Adopting low carbon practices: a cost-effective strategy for French dairy Farms

Castellan Elisabeth, French Livestock Institute
Gregoire Mathilde, French Dairy Interbranch
Gaudillière Nicolas, Eliance
Benoist Laura, Indre Chamber of Agriculture
Tattevin Frédéric, Seenovia
Perez Thibault, French Chambers of Agriculture

Financed by:

Led by:

In partnership with:

Context

Major environmental challenges for dairy farming

+ Slow uptake of mitigation actions

= Needs to **motivate** the transition

↓

Positive link between economy and low carbon practices ?

= **Carbon€co project**

Target
farmers,
advisers

Financed by CNIEL (French dairy interbranch), lead by IDELE with the support of Eliance and Chambers of agriculture

Methodology

Action 1: Cross databases analysis

CAP'2ER®

COUPROD

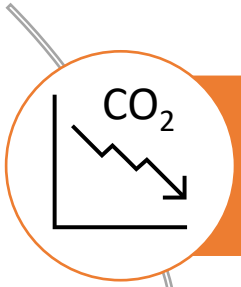
Environment database: 7232 diagnosis Level 2 in dairy farms from 2013 to 2023

Economic database: 7128 calculation in dairy farms from 2013 to 2023

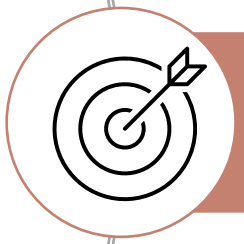
Identification of **357** farms with both diagnosis for the same year

Autorisation of **188 farms** out of the 357 to use economics data

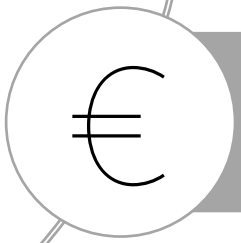
Action 2: Farms paths towards environmental performances



Identify in CAP2ER database farms with 2 diagnosis and with an improvement of carbon footprint



Selection criteria: reduction of carbon foot print> 13%, limited structural evolution (20%), change of 3 different practices, no organic conversion



On the 5 case studies (one/system): calculation of the **economical impacts** of the technical changes (with theoretical data)

Methodology – Action 1

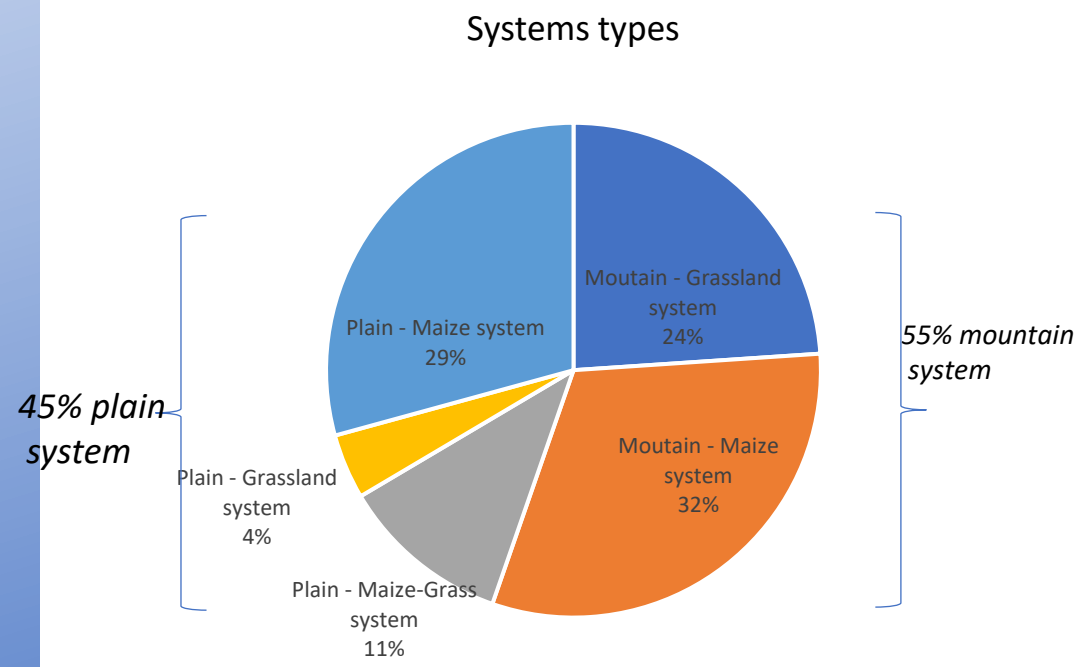
Zoom on the main indicators use in the analysis

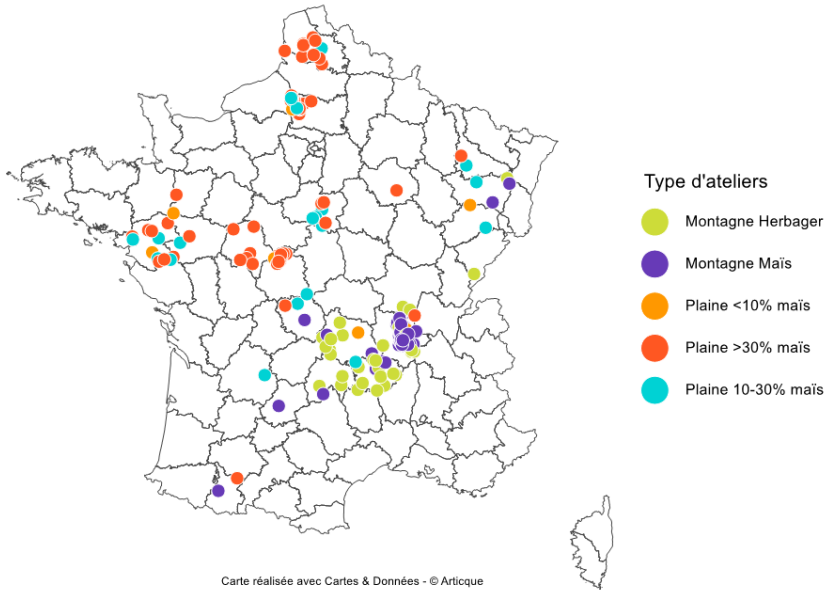
- Economics (€/1000l):
  - **Cost of the feeding system**: purchased feed, surface input (fertilizer, seeds), machineries cost (external, fuel, maintenance, depreciation…), land cost
  - **Dairy EBITDA** (Earnings Before Interest and Taxes Depreciation Amortization) = output (milk, meat, subsidies) - operational costs (feed purchased, surface input, breeding costs) – structural costs allocated to the dairy part from the COUPPROD distribution keys (mechanization, building and installation, land, management costs) before depreciation.
  - Cost of production
  - Nb SMIC (french minimum wage)/FTE (full-time equivalent)
- Environment (kg eq CO2/product unit or /ha forage)
  - **GHG emission**: sum of 3 GHG (CO_2, CH_4, N_2O)
  - **Net carbon footprint** : GHG emission – carbon sequestration (standard value for permanent/temporary grassland, hedges, cover crops)
  - Number of fed people

Descriptive and statistical analysis (Spearman correlation, Student test,…)

- of the whole dataset
- by systems : with sample depending on GHG emission results

Results
Description of the dataset

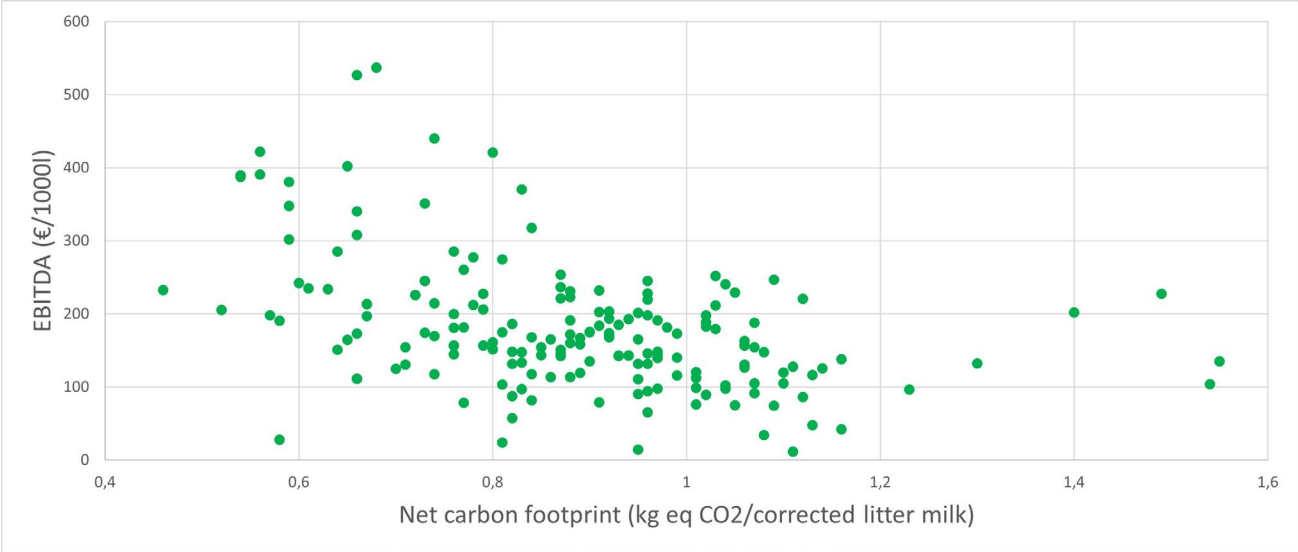




- Dataset not representative of dairy farming in France (geographical repartition)
- But good representativity of the system diversity

Results
On the whole dataset

Example: Correlation between Dairy EBITDA and net Carbon footprint



Other correlations

Correlation	EBITDA/1000 L	Feeding system cost
Net carbon footprint (kg eq CO_2/corrected liter milk)	(-) ***	(-) *
GHG emission (kg eq CO_2/corrected liter milk)		(+) ***
GHG emission (kg eq CO_2/ha forage area)	(-) ***	(-) ***
Net carbon footprint (kg eq CO_2/ha forage area)	(-) ***	(-) ***

*Correlation analysis between economics and environment indicators (Spearman correlation: 0,001 : '***' ; < 0,01 : '**' ; < 0,05 : '*', ; <0.1 : '.')*

= Significant correlation between several indicators which confirm the trend between economy and environment

Results *By system*

= an intra system variabilty showing room for improvment within systems

Sample on GHG emissions

Indicators		Moutain system (104)			Plain system (84)		
		Quarter -	Average	Quarter +	Quarter -	Average	Quarter +
Technical	Production (L/cow)	6 422	6 992	7 256	7 916	8 203	8 254
	Concentrate for cow (g/L)	251	231	212	225	196	179
	Mineral fertilizer (kg N/ha dairy AA)	49	38	26	78	73	46
Environment	Net carbon footprint (kg eq CO2/l)	0,97	0,83	0,72	1,16	0,93	0,73
	GHG emission (kg eq CO2/l	1,23^{a}	1,06^{b}	0,91^{c}	1,24^{a}	1,03^{b}	0,85^{c}
Economics	Feed system cost	344^{a}	310^{b}	299^{b}	271	246	240
	Dairy EBITDA	208^{a}	207^{ab}	242^{b}	113^{a}	143^{ab}	164^{b}

≠ 31%

Student test <0.1 : a b

≠ 26%

≠ 45€/1000l

≠ 51€/1000l

Discussion

- Link between environment and economics performances
- Results consistent with other projects:
  - Qualitative analysis of milk gross margin in Life Carbon farming (1143 farms) or an INNOVAL study (322 farms) : from 14 to 16€/1000L difference on operational cost between extreme (top 10)
  - Statistical analysis in INOSYS Farms network (1110 farms from 2009-2017) : 80€/1000l difference on the feed cost system between top 10 and bottom 10 (on GHG emission)
- Results are impacted by the year (output/input price, climatic conditions…) that affect farm performances
- Need to have a broader view on the economic impact of carbon transition: risk taken by farmers, external risk (price, climatic conditions)… that can affect economical results (on going work in LIFE Carbon farming project)

Thank you for your attention

View the slideshows of our conferences at

idele.fr