Establishing the referential costs of carbon action plans for livestock farms in Europe

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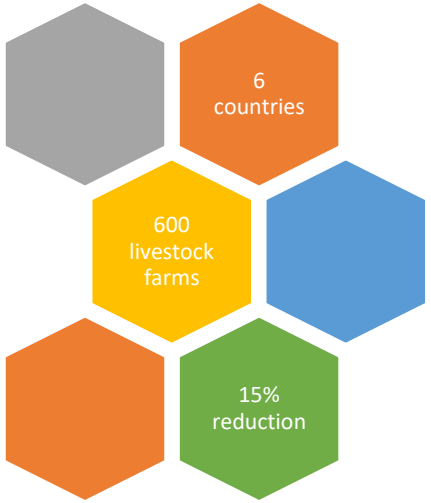
Ce projet bénéficie du soutien du programme LIFE de l'Union Européenne.

Context

Aim : to motivate the uptake of carbon farming practices by the incentive of a financial scheme

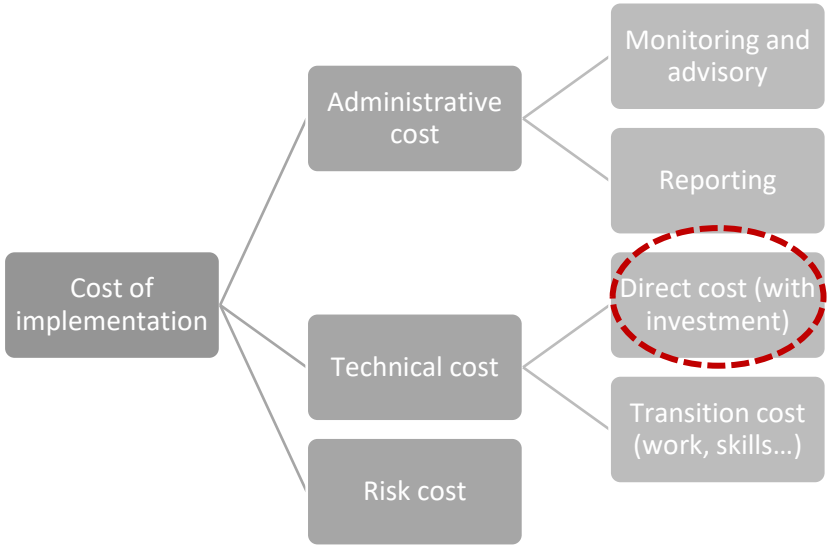


Reduce the carbon footprint

Build a European benchmark for the costs of implementing low-carbon projects

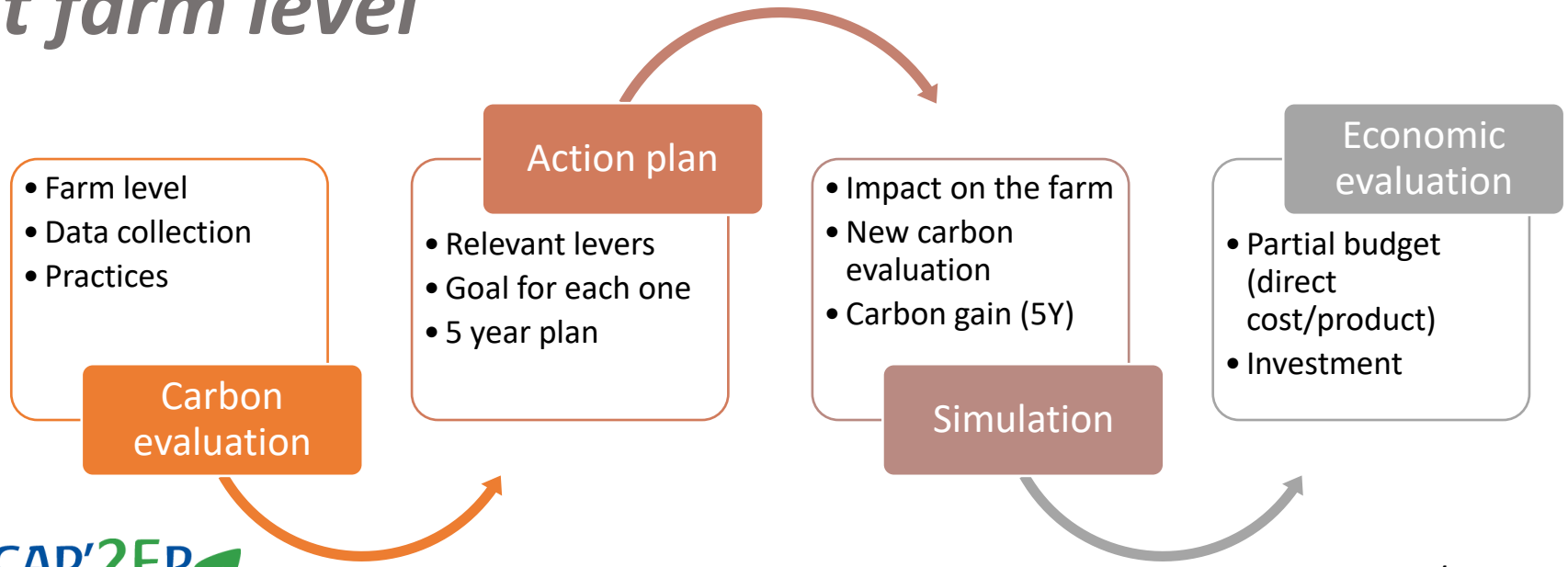
Harmonise tools and standards

Innovate with a European financial reward system



Methodology

At farm level



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2 assessments:

Farm scale

« Carbon gain » = *emissions reductions + carbon sequestration* (T CO2eq/farm)

Farm scale

« Action plan's economic impact » (€/farm)

Action plan with/without investment

« Action plan's economic impact » (€/tCO2eq)

Carbon gain scale

Positive/negative economic impact

Legend :

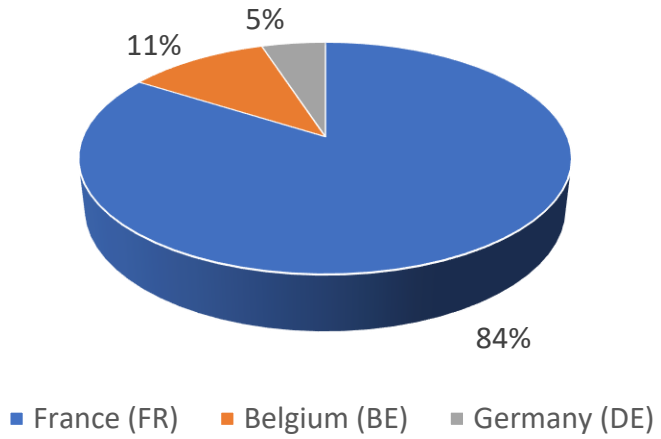
Quantitative indicators

Qualitative indicators

Methodology
For the analysis

Sample

- 351 farms
- From 3 countries



- Evaluation with

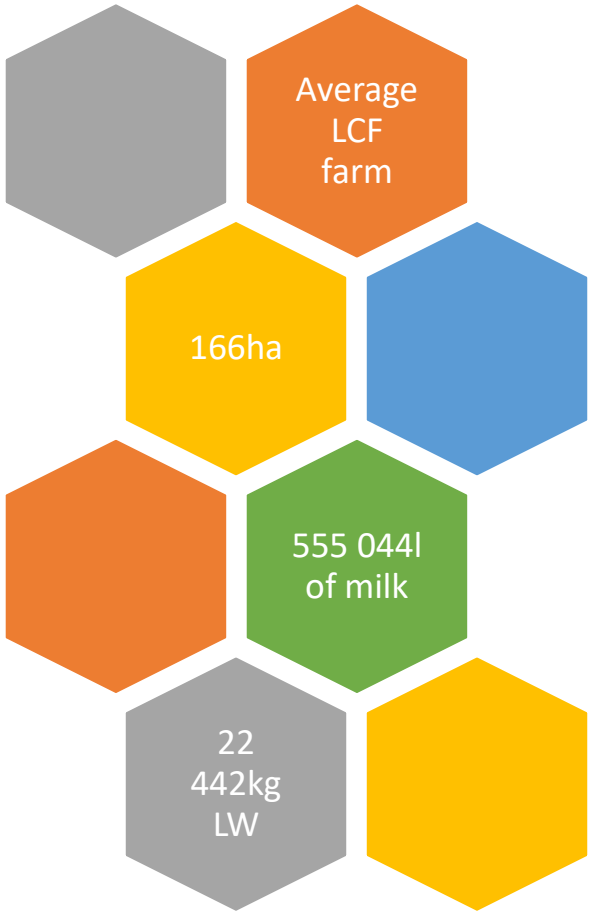
CAP'2ER®

Analysis

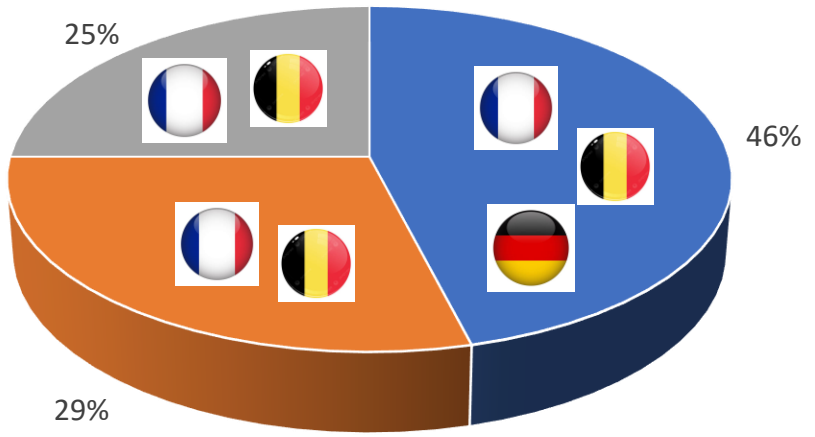
- ANOVA
- For the 3 quantitative indicators + 2 qualitative indicators
- Effect of :
  - Countries
  - Carbon gain
  - Investment
  - Positive / negative gain

Results

Descriptive analysis



Type of production

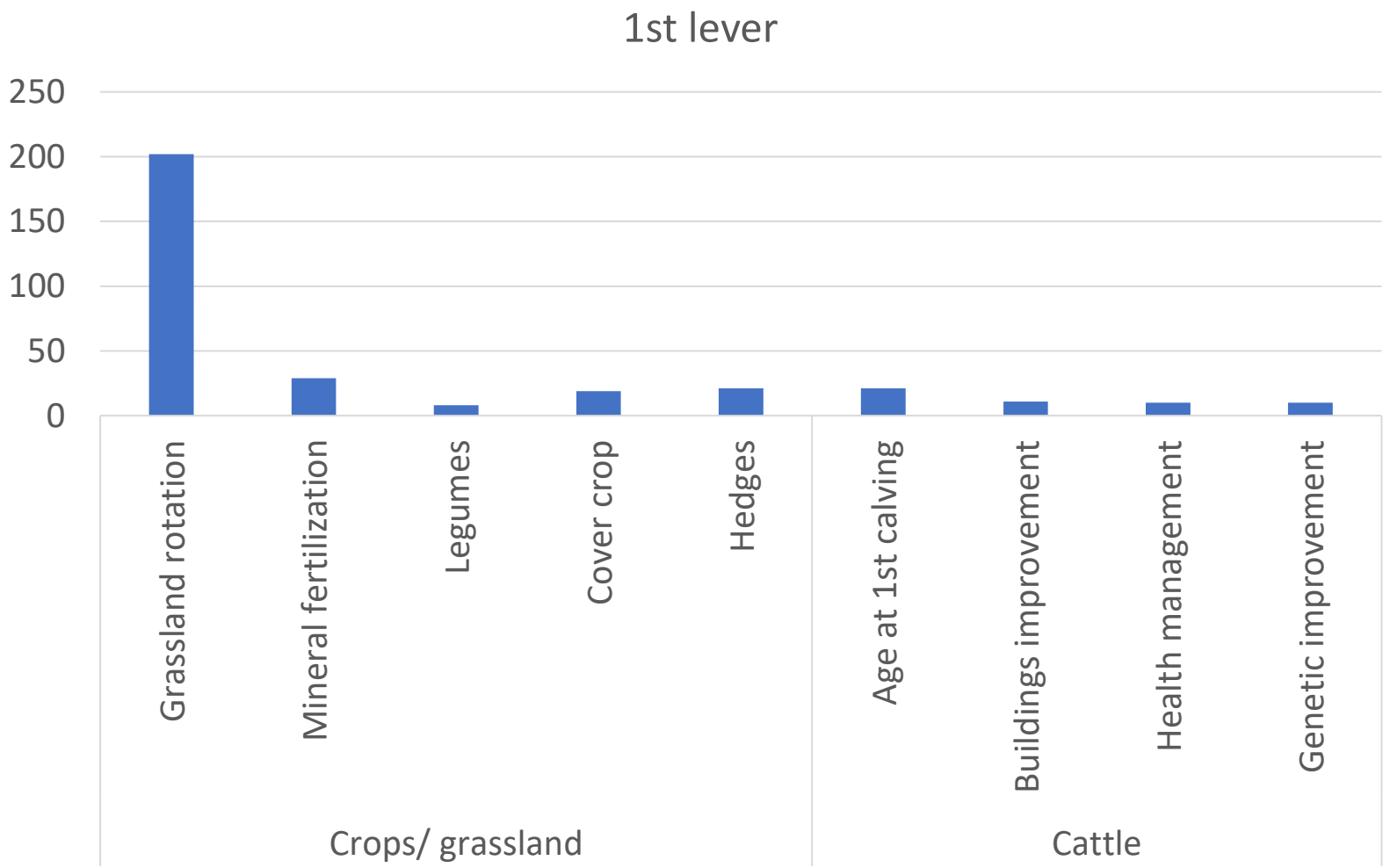


➔ *Statistical analysis of 2 different samples: dairy farms, french and belgium farms (all production)*

Results

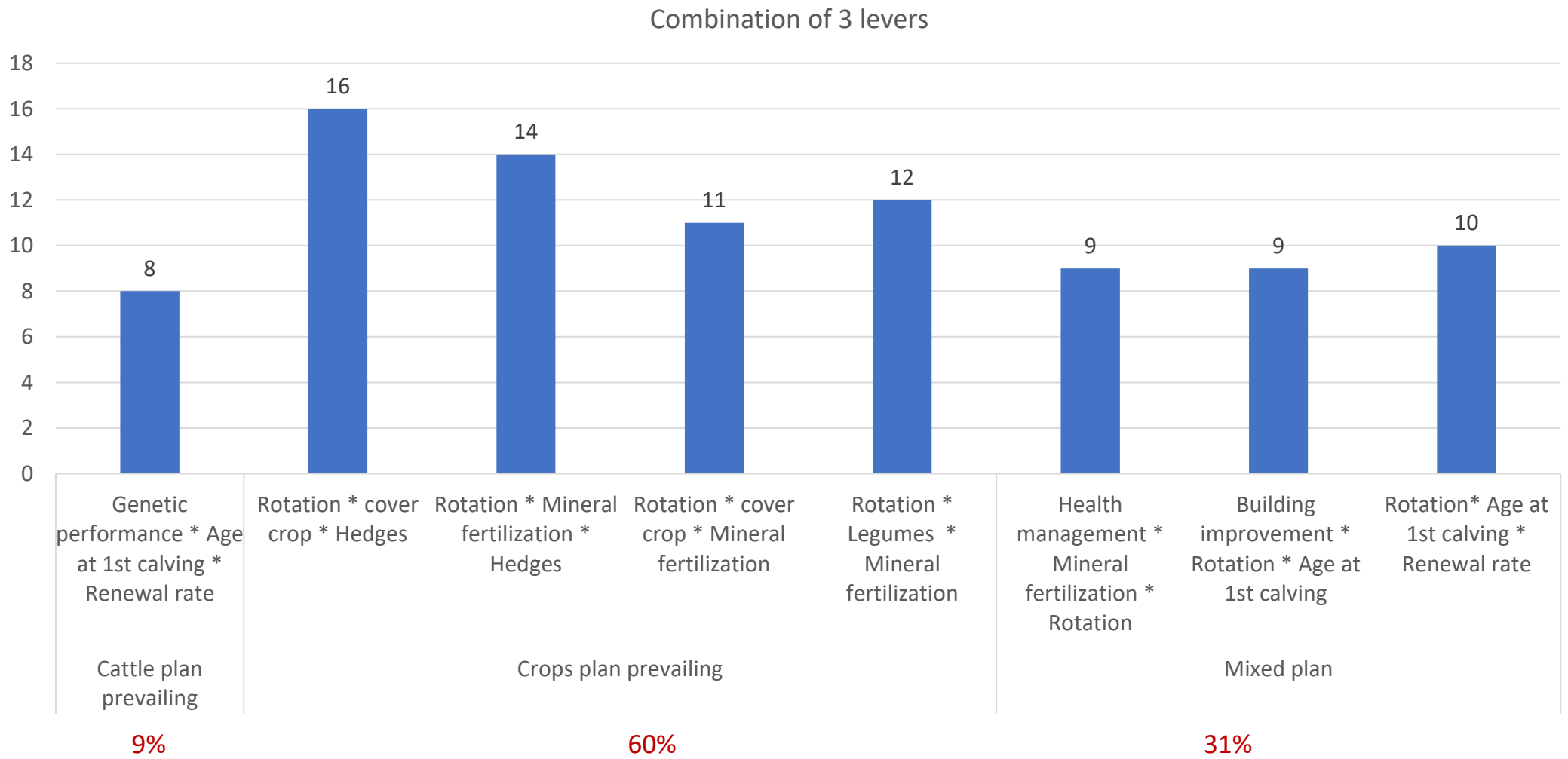
Action plan description

In average: 4 levers/action plan

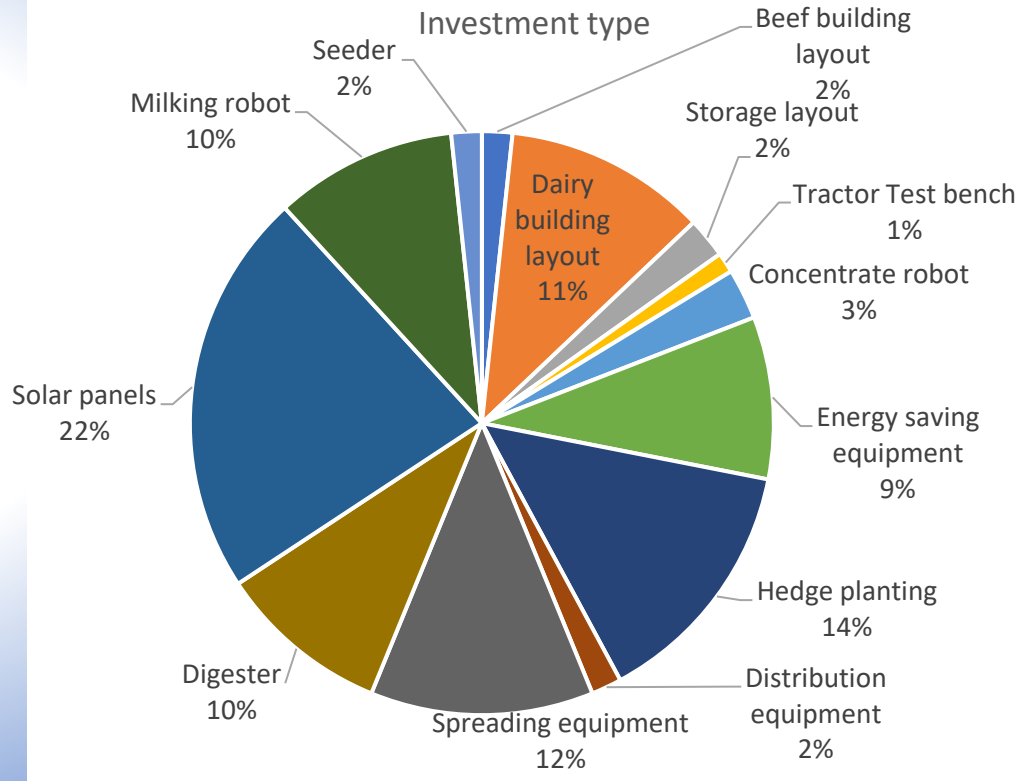


Results

Action plan description



Results
Action plan description



50% of the farms have investment

Quantitative indicators	
« Carbon gain » = *emissions reductions + carbon sequestration* (T CO2eq/farm)	443 t C02eq avoided/farm*
« Action plan's economic impact » (€/farm)	+ 7 826€/farm*
« Action plan's economic impact » (€/tCO2eq)	+ 18 €/t CO2eq*

**median*

Results
Carbon gain

Significant effect of the country and production

- Effect of the country / production

Dairy farms sample

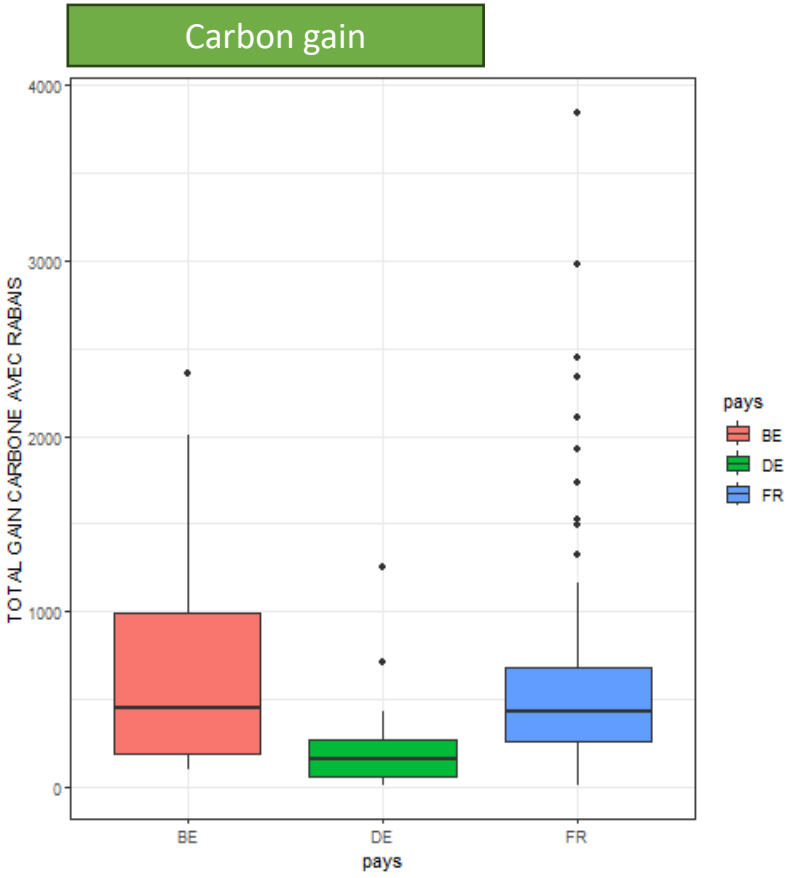
Country	Adjusted mean (t CO2eq)	CI 95%
FR	611 a	[527 ; 694]
BE	535 a	[352 ; 719]
DE	100 b	[-122 ; 232]

Belgium-France sample

Country	Adjusted mean (t CO2eq)	CI 95%
FR	653 a CI[	[589 ; 715]
BE	845 b	[682 ; 1007]

Production	Adjusted mean (t CO2eq)	CI 95%
Beef farm	901 a	[732 ; 1069]
Mixed farm	765 a	[628 ; 901]
Dairy farm	580 b	[599 ; 830]

Example for the dairy farms of the variability



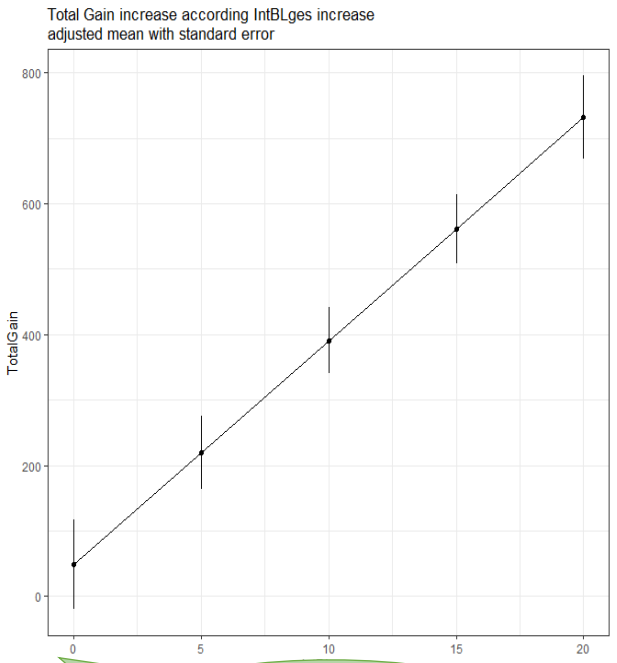
Results

Carbon gain

- Initial level of emission :

Dairy farms sample

Graph à corriger

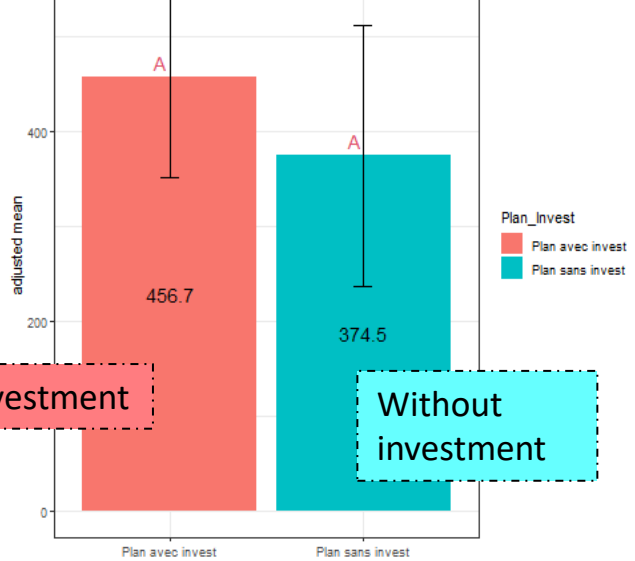


Impact significant only in dairy production

- Investiment or cost :

Impact of cost €/t on carbon gain only in BL-FR sample

Carbon gain



With investment

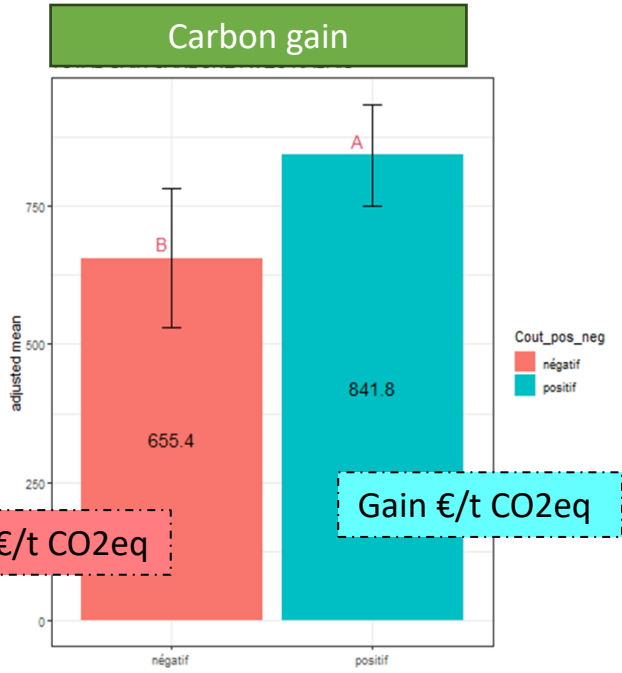
Without investment

Action plan with/without investment

No effect of investment on carbon gain

Belgium-France sample

Carbon gain



Cost €/t CO2eq

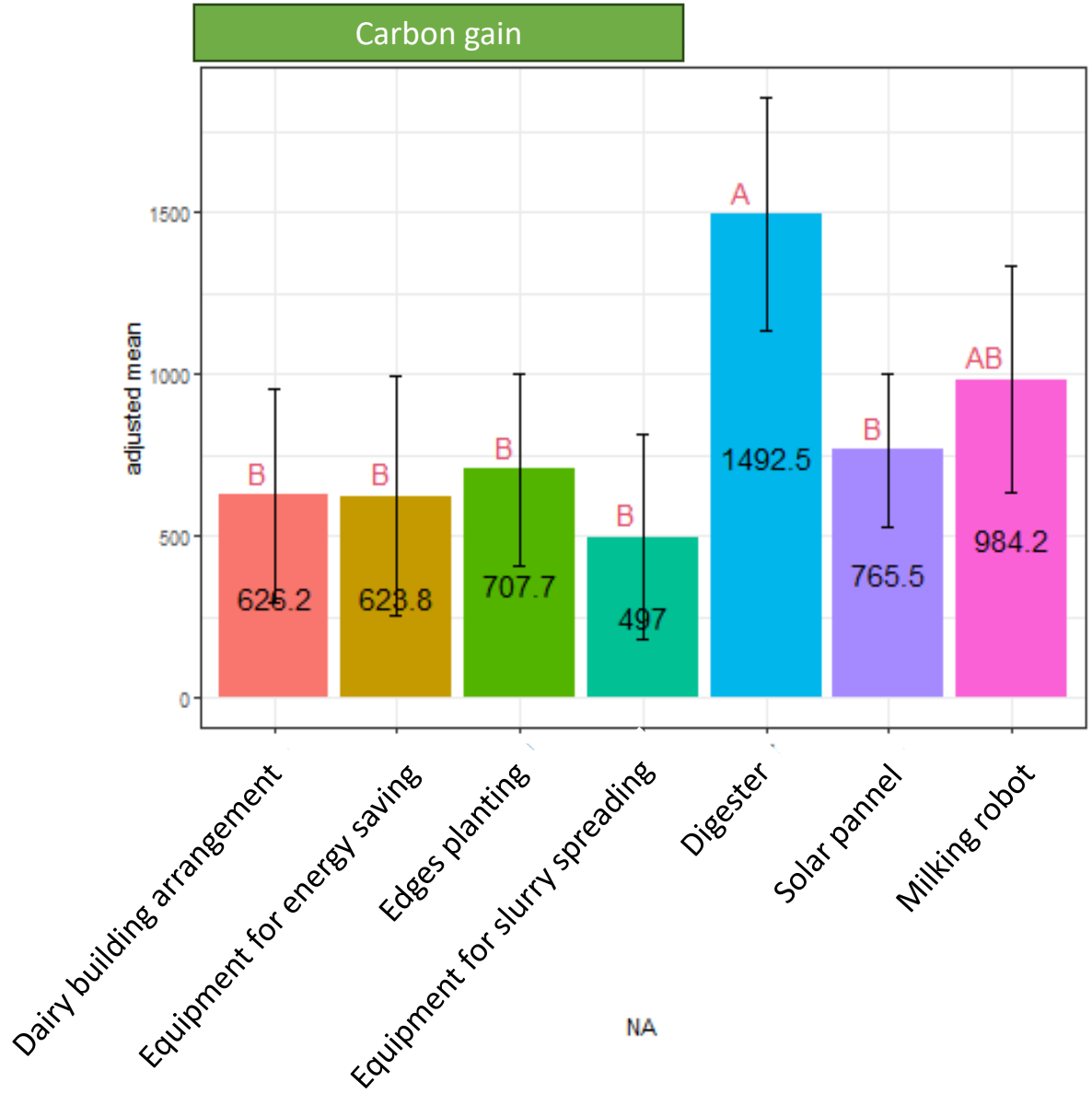
Gain €/t CO2eq

Positive/negative economic impact

Results
Carbon gain

- Levers combination :
  - Not significant
- Type of investment:
  - Described in the carbon plan
  - 50% of the farms have investment

Significant only between digester and other investment (except milking robot)



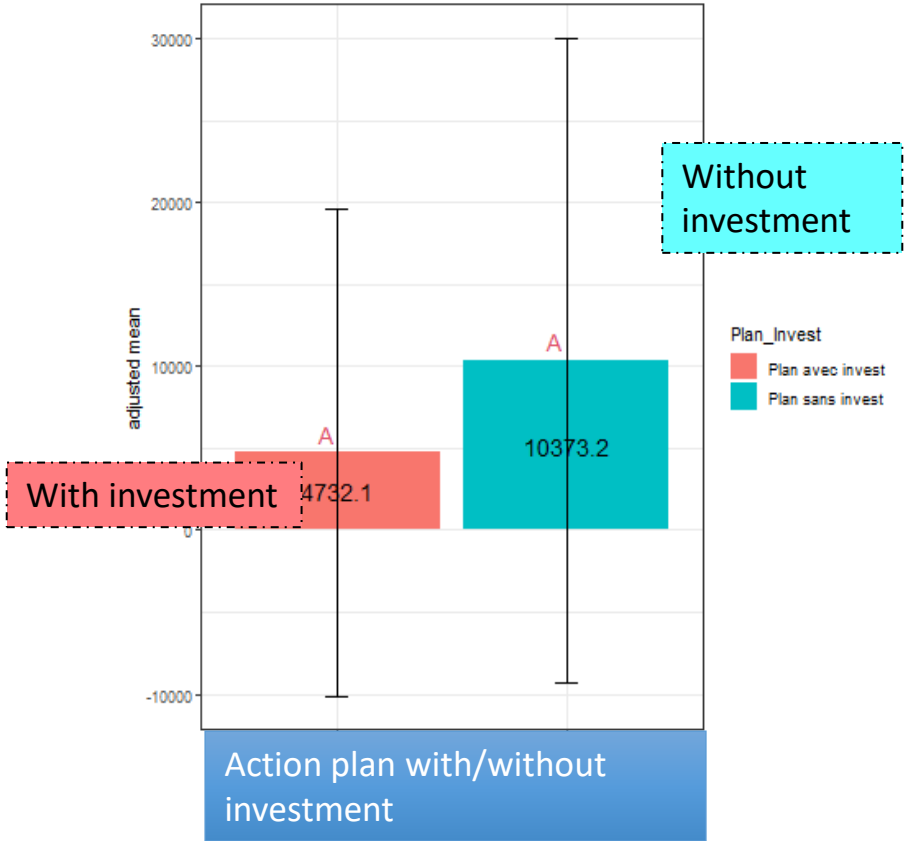
Results
Economic impact

No effect of investment on the farm assessment but on the carbon gain €/t (only in dairy)

No effect of the country, or initial emission level

Dairy farms sample

« Action plan's economic impact » (€/farm)

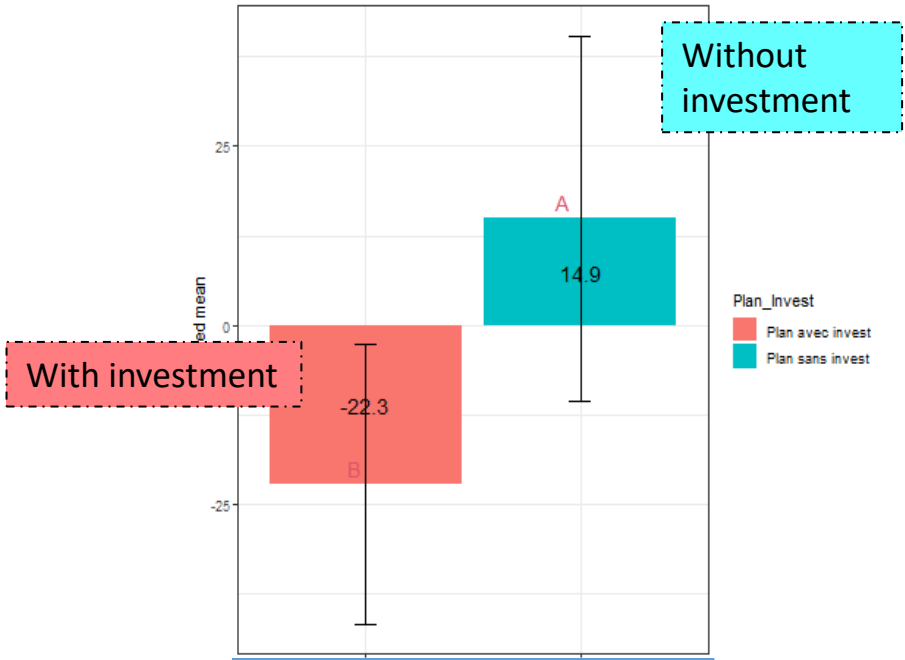


Without investment

With investment

Action plan with/without investment

« Action plan's economic impact » (€/tCO2eq)



Without investment

With investment

Action plan with/without investment

Results
Economic impact

- Effect of the lever/combination ?
  - Difficult because more than 40 levers
  - A lot of possible combination
  - A small significant difference with 3 levers combination (and not on the choice of 1st lever or combination of 2).

Combination of the 3 1st levers	Action plan's economic impact (€/farm)	Sign	Action plan's economic impact (€/tCO2eq)	Sign2
Rotation * cover crop * Mineral fertilization	70 211	A	103	A
Health management * Mineral fertilization * Rotation	29 366	AB	49	AB
Rotation * Legumes * Mineral fertilization	26 044	AB	31	AB
Genetic performance * Age at 1st calving * Renewal rate	17 716	AB	58	AB
Building improvement * Rotation * Age at 1st calving	15 609	AB	52	AB
Rotation* Age at 1st calving * Renewal rate	10 723	AB	-60	AB
Rotation * Mineral fertilization * Hedges	- 888	AB	-34	AB
Rotation * cover crop * Hedges	- 16 653	B	-83	B

Results

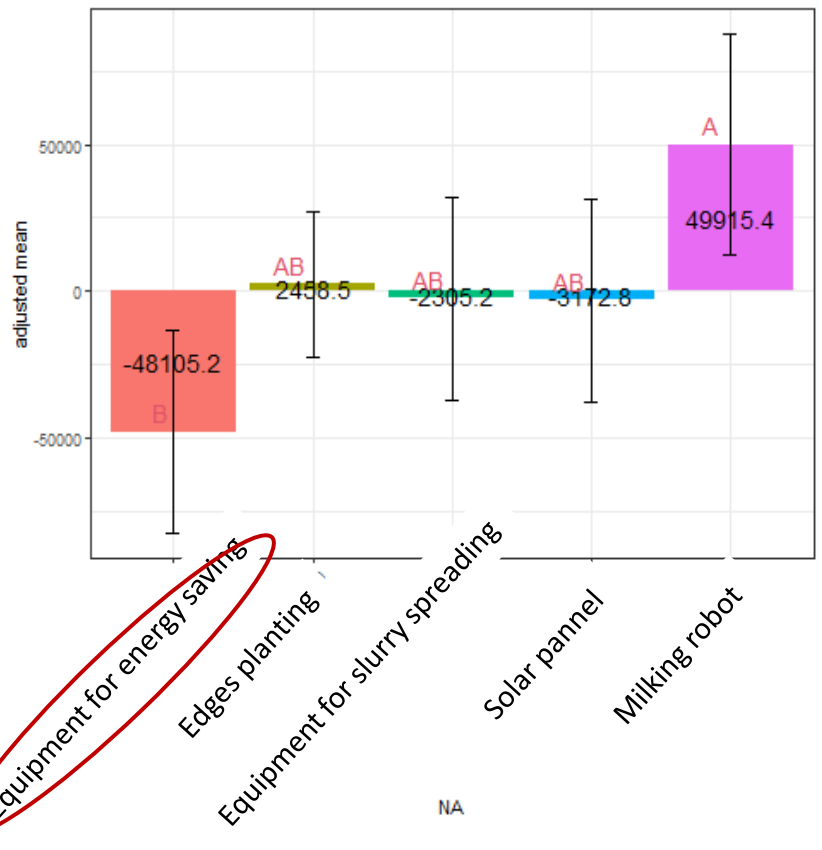
Economic impact

- Effect of the type of investment?

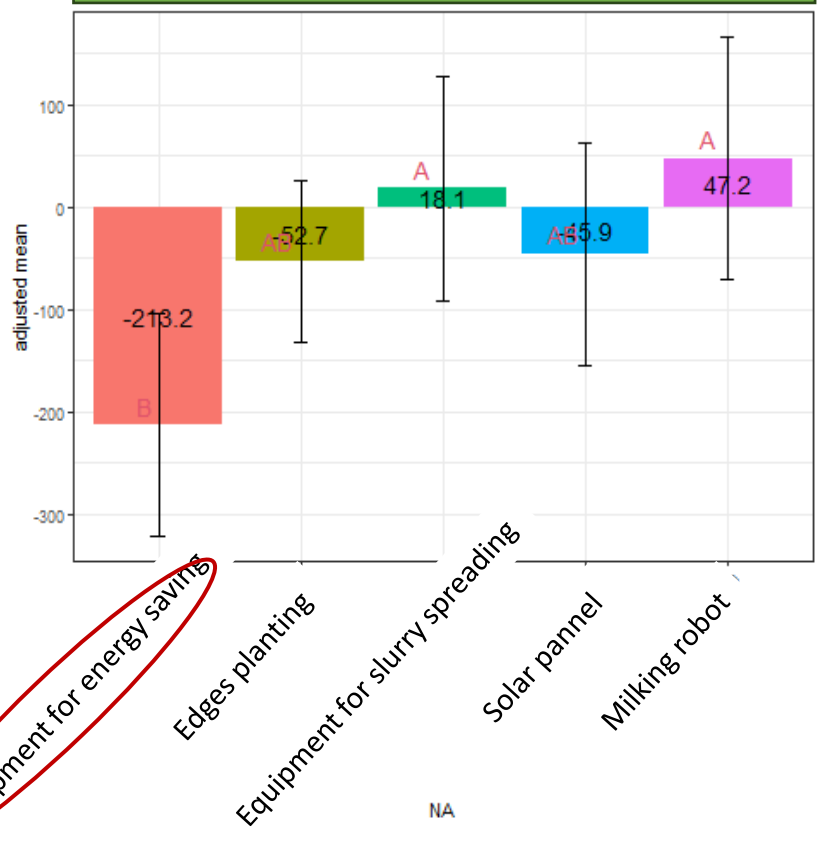
Belgium-France sample

Effect of investment on the farm assessment and the carbon gain assessment **only** in BE-FR sample

« Action plan's economic impact » (€/farm)



« Action plan's economic impact » (€/tCO2eq)



Discussion

- Carbon action plan
  - In general positive economic impact
  - But high variability between farms difficult to explain
- The lever choices have little impact on the carbon gain or economic aspect.
- No obvious link between carbon gain (t) and economic impact (investment, farm level, €/t)
- Difference between countries, why?
  - Farm structure? Lever choice?
- This evaluation takes into account only direct cost without the transition period. → Effect of failure of practice ? Time ? Skill → *Next phase: farmers survey involved in a transition period*

Thank you for your attention

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life-carbon-farming.eu