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

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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

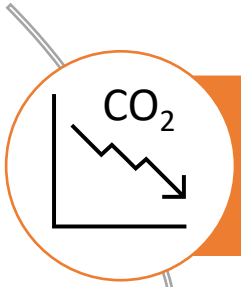
Environnement database: 7232 diagnosis Level 2 in dairy farms from 2013 to 2021

Economic database: XXX calculation in dairy farms from 2013 to 2021

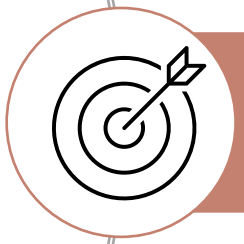
Identification of **357** farms with both diagnosis for the same year

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

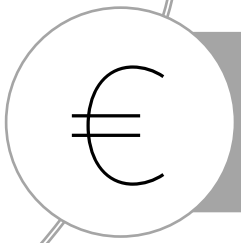
Action 2: Farms paths towards environmental performances



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



Selection criterias: 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 theoric data)

Methodology – Action 1

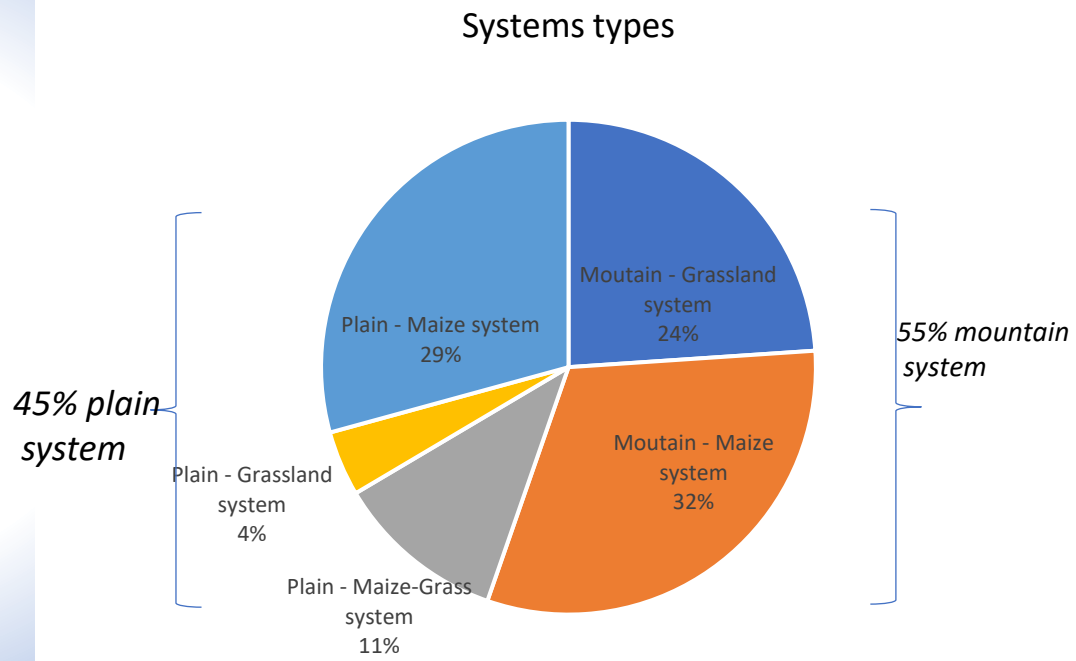
Zoom on the main indicators use in the analysis

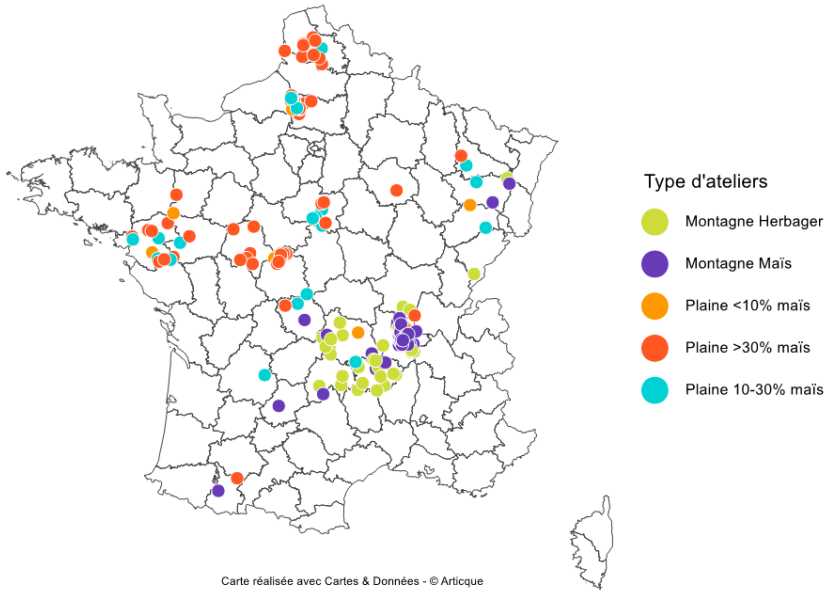
- Economics:
  - **Cost of the feeding system**: purchased feed, surface input (fertilizer, seeds), machineries cost (external, fuel, maintenance, depreciation…), land cost
  - **EBITDA** (Earnings Before Interest and Taxes Depreciation Amortization) = output (milk, meat, subsidies) - operational costs (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)
  - Cost of production
  - Nb SMIC (french minimum wage)/FTE (full-time equivalent)
- Environment
  - **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, *ANOVA*…)

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

Results
Description of the dataset

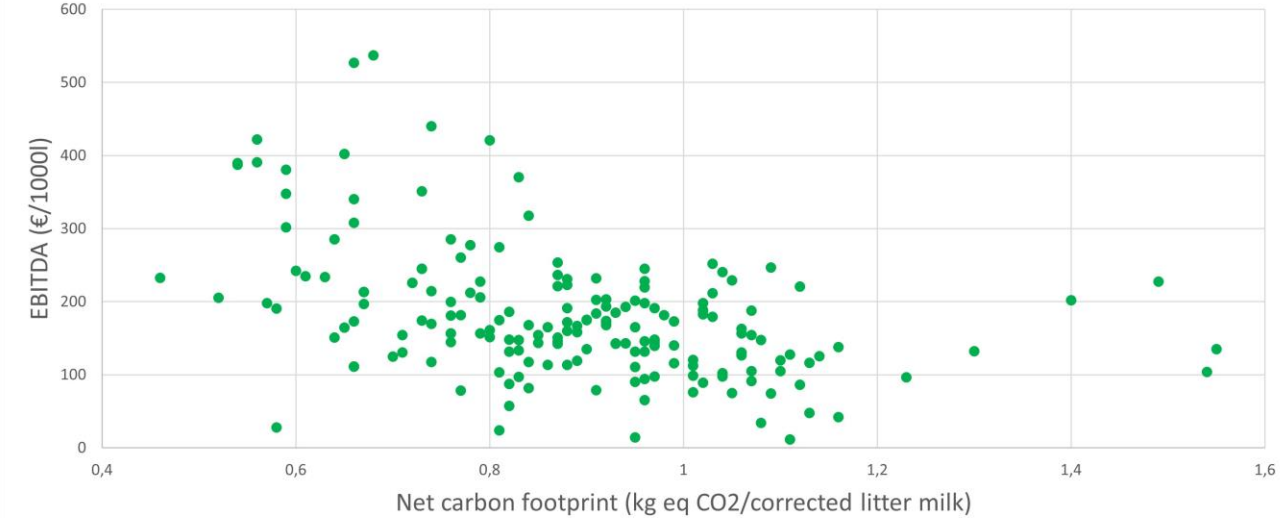




- Dataset not representative of dairy farming in France (geographical repartition)
- But good representativity of the system diversity

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 wich 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)	1,23	1,06	0,91	1,24	1,03	0,85
	GHG emission (kg eq CO2/l)	$0,97^{a}$	$0,83^{b}$	$0,72^{c}$	$1,16^{a}$	$0,93^{b}$	$0,73^{c}$
Economics	Feed system cost	344^{a}	310^{bc}	299^{c}	271	246	240
	Dairy EBITDA	208^{ab}	207^{a}	242^{b}	113^{a}	143^{bc}	164^{c}

≠ 45€/1000l

≠ 31€/1000l

Student test <0.1 : a b

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 between extreme
  - Statistical analysis in INOSYS Farms network (1110 farms from 2009-2017) : 80€/1000l difference on the feed cost system between top and bottom (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

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