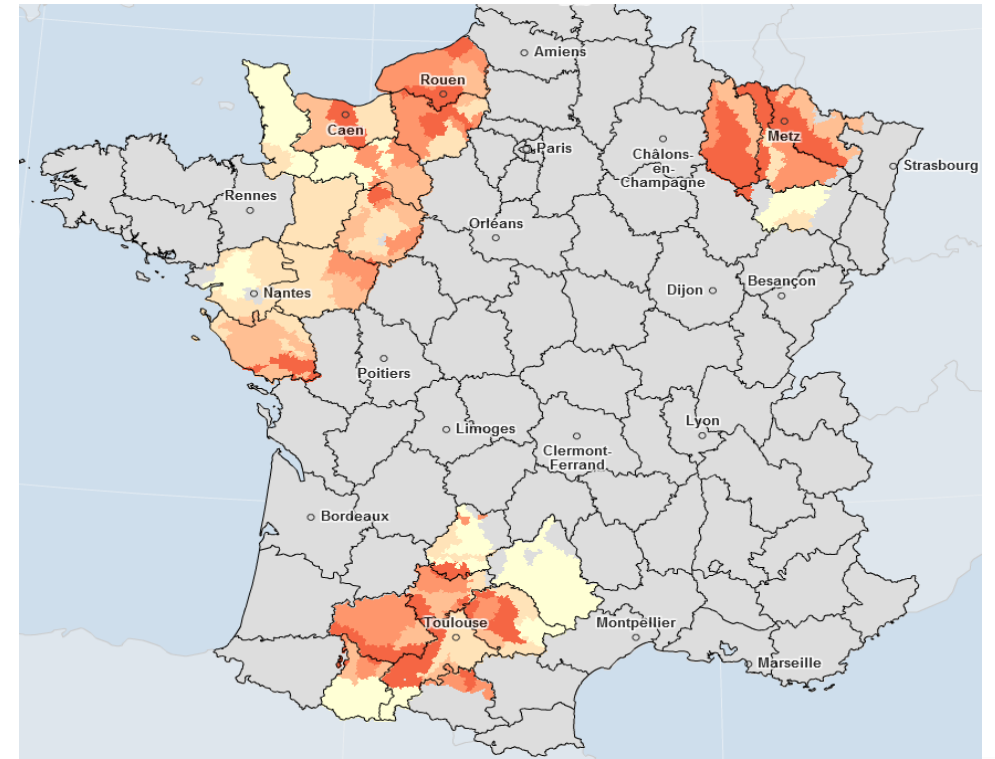
Nelly Dubosc (Chambre Régionale d'Agriculture d'Occitanie, France)



# Introduction

- Crop-livestock systems (CLS) can use complementarities between crops and livestock to reduce their input consumption
- CLS have regressed over the last decade in France
- This figure shows in red CLS specializing in crop production (source *SRISE, CRA Normandie*)

→ **How crop-livestock systems might evolve in the future in four French regions?**



# Method Overview

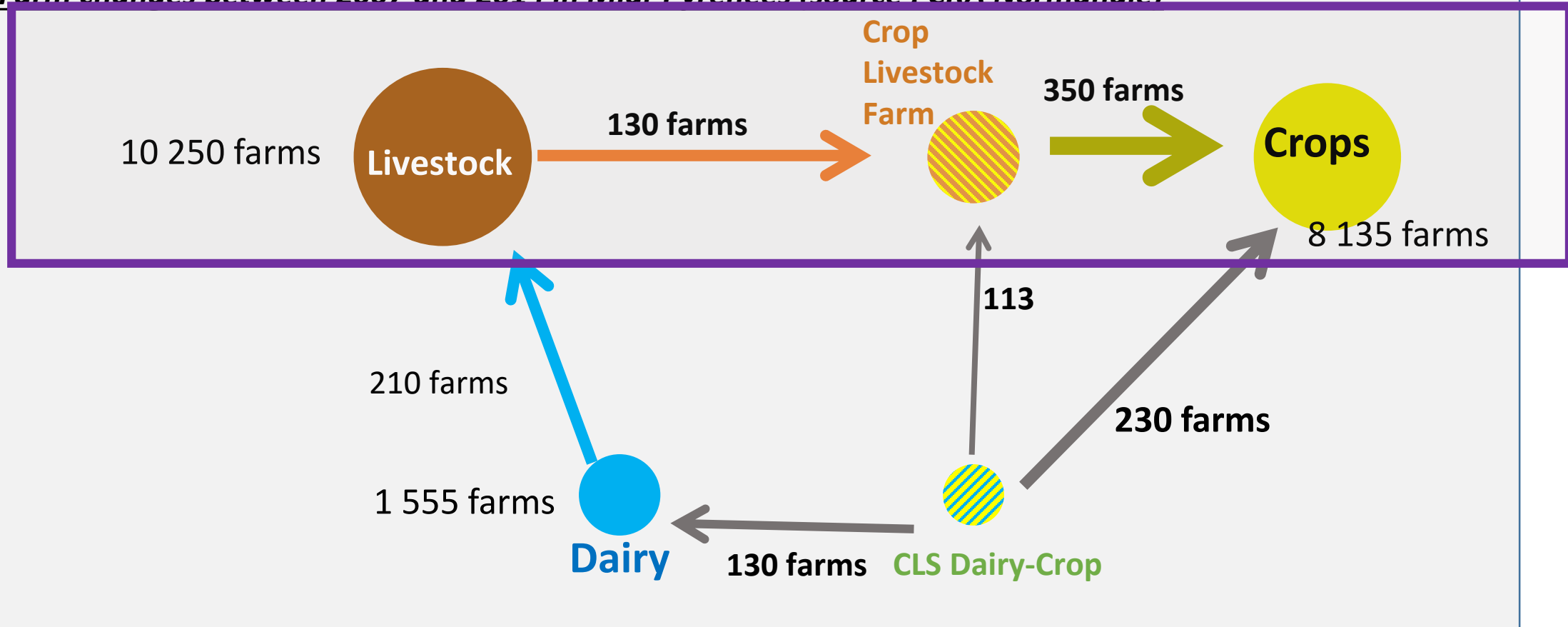
- 3 contrasted prospective scenarios

<b>S1: Liberal</b>	<b>S2: Territorial</b>	<b>S3: AgroEcologic/ energy</b>
<ul style="list-style-type: none"><li>❖ minimum involvement of the state in the economy</li><li>❖ Capitalist logic of companies</li></ul>	<ul style="list-style-type: none"><li>❖ Refocusing the economic system on the territory</li><li>❖ Demand for quality local products</li></ul>	<ul style="list-style-type: none"><li>❖ The environment is at the heart of public policies and consumer demand</li></ul>

# Method : focus groups with experts

- Obj: imagine the evolution of the local context and of farming systems

*Farm changes between 2007 and 2014 in Midi-Pyrénées (source : CRA Normandie)*



# Simulation: Method

## *the Orfee farm Bioeconomic Model*

**Farm type:** crop yield and animal production

**Scenarios:** price, policy, land available, labour available,

**CHOOSE:**  
Crop allocation,  
herd size, type of animals, diets,  
fertilizer use, etc.

**MAXIMIZE:**  
Mean Profit –  
0.5 SD of profit

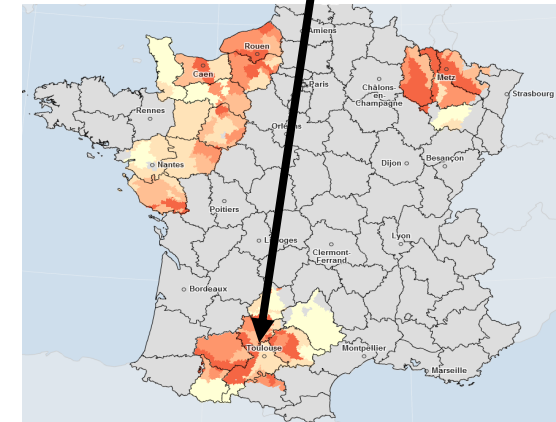
**Under CONSTRAINTS:**  
**Crops:** rotation, machine operation, inputs..  
**Herd:** herd renewal, feed requirement, housing  
**Land**

**Economics indicators**

**Environmental ind.**

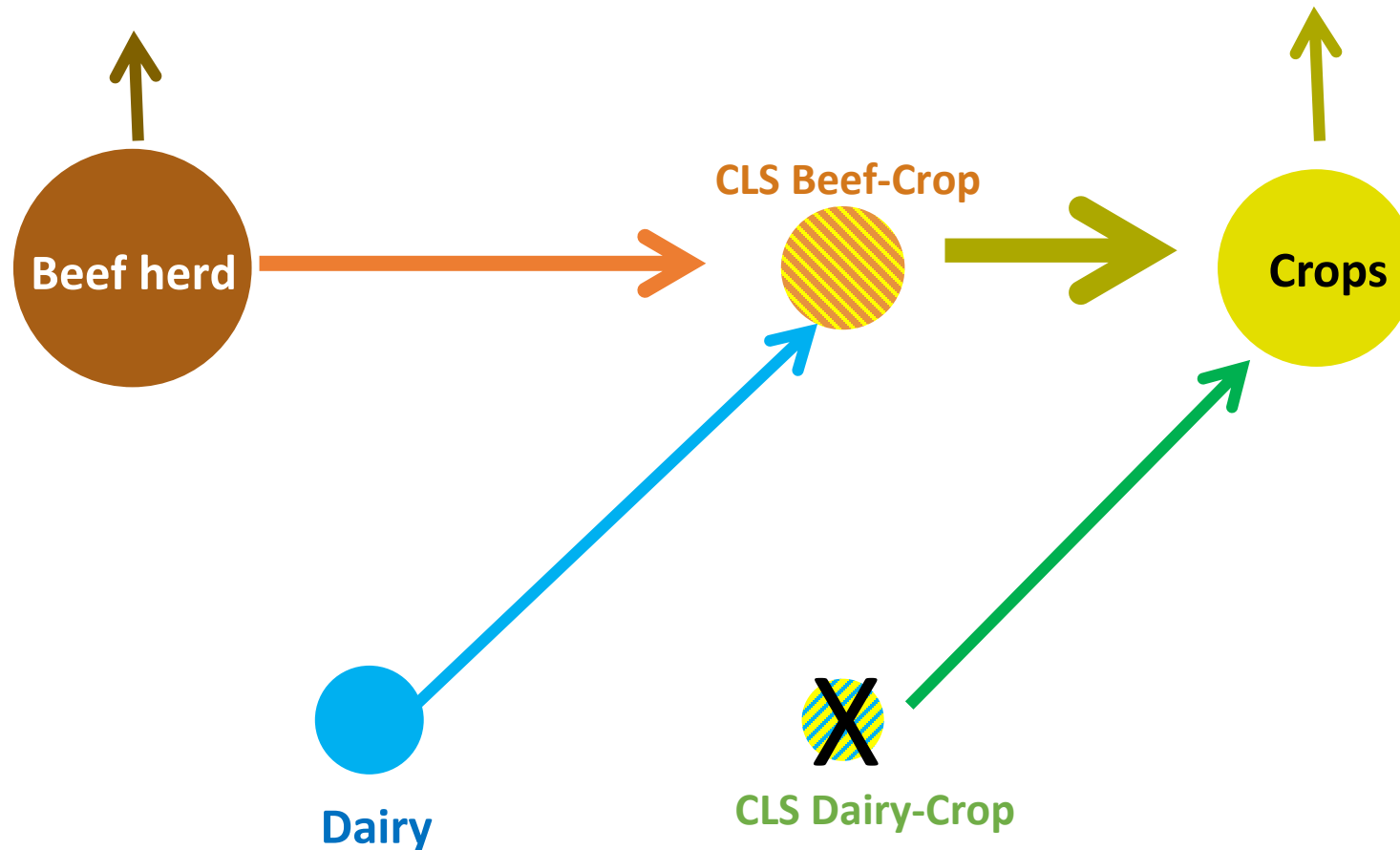
**Social ind.**

**Case study beef cattle in Occitanie**  
98 livestock Units  
105 ha



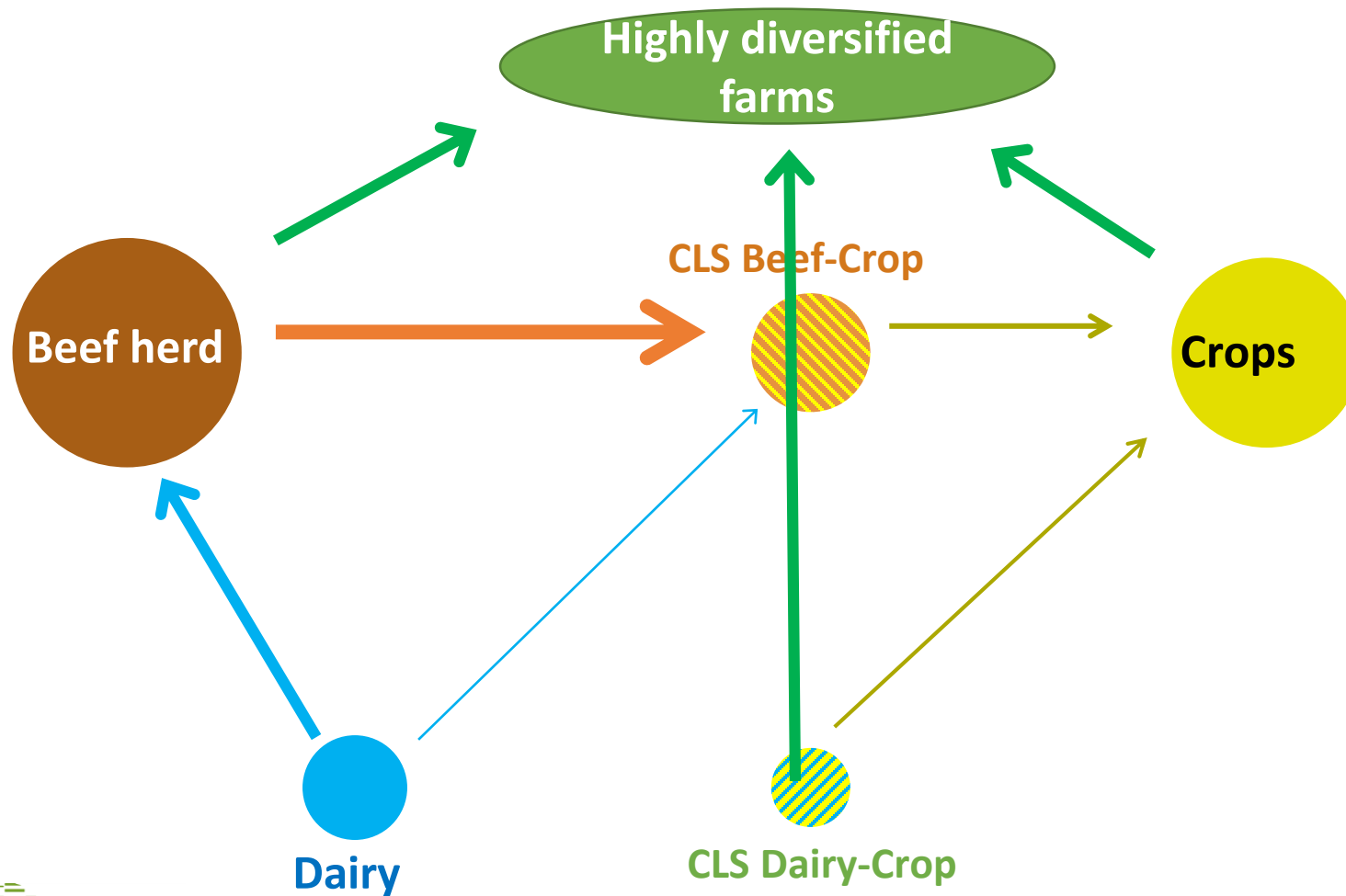
# Focus group: Results

## Scénario 1: Liberal and Globalization



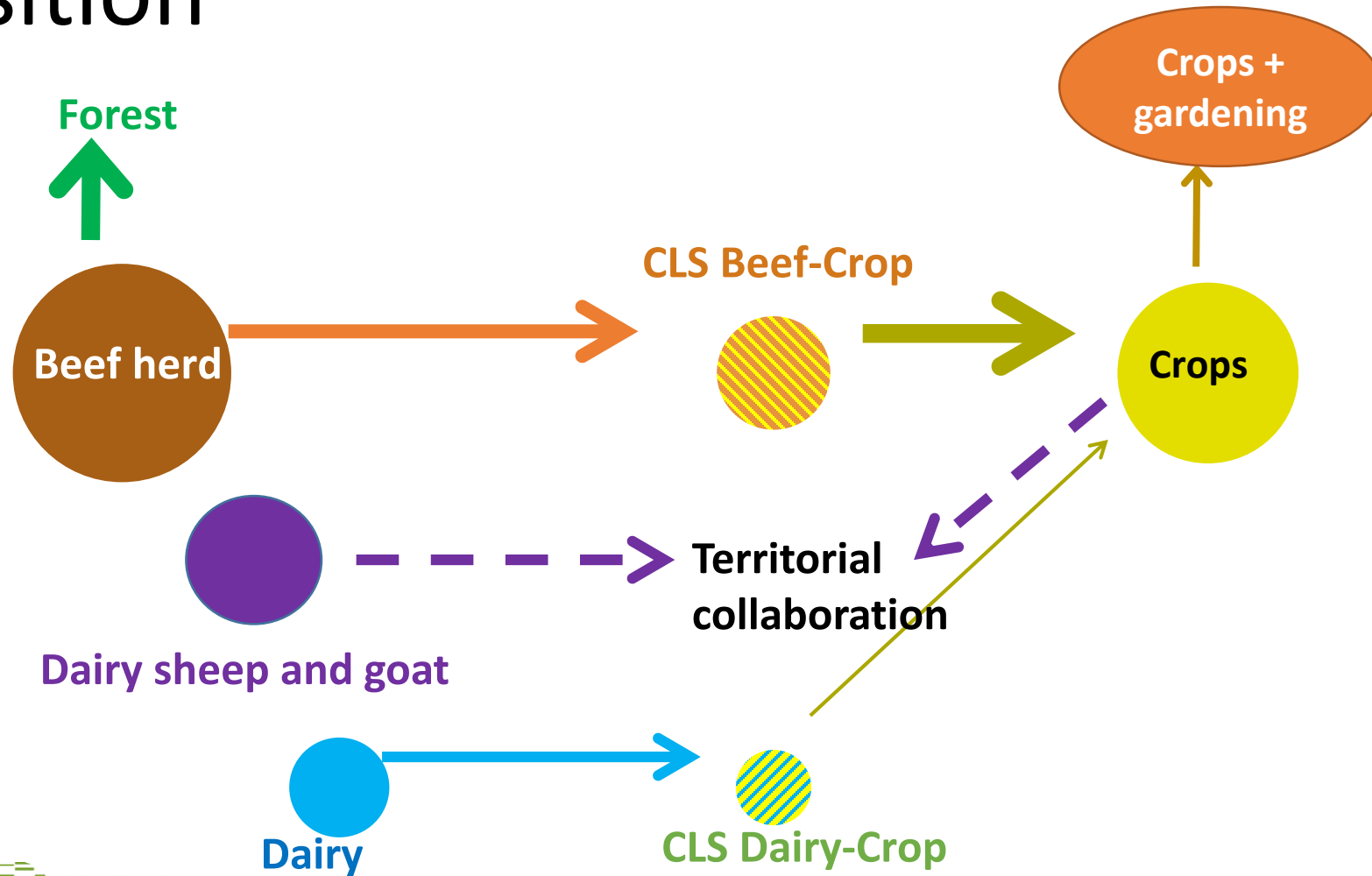
# Focus group: Results

## Scenario 2: Territorial economy and quality



# Focus group: Results

## Scenario 3: AgroEcology and energetic transition





# Simulation: Method

## *Main scenario Assumptions*

S1 Liberal	S2 Territorial and Quality	S3 Agroecology and energy
Cereal price: +15% ; beef price: +20% ; fuel price: +40%; fertilizer price: + 25%		
Variability of prices x 2	/2	=
None	= 2015 + Share of concentrate feed in diets <10% ; grazing >40%; integrated farming	Carbon tax (40€/tCO2e), Organic farming
Land: x2 Salaried employees	Land: + 15%, Family manpower	Land: +30%, easy Family+Salaried employees
Same Crop and animal production possibilities as in the Case study + mix-cereal protein crops, alfalfa, protein crops		



# Simulations: Main Results

	Ref.	S1	S2	S3
Specialisation in animal production*	62	32	51	40
Stocking rate	1.5	1.3	1.2	0.8
Concentrate feed / LU	650	470	370	125

\*animal sales (€) / total sales (€)

↓ of beef production and extensification

	S1	S2	S3
Average Income	Green	Yellow	Yellow
Income stability	Orange	Green	Yellow
Dependency to subsidies	Green	Orange	Yellow
Quantity of energy and protein produced	Green	Yellow	Orange
Quality (share of grazed grass)	Green	Green	Green
Employment density	Green	Yellow	Orange
GHG emissions	Orange	Yellow	Green
Efficiency of input use	Orange	Yellow	Green

# conclusions

## S1: Liberal

- Reduction of specialised cattle farms → more crops or abandonment
- Income high (?) but variable. Less favourable to the environment

## S2: Territorial

- Smallest reconfiguration of current farming systems
- Intermediate values for indicators.
- Consumers must be ready to pay higher price to limit public support

## S3: A-Ecology

- Reduction and extensification of cattle
- Better environmental indicators ≠ social indicators

→ The future will probably be at the crossroad of these three scenarios.



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# Thank you for attention!

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# Conclusions

- Complementarity of approaches

Focus groups	Model
Broader visions of production (forest etc.) Easier to imagine breaks Get people involved	Test the impacts of a combination of factors Understand relationships between causes and consequences Make the potential futures more concrete

- Next steps: propose policies and measures to favour LCS and agroecology in all scenarios