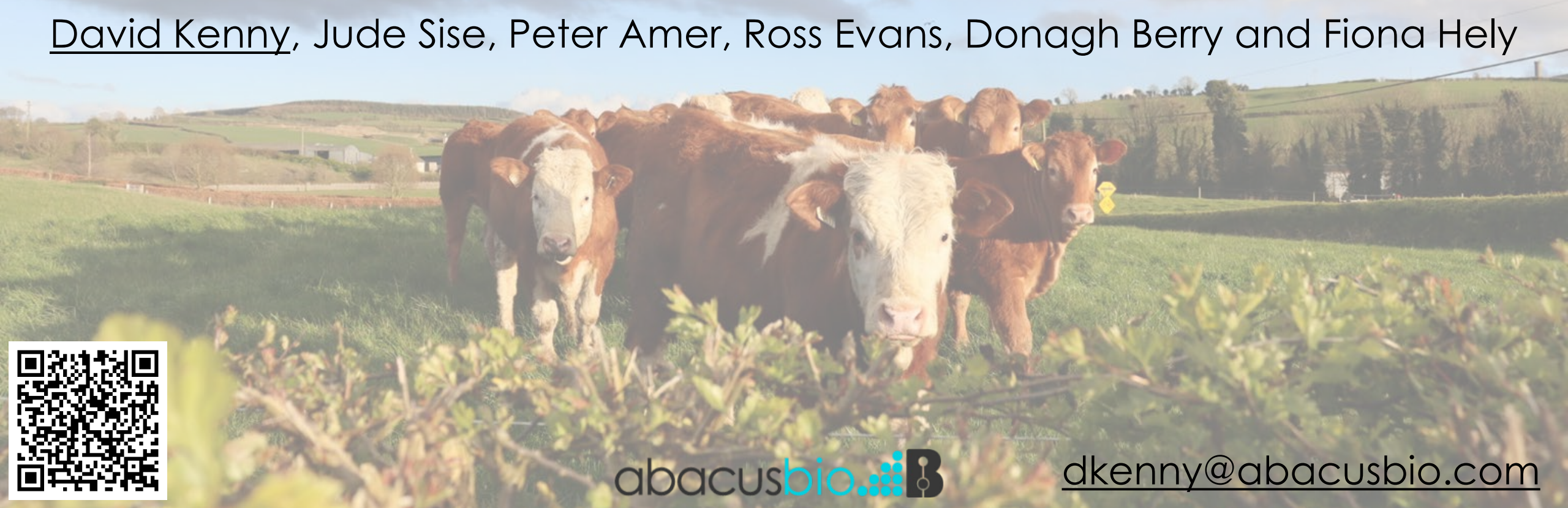




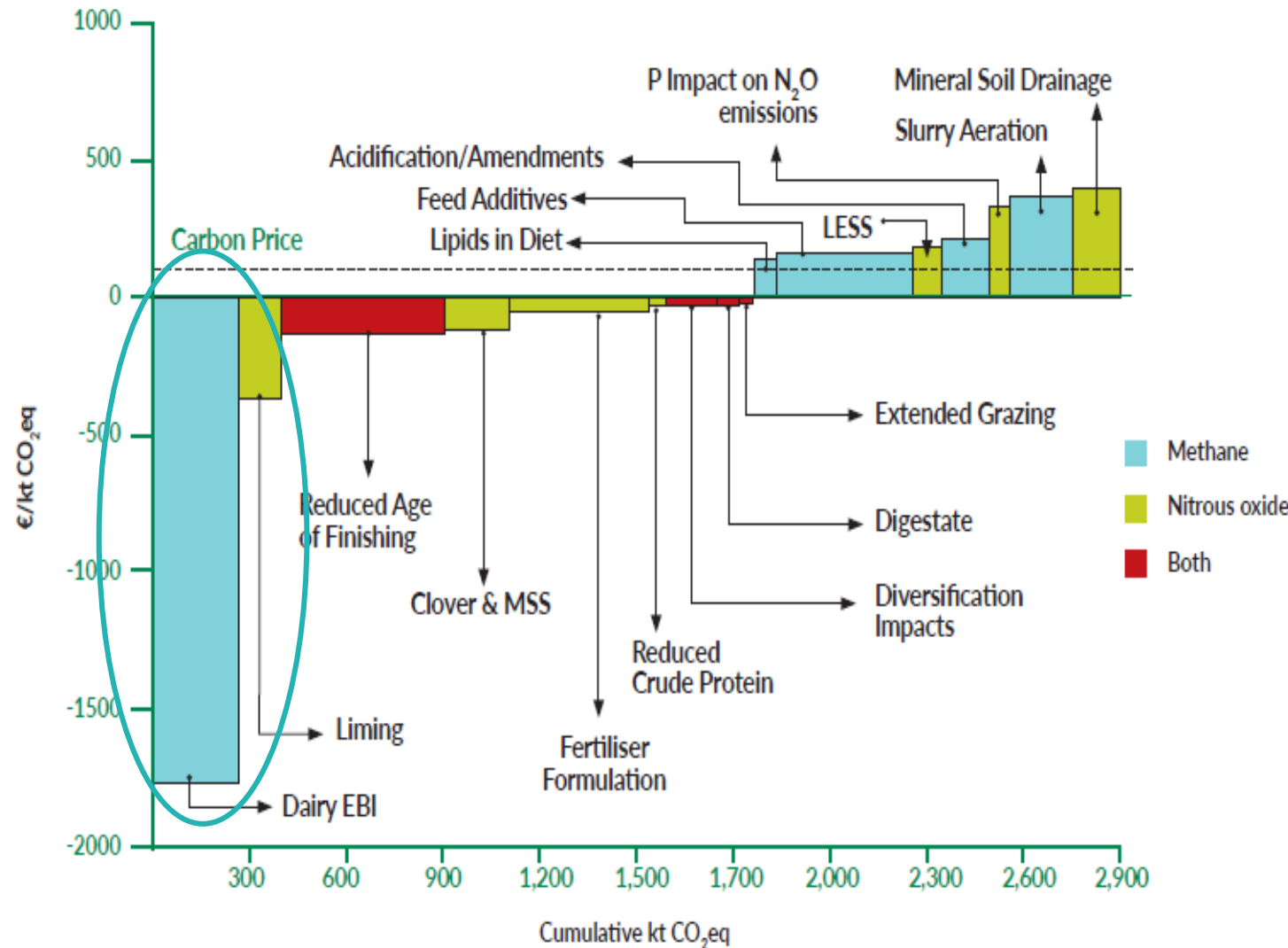
Future emission reductions deliverable by Irish beef and dairy breeding indices

David Kenny, Jude Sise, Peter Amer, Ross Evans, Donagh Berry and Fiona Hely



The need to reduce emissions

- Commitments to reduce emissions made at the international, national and industry levels, with fulfilment of these is key to securing the future
- Genetic selection is recognised as a low-cost approach with a high mitigation potential

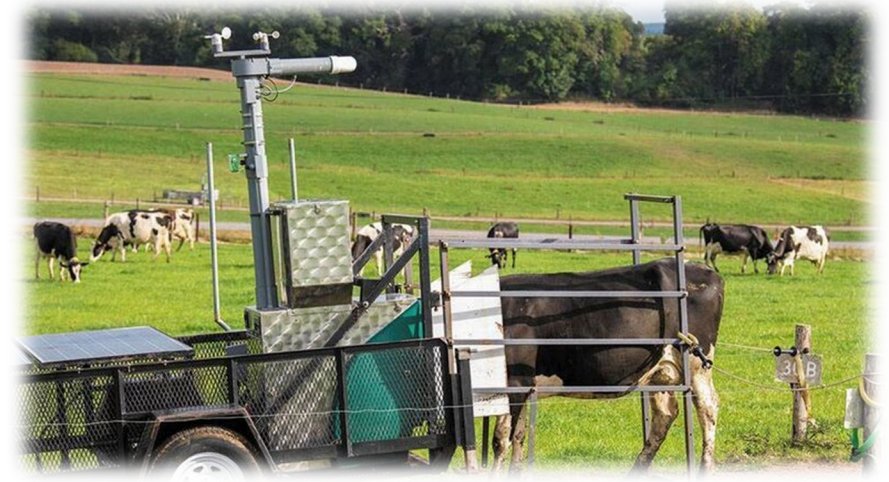


Source: Lanigan et al., 2023



Concept

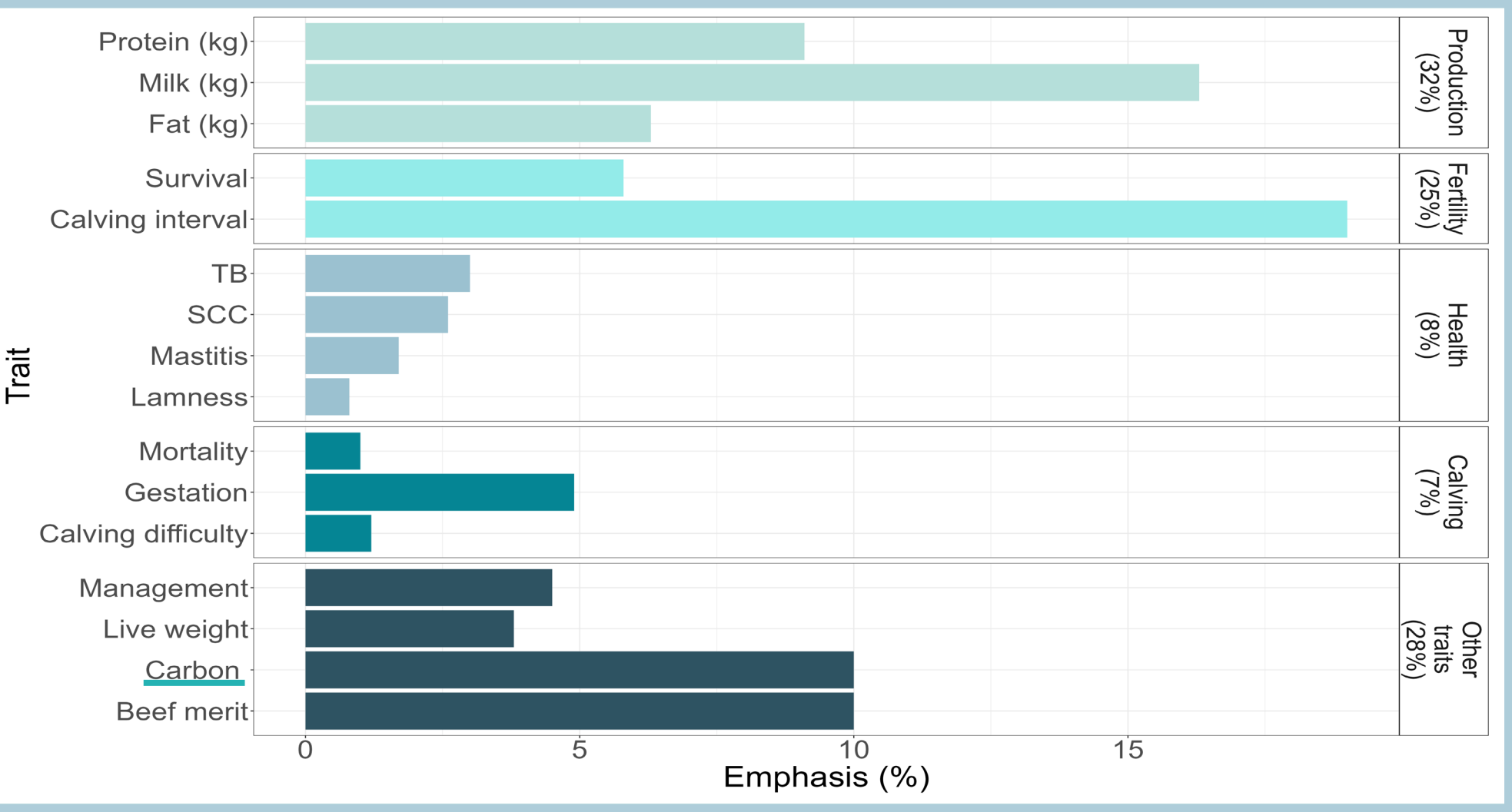
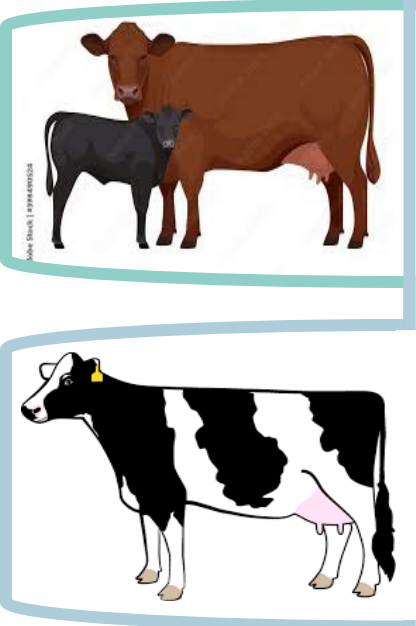
- Insight into benefits deliverable by selection indexes aids development of a roadmap to increase benefits
 - Benefits extend to emission reductions
- Incorporating enteric methane traits in selection indexes receives significant focus to reduce (enteric) emissions
 - Expected trade-off with currently delivered productive and economic benefits



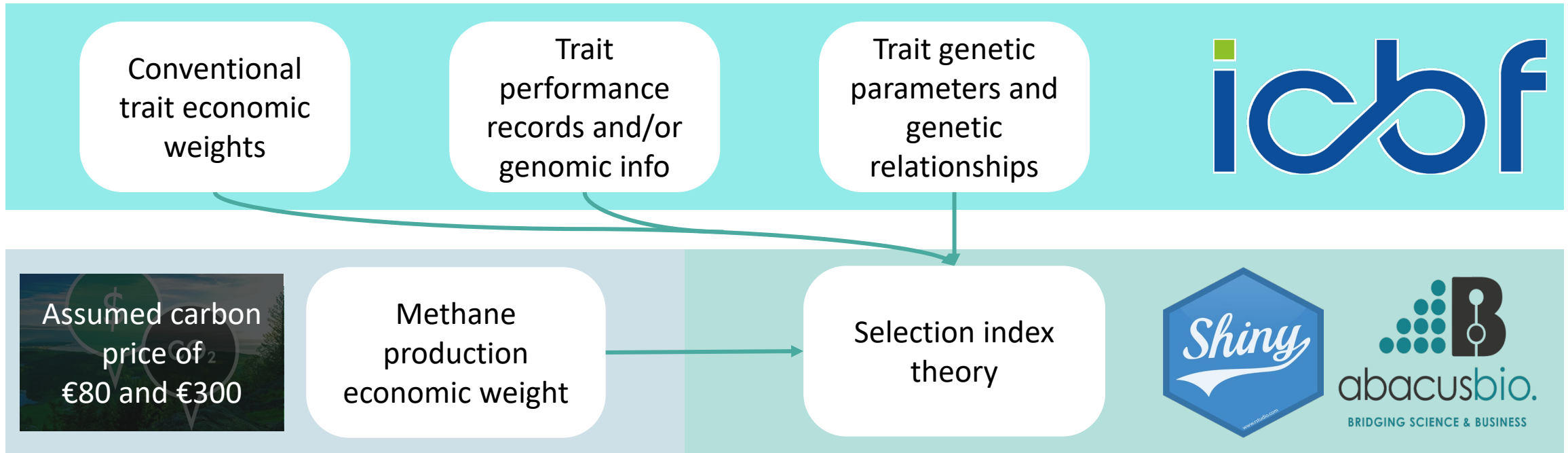
Objectives

1. Estimate potential emission reductions deliverable by Irish national beef and dairy selection indexes with and without the inclusion of a methane production trait within the indexes
2. Determine expected trades-offs in genetic gain for conventional profit traits resulting from inclusion of methane production traits

Methodology - Indexes



Methodology - Inputs



Modelling scenarios

1. Status quo - indexes comprises current traits only
2. Inclusion of methane production trait (g CH₄/animal/day) - assumed carbon price of €80
3. Inclusion of methane production trait (g CH₄/animal/day) - assumed carbon price of €300

Methodology - Outputs



Selection index theory



Trait unit responses

Economic responses

Emission reductions

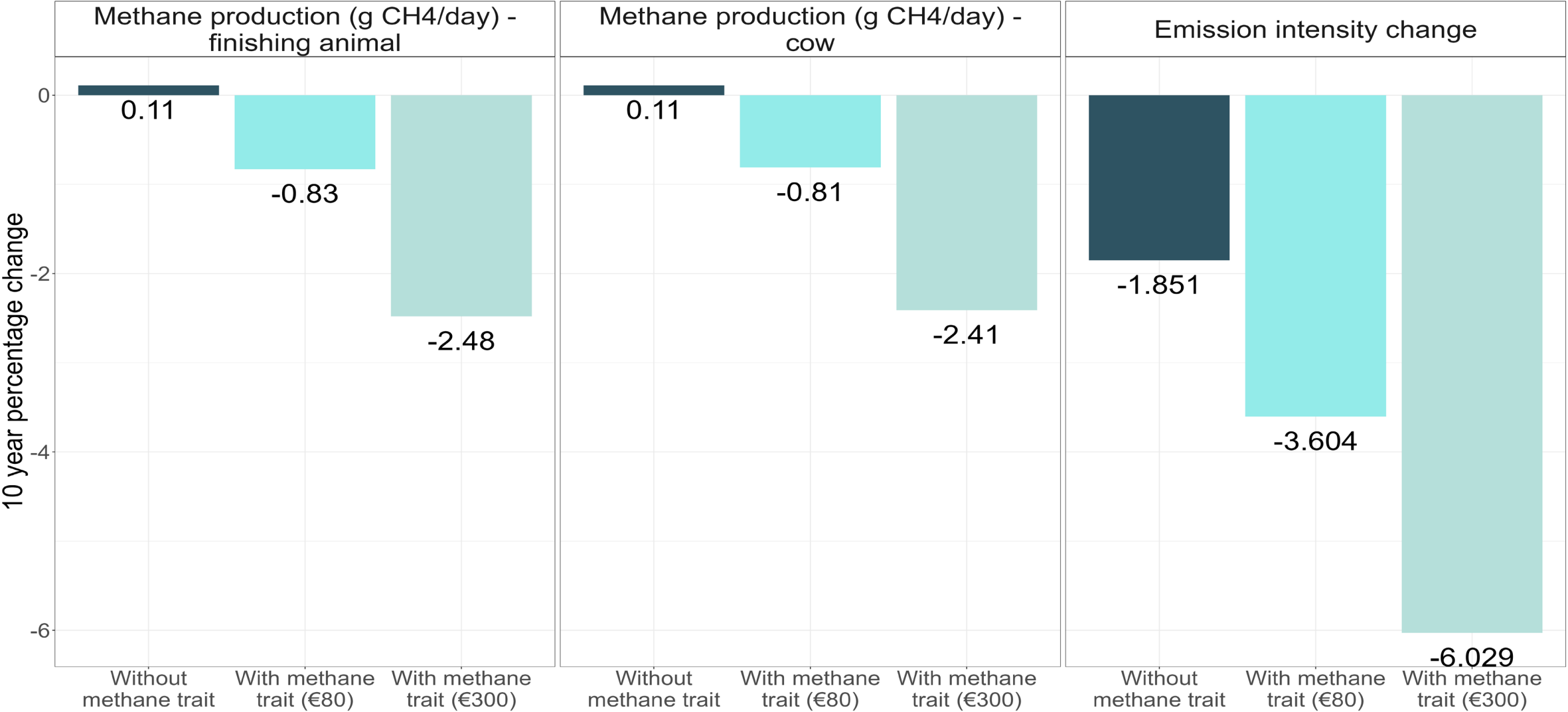
1. 10-year animal gross emissions changes
2. Emission intensity change (%)
3. 2050 industry-level emission reductions

Trade-offs

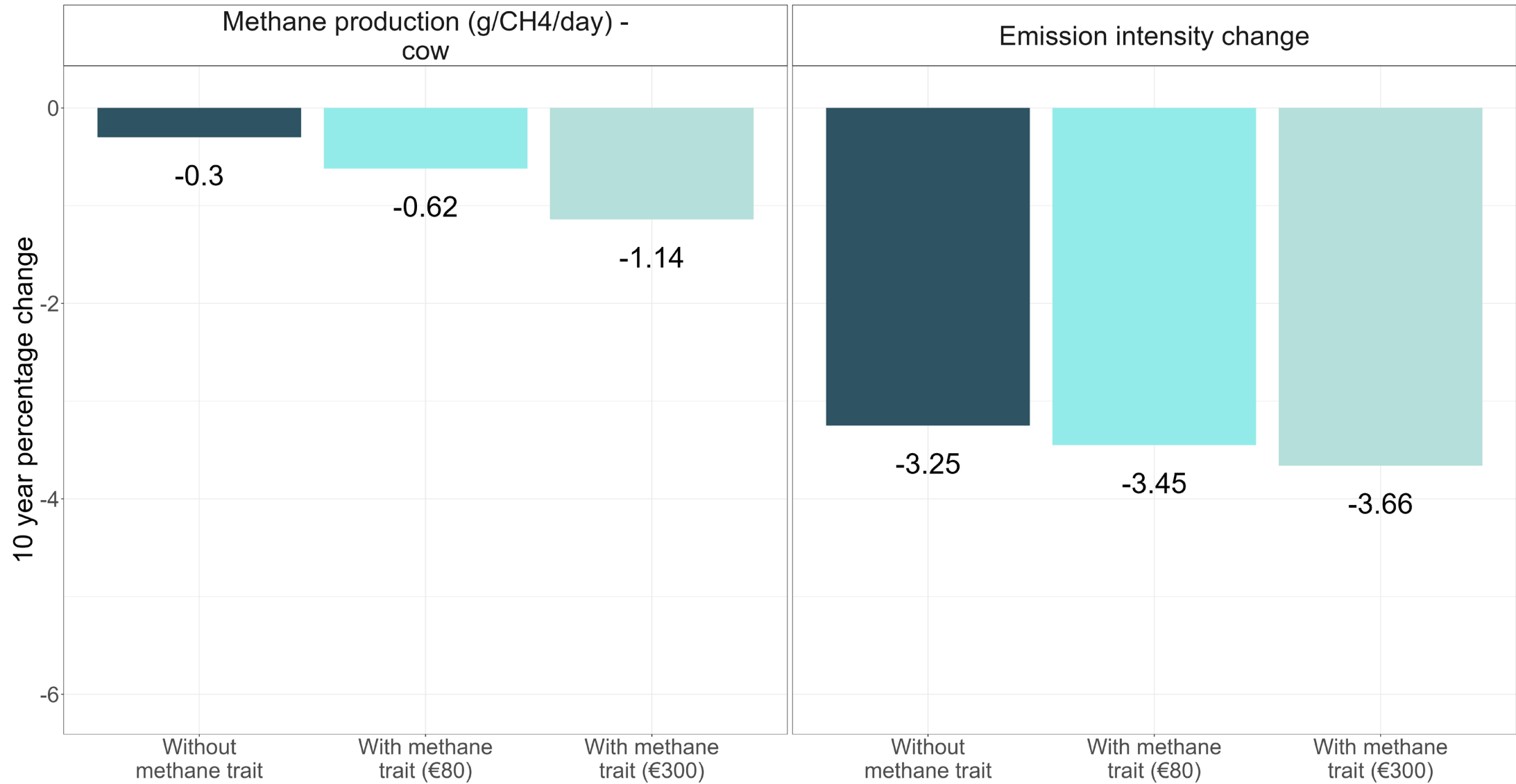
1. Reduction in economic response from conventional index traits
2. Total opportunity cost (€M)
3. Opportunity cost per tonne CO₂ mitigated



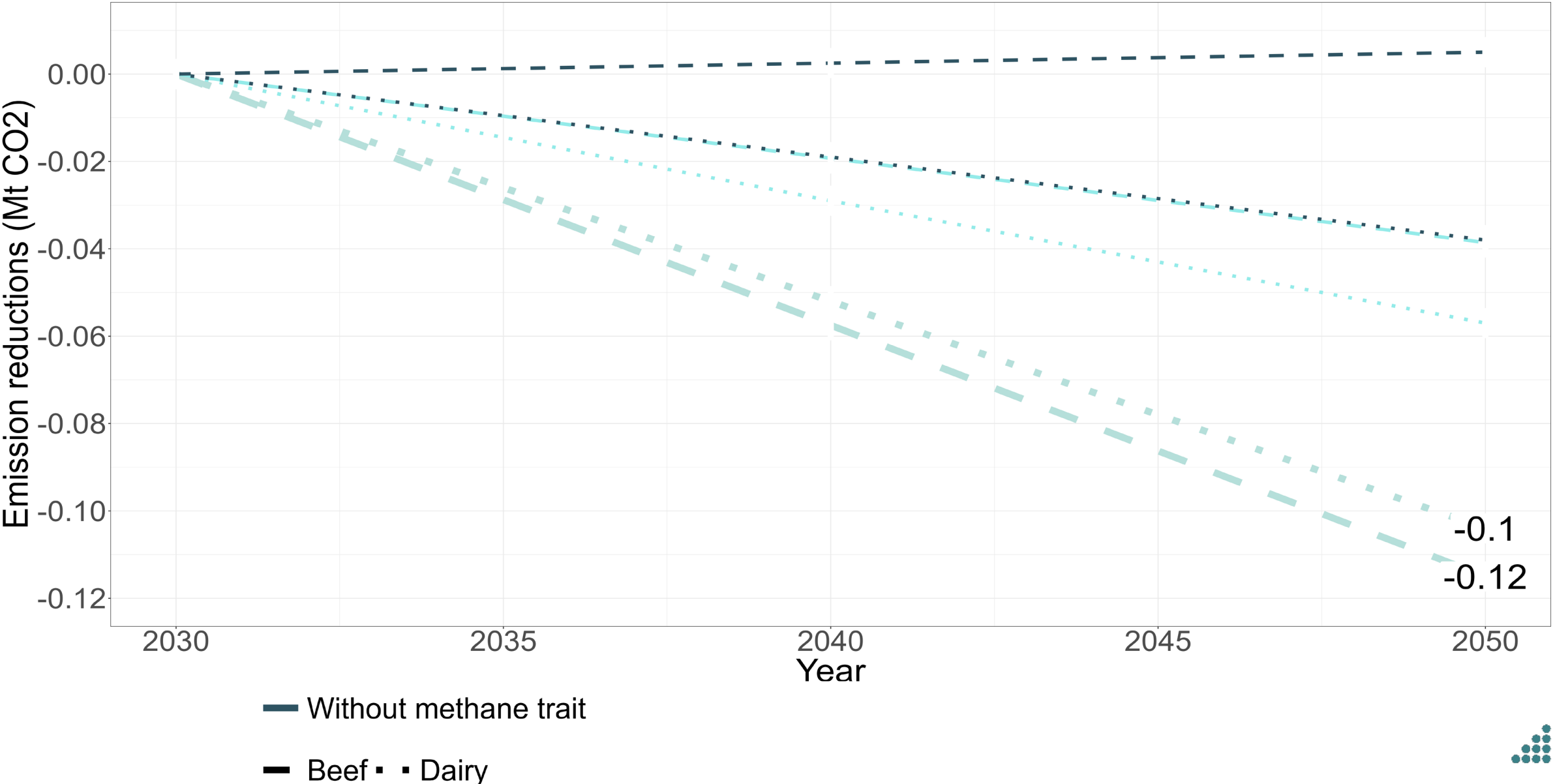
Emission reductions - Beef



Emission reductions - Dairy



Industry emission reductions over time



Trade-offs from methane selection - Beef

- Higher carbon prices provide greater emission mitigation
 - Corresponds to greater reductions in conventional economic gains and increased total opportunity costs
- Higher carbon prices translates to higher opportunity costs per tonne of CO₂ mitigated
 - Despite three times higher emission `

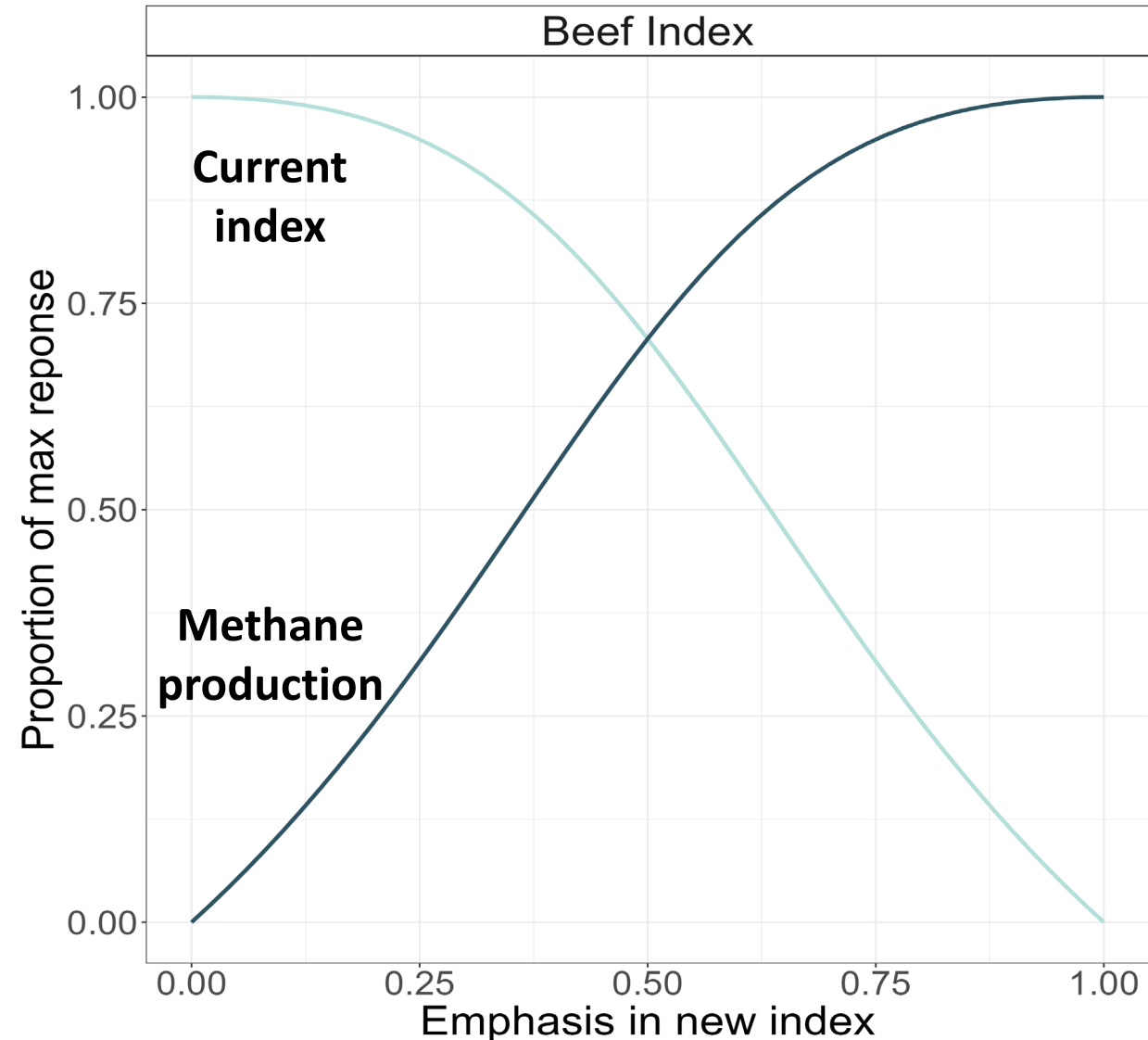
	Carbon price: €80	Carbon price: €300
Emissions reductions (Mt CO₂)	0.019	0.058
Change in current index trait economic gain	-6.36%	-47.53%
Total opportunity cost (€M)	€2.14	€15.96
Opportunity cost (€/tonne mitigated CO₂)	€110.66	€277.54

Trade-offs from methane selection - Dairy

	Carbon price: €80	Carbon price: €300
Emissions reductions (Mt CO ₂)	0.043	0.080
Change in current index trait economic gain	-0.1%	-2.4%
Total opportunity cost (€M)	€0.13	€6.91
Opportunity cost (€/tonne mitigated CO ₂)	€1.83	€54.75

Conclusions

- Inclusion of methane traits in breeding indexes provides reduce enteric methane emissions
- Incorporating methane traits represents a balancing act between reducing emissions and productive/economic industry benefits
- Current beef and dairy indexes are relatively efficient at reducing emission intensity
 - Inclusion of a methane trait into the Irish dairy selection index only delivers a reduction of 13% in emission intensity





Thank you for listening
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