

CLIMATE-SMART
Agriculture
2015



Global Science Conference

March 16-18, 2015

Le Corum, Montpellier France

Economic assessment of greenhouse gas mitigation on livestock farms

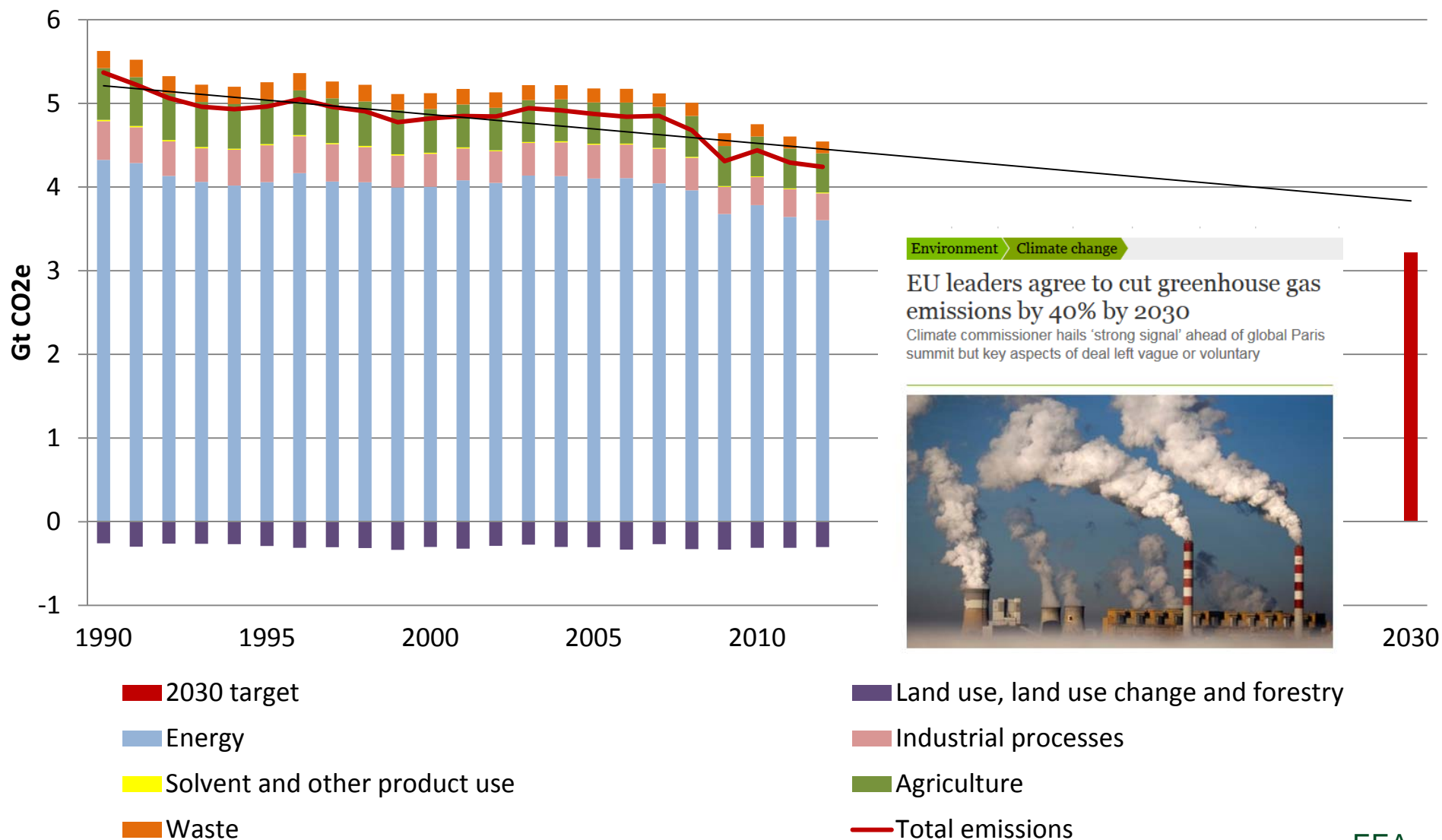
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GHG emissions in Europe



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

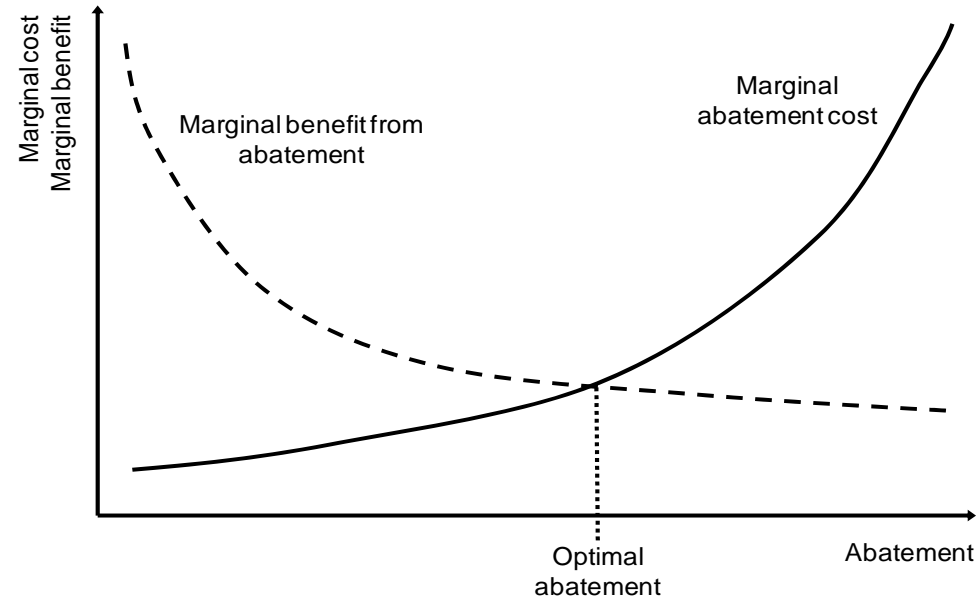


Assessment of mitigation options

- 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

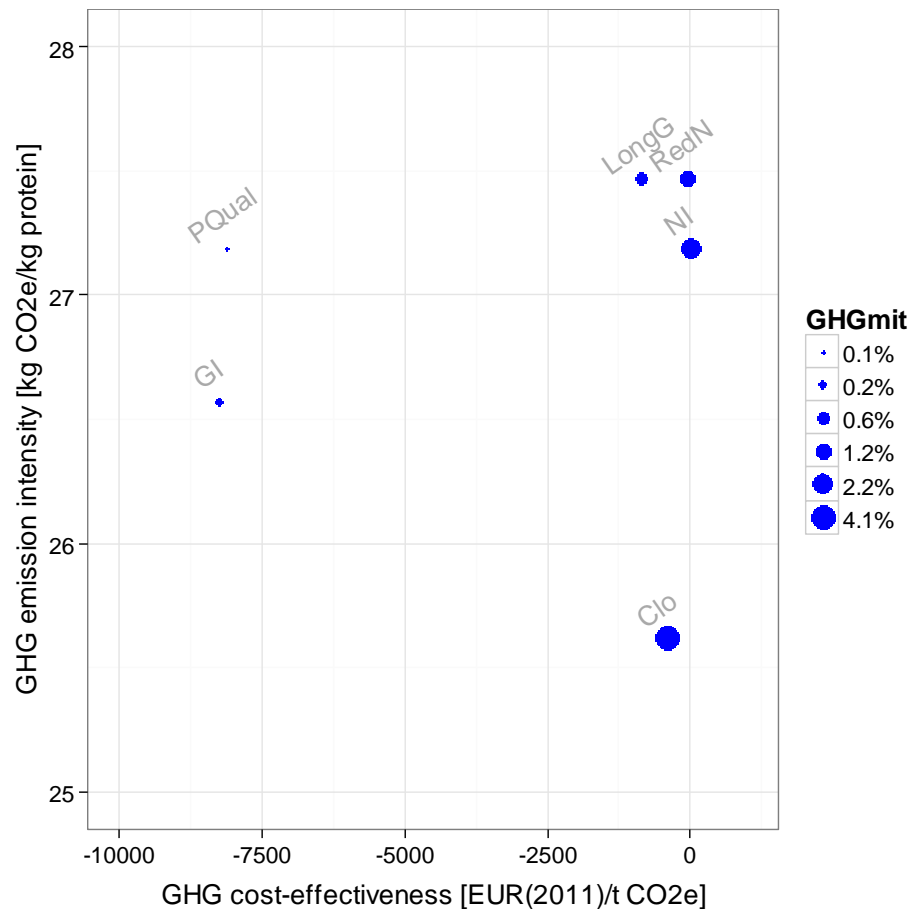
- AnimalChange project: farm level biophysical modelling on farms across Europe
- Mitigation options selected by farm experts
- Economic assessment on two farms (so far):
 - Maritime grass-based dairy (Irish national average farm)
 - Maritime grass-based beef (Irish national average farm)

Agronomic and cost assumptions

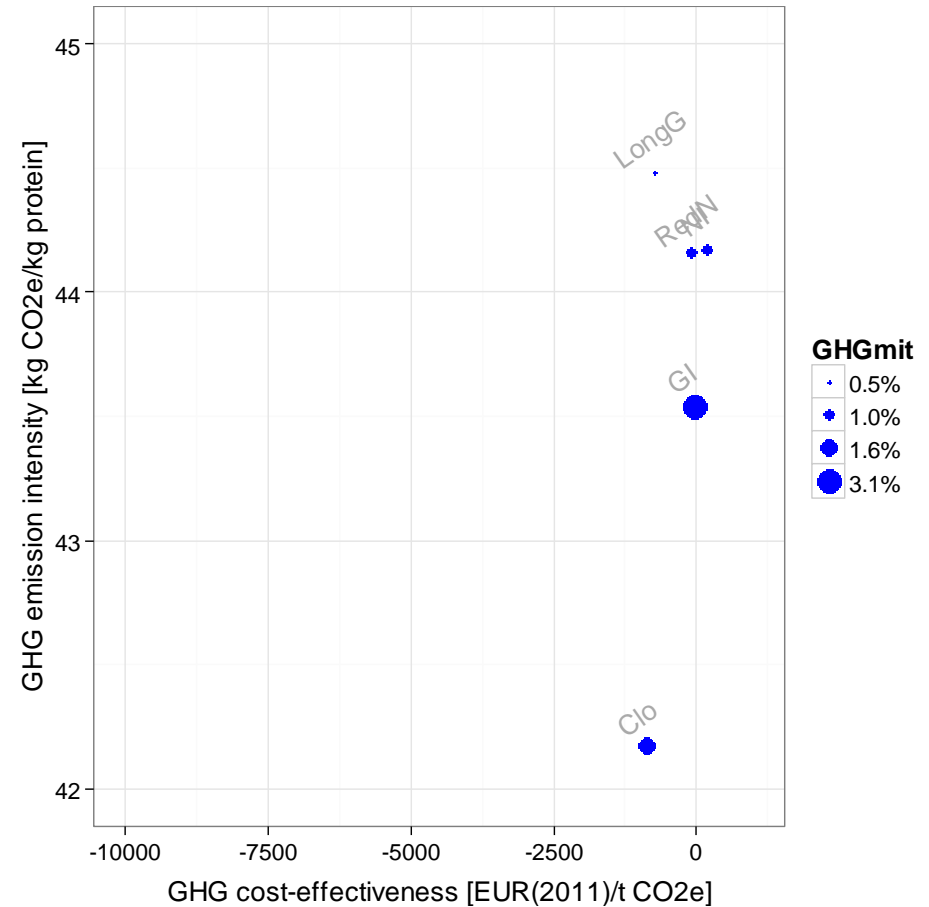
- Reduced N fertilisation
 - -5% synthetic N, -4-6% grass yield, +3-4% forage utilisation
 - Scenario with silage import
- Grass – clover mixture (7-10% clover)
 - -16% synthetic N, same grass yield, +4% milk yield (growth rate)
 - Seeding cost €8/ha/y, same reseeding frequency
- Improving pasture quality 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

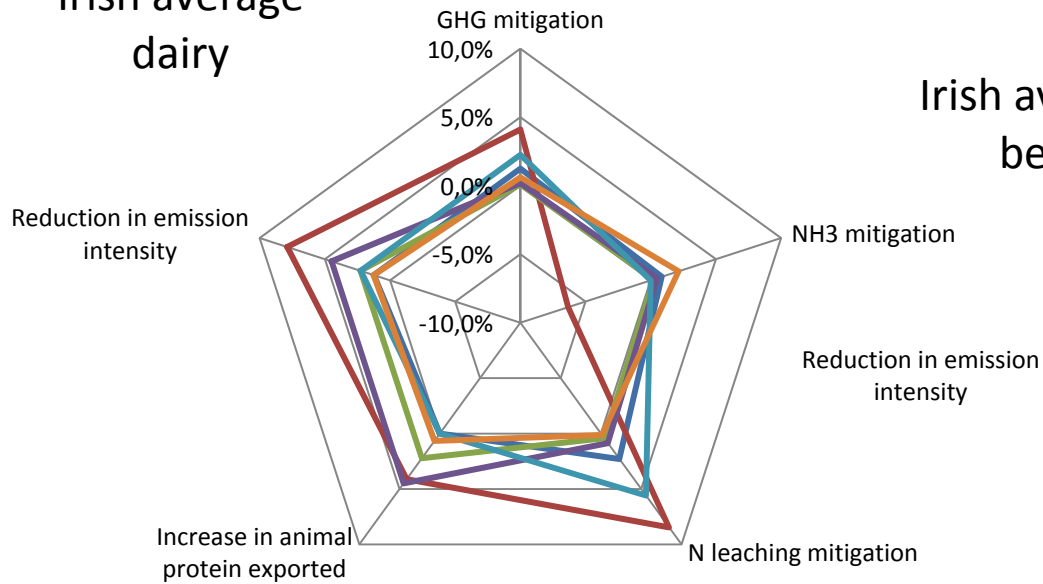


Sensitivity analysis of CE (dairy)

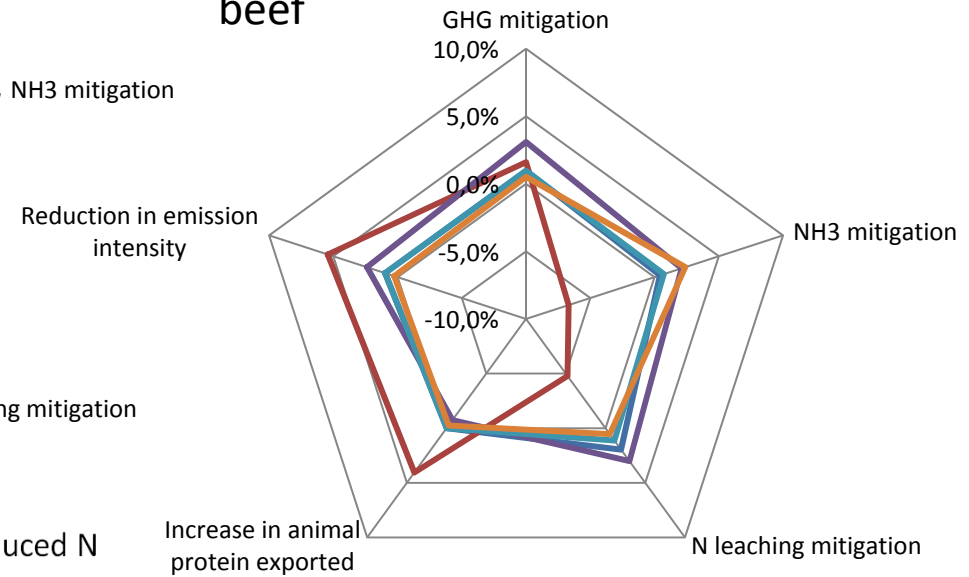
	Reduced N	Clover	Pasture quality	Genetic improvement	Nitrification inhibitors	Longer grazing
Urea price	41%	7%			-10%	0%
CAN price	59%	10%			-15%	1%
Reseeding frequency		-3%	-46%			
Reseeding cost			44%			
DCD price					125%	
Milk price		87%	102%	100%		98%
Beef cattle price						

Results: other pollutants

Irish average dairy

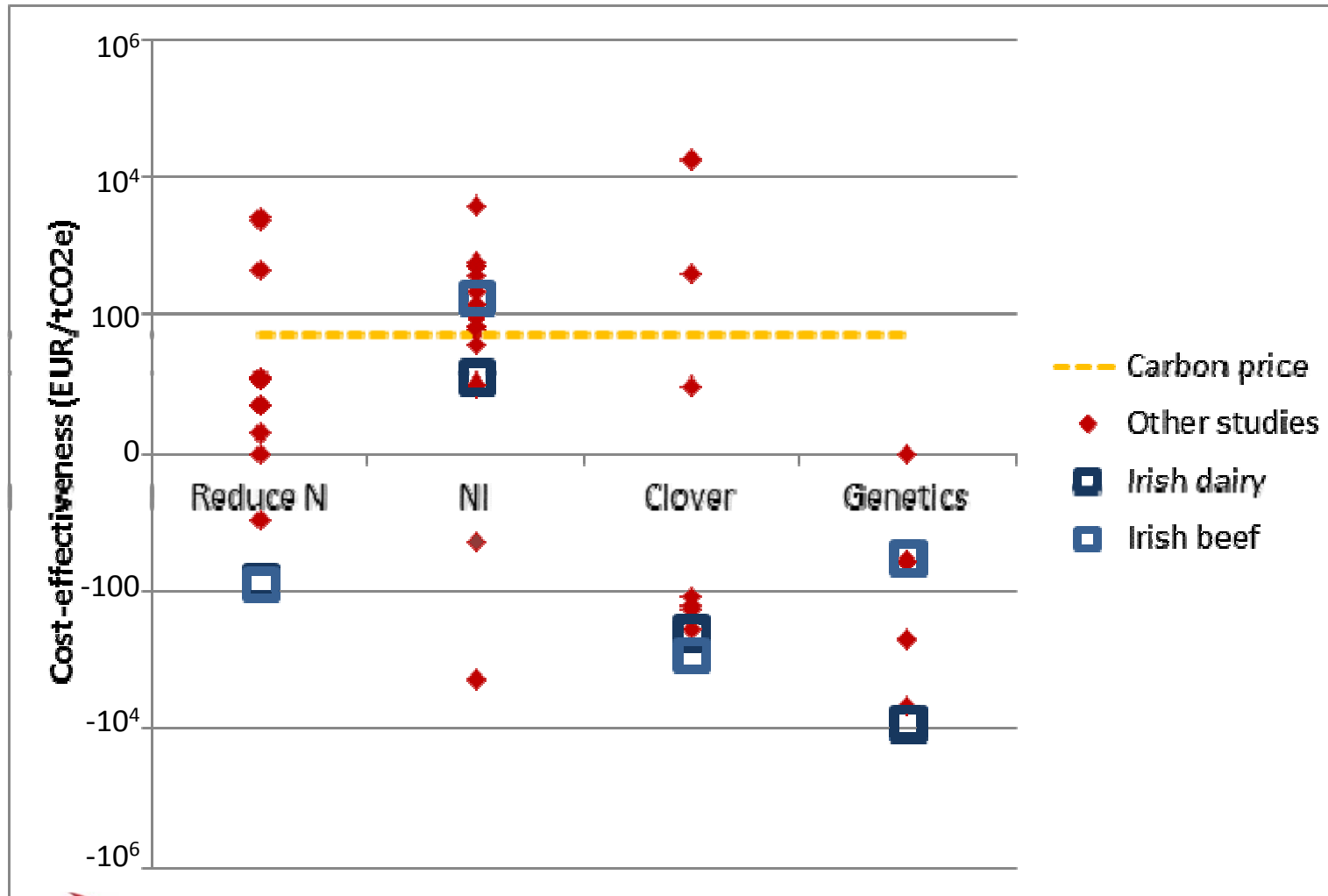


Irish average beef



- 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!

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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