

CLIMATE-SMART
Agriculture
2015



Global Science Conference

March 16-18, 2015
Le Corum, Montpellier France

Economic assessment of greenhouse gas mitigation on livestock farms

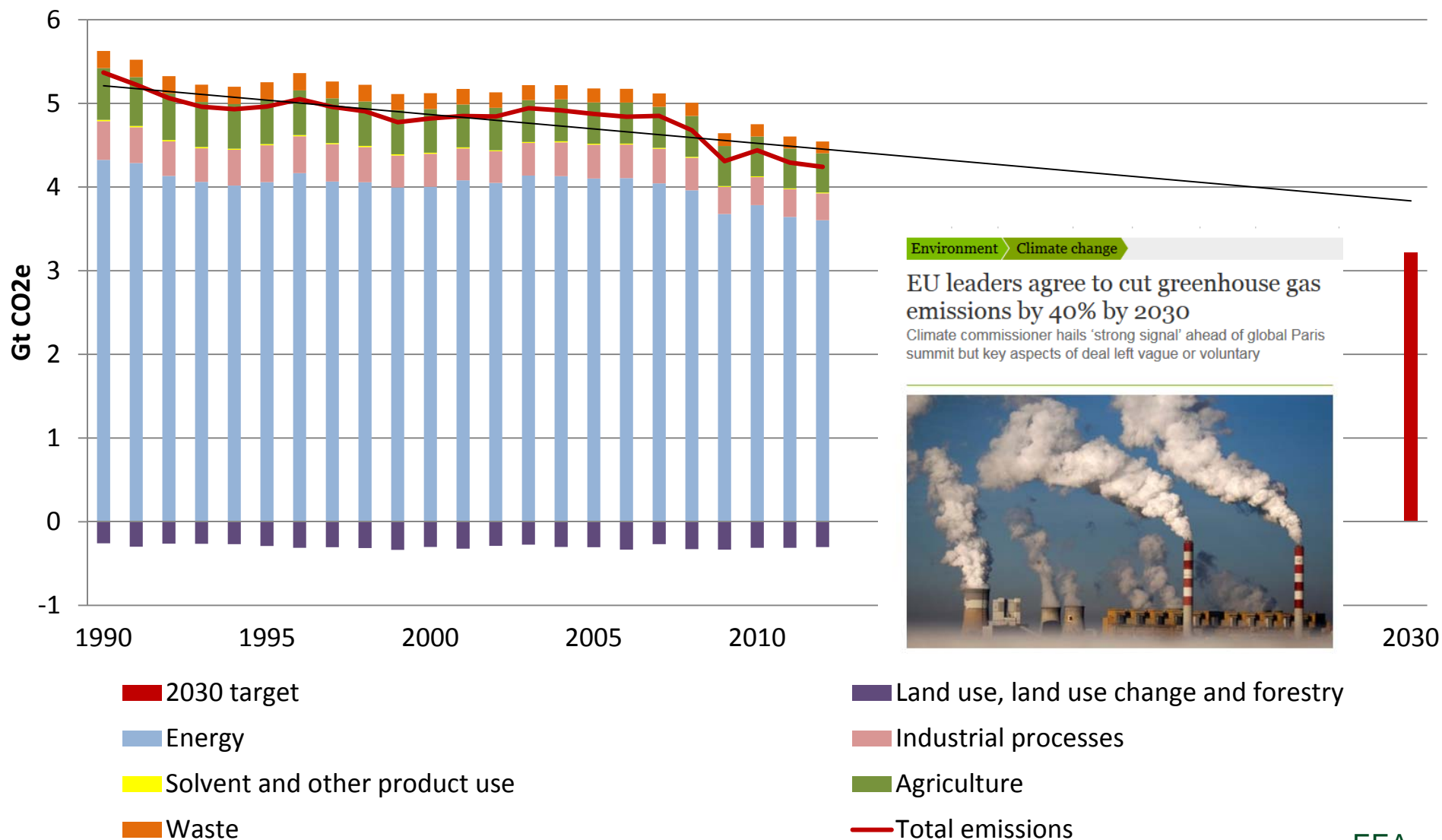
Vera Eory¹, Philippe Faverdin², Donal O'Brien³

¹SRUC, ²INRA, ³TEAGASC

Montpellier

March 16-18, 2015

GHG emissions in Europe



Environment > Climate change

EU leaders agree to cut greenhouse gas emissions by 40% by 2030
 Climate commissioner hails 'strong signal' ahead of global Paris summit but key aspects of deal left vague or voluntary

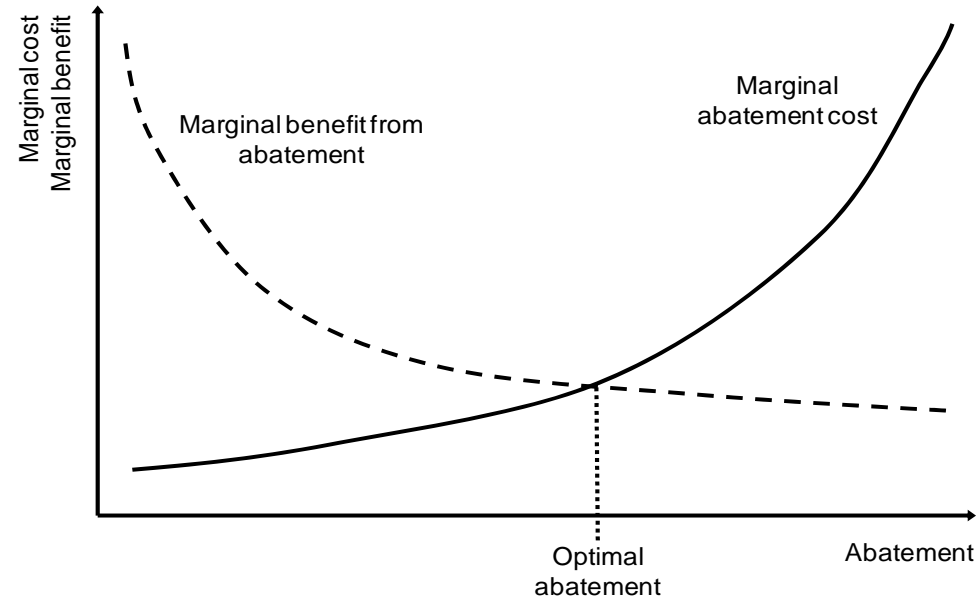


Assessment of mitigation options

- Where to reduce emissions, which pathways to choose?
- Aspects
 - **Economic:** At what cost? How efficient?
 - **Distributional:** Who loses, who gains?
 - **Environmental:** How much mitigation? Are there any negative or positive co-effects?
 - **Institutional:** Transaction costs? How to monitor?

Marginal abatement cost curves

- Economic rationale



Pearce and Turner 1989

- How do they help?
 - Identify the most cost-effective ways of meeting the targets – within and between sectors
 - Identify options that cost less than the a C price

Farm level assessment

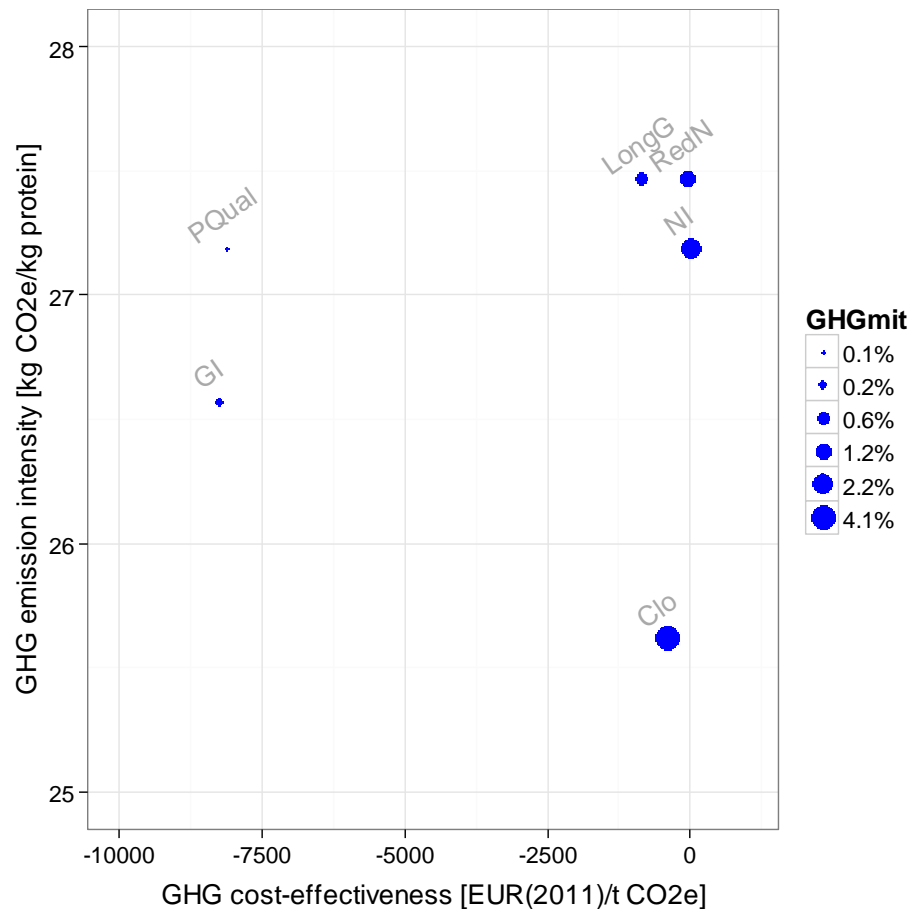
- AnimalChange project: farm level biophysical modelling on farms across Europe
- Mitigation options selected by farm experts
- Economic assessment on two farms (so far):
 - Maritime grass-based dairy (Irish national average farm)
 - Maritime grass-based beef (Irish national average farm)

Agronomic and cost assumptions

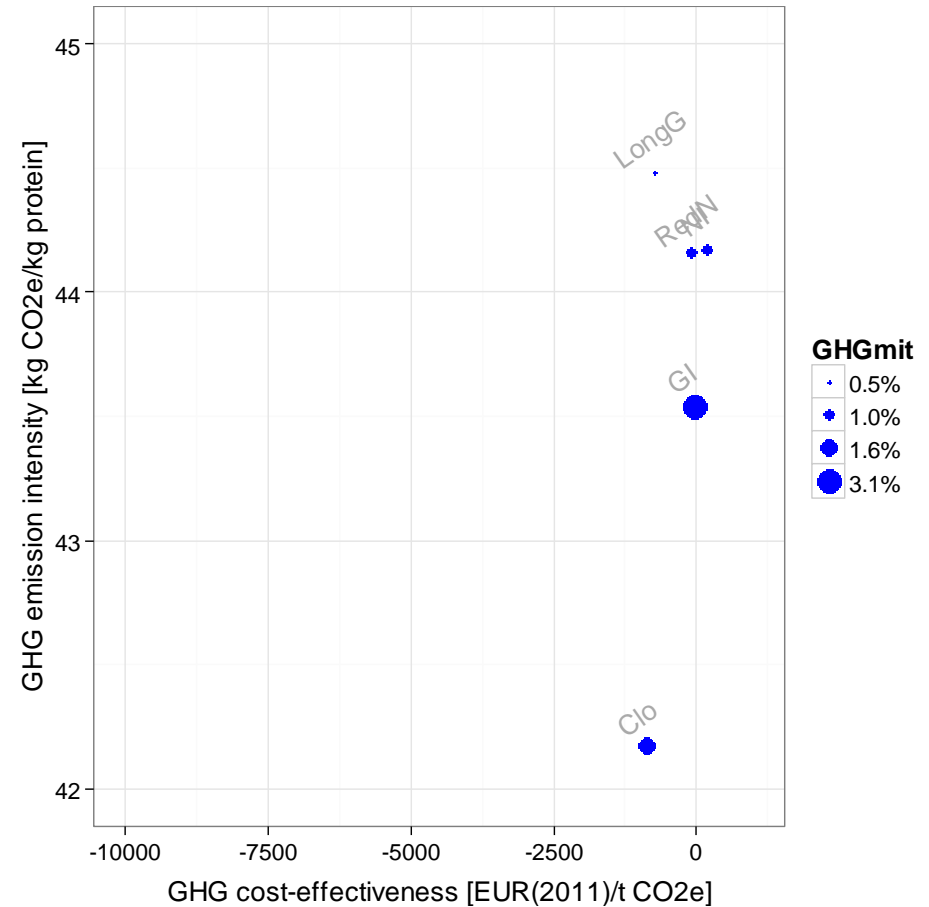
- Reduced N fertilisation
 - -5% synthetic N, -4-6% grass yield, +3-4% forage utilisation
 - Scenario with silage import
- Grass – clover mixture (7-10% clover)
 - -16% synthetic N, same grass yield, +4% milk yield (growth rate)
 - Seeding cost €8/ha/y, same reseeding frequency
- Improving pasture quality through better management
 - Increased digestibility, +2% milk yield (growth rate)
 - Reseeding frequency increased
- Improved genetics
 - +5% milk yield (growth rate)
 - No cost (assumption: artificial insemination in the baseline)
- Nitrification inhibitors
 - -9% synthetic N, +2% milk yield (growth rate)
 - DCD cost €17/ha/y
- Longer grazing (+5 days)
 - -0.5% synthetic N, +1% milk yield (growth rate)

Results: CE, EI, GHG mitigation

Irish National Average Dairy Farm



Irish National Average Beef Farm

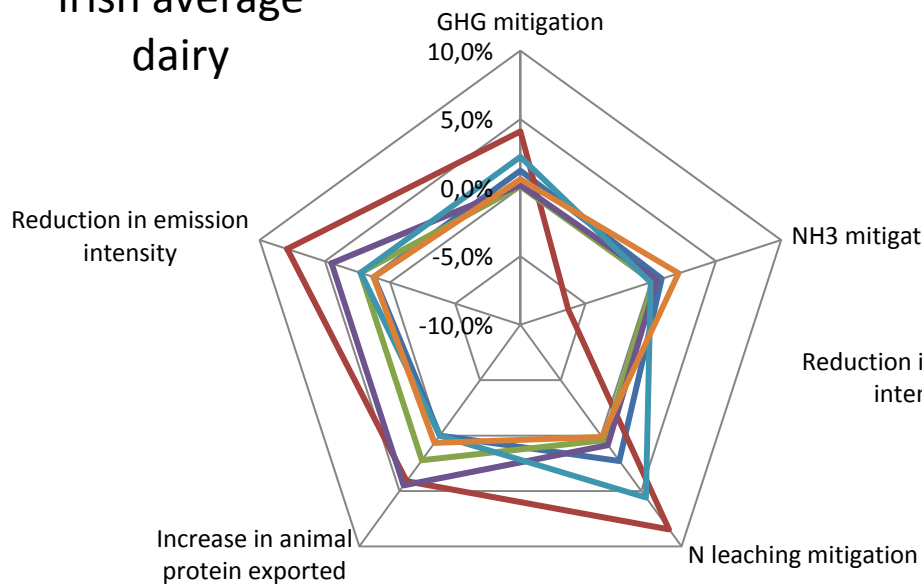


Sensitivity analysis of CE (dairy)

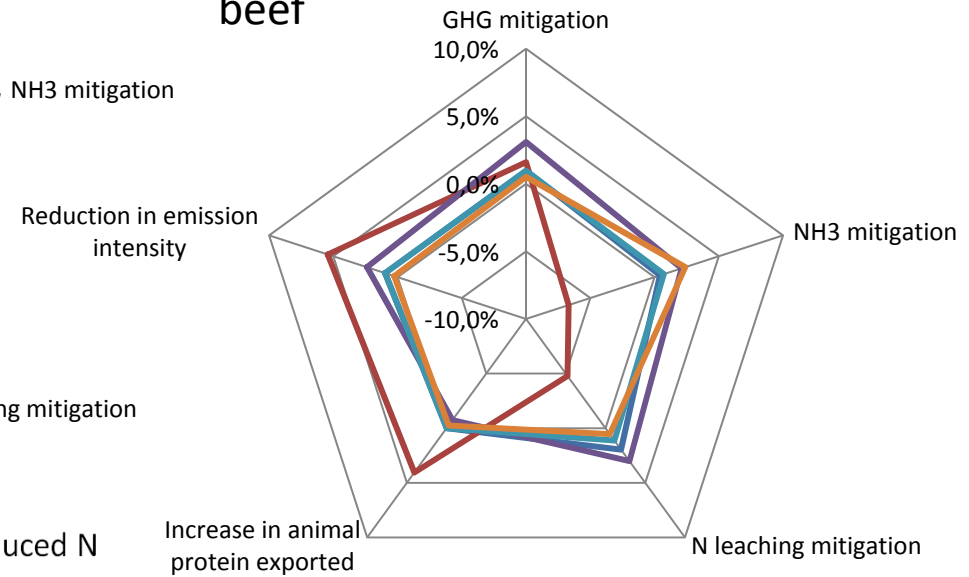
	Reduced N	Clover	Pasture quality	Genetic improvement	Nitrification inhibitors	Longer grazing
Urea price	41%	7%			-10%	0%
CAN price	59%	10%			-15%	1%
Reseeding frequency		-3%	-46%			
Reseeding cost			44%			
DCD price					125%	
Milk price		87%	102%	100%		98%
Beef cattle price						

Results: other pollutants

Irish average dairy

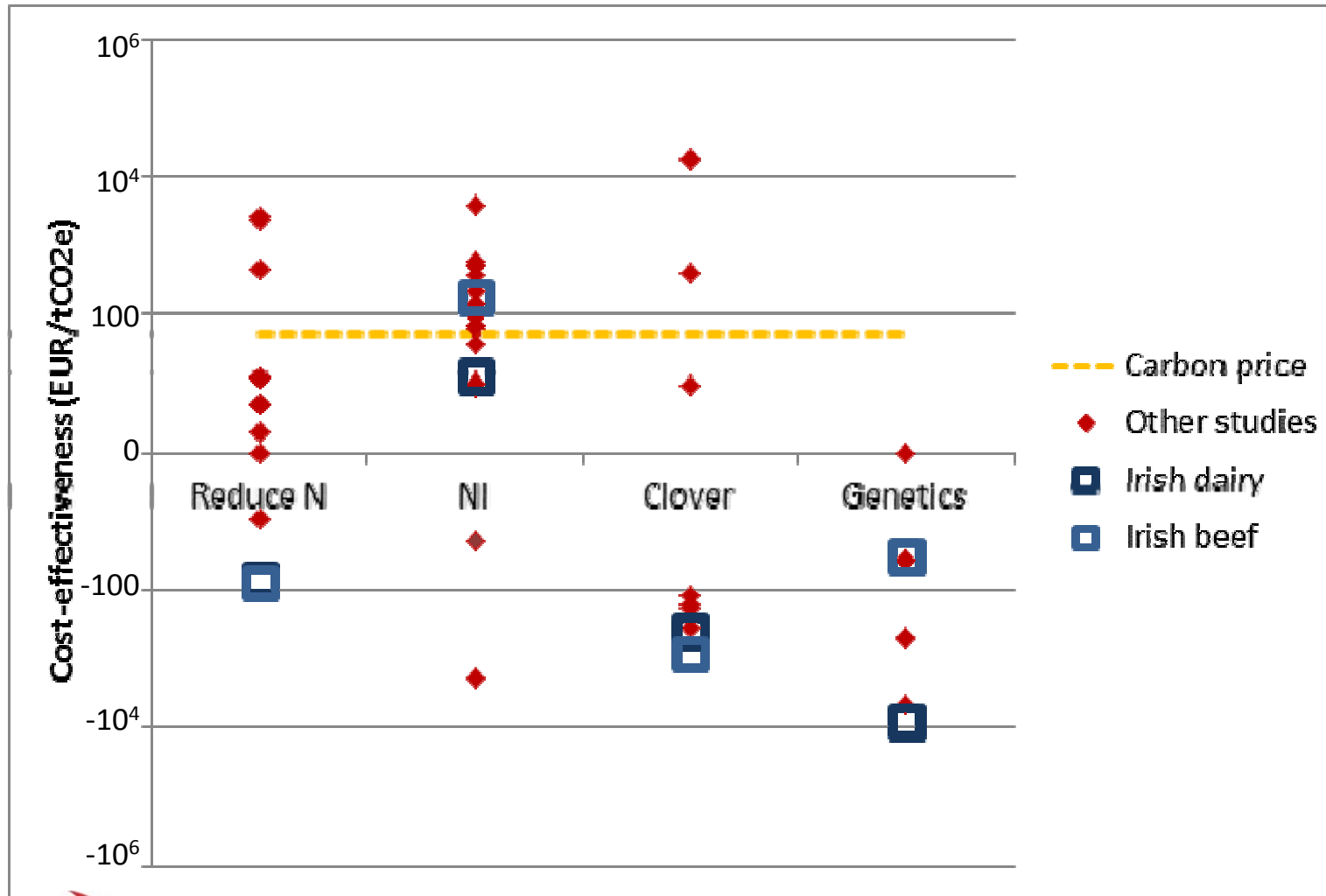


Irish average beef



- Reduced N
- Clover
- Pasture quality
- Genetic improvement
- Nitrification inh.
- Longer grazing

Comparison with other studies



Conclusions

- Most of the selected measures are “win-win” considering technical costs, many implies improved management practice
- Both implementation and effects are different on different farms
- Potential barriers: lack of information, time/effort of implementation, perceived risk of reduced yield
- Policy instruments:
 - Voluntary (information, financial risk reduction)
 - Information/advice should be farm-specific
 - Framing the message: focus on efficiency and profitability
 - Regulatory instruments for the consistently win-win measures
 - Market-based solutions?

Thank you!

Funded by the EU Seventh Framework Programme (AnimalChange project, grant agreement no 266018), and the Scottish Government Rural and Environmental Science and Analytical Services division (RESAS) funding to SRUC.

Contact: vera.eory@sruc.ac.uk



Additional slides

Results: summary

Irish average dairy

	Unit	Reduced N	Clover	Pasture quality	Genetic improvement	Nitrification inhibitor	Longer grazing
GHG mitigation	t CO2e/farm/y	4.0	13.3	0.3	0.6	7.3	2.0
GHG mitigation	% BAU	1.2%	4.1%	0.1%	0.2%	2.2%	0.6%
Animal protein exported	% change from BAU	0.0%	4.1%	2.2%	4.5%	0.0%	0.7%
Total cost	EUR(2011)/farm/y	-281	-5,298	-2,514	-5,170	1,971	-1,683
GHG CE	EUR(2011)/t CO2e	-70	-400	-8,115	-8,245	272	-859

Irish average beef

	Unit	Reduced N	Clover	Pasture quality	Genetic improvement	Nitrification inhibitor	Longer grazing
GHG mitigation	t CO2e/farm/y	2.5	4.1	-0.8	8.0	2.5	1.3
GHG mitigation	% BAU	1.0%	1.6%	-0.3%	3.1%	1.0%	0.5%
Animal protein exported	% change from BAU	0.0%	4.1%	3.7%	-0.7%	0.0%	-0.2%
Total cost	EUR(2011)/farm/y	-194	-3,551	-2,557	-254	2,974	-973
GHG CE	EUR(2011)/t CO2e	-76	-856	NA	-32	1,188	-734