Enhancing Profit and the Environment

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Grass fed – Protein efficiency

Total Efficiency = Proteins produced (whole carcasses, milk) / Proteins consumed by livestock (total feed)

Net Efficiency = **Human edible** proteins produced / **Human edible** proteins consumed

Net efficiency

- above 1: **Net producer**
- between 0 and 1: **Net consumer**

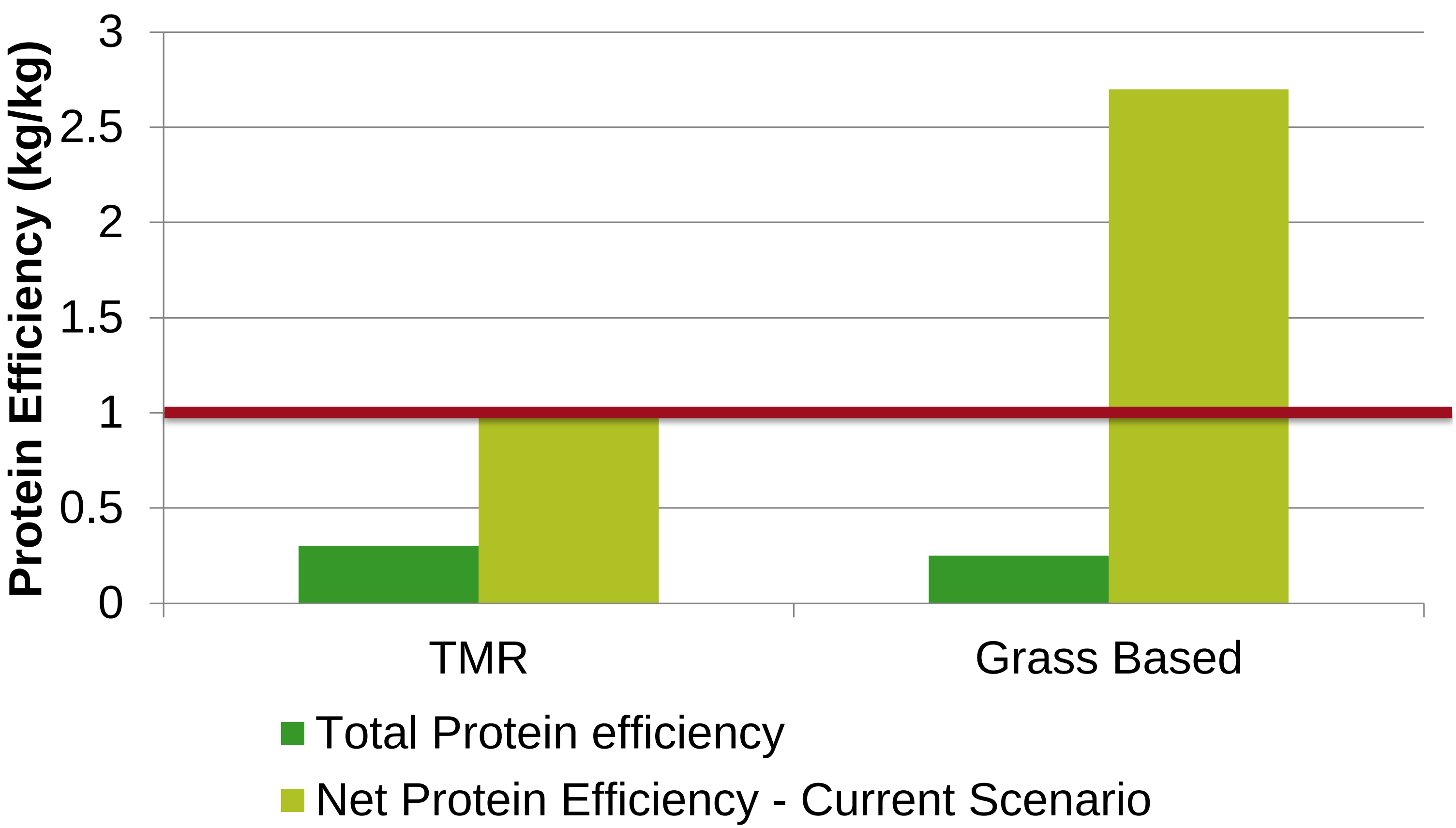
(adapted from Wilkinson, 2011; Ertl et al, 2015)

→ **What is human-edible ?**

Laisse et al., 2018

Grass fed – Protein efficiency

VistaMilk



Laisse et al., 2018

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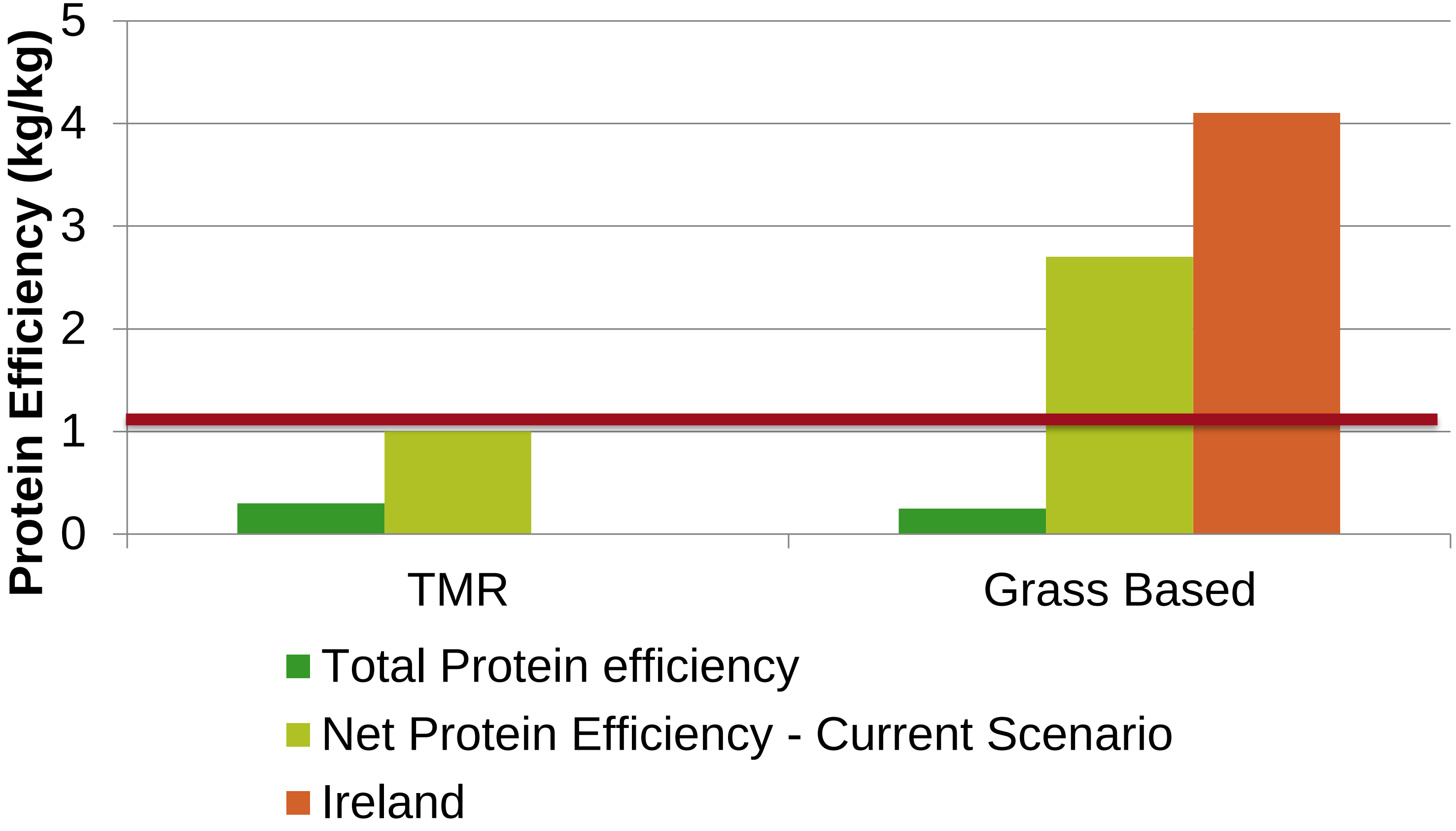
Grass fed – Protein efficiency



The System

	Current	Target
Grass Utilised kgDM/Ha	7.8	12.9
SR LU/Ha	2.10	2.7
EBI (Similar to BW)	90	150
Milk Solids kg/cow	417	480
Six week calving Rate %	62	90
Labour (hours per cow)	40 (60 cows)	16 (150 cows)

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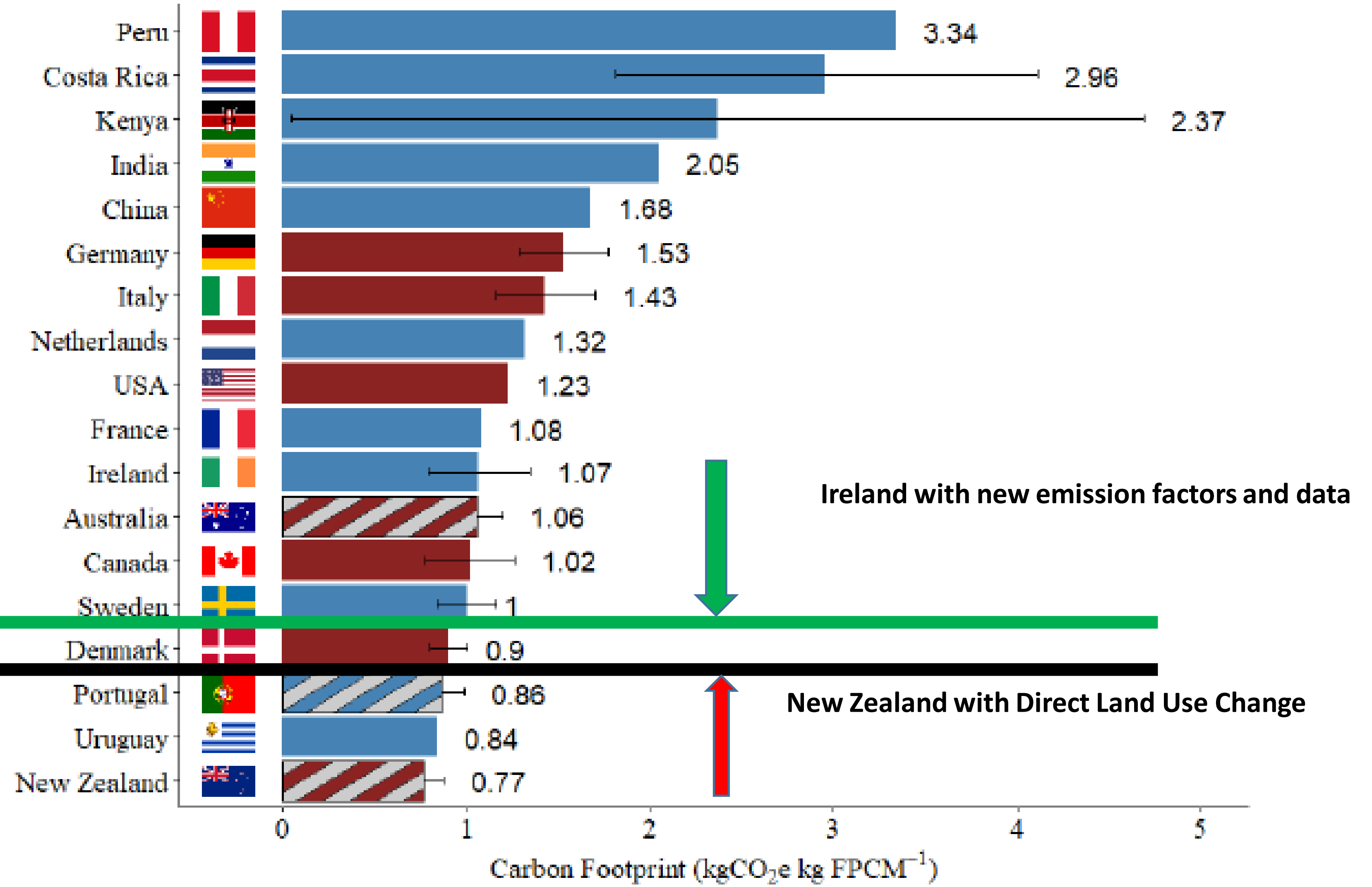
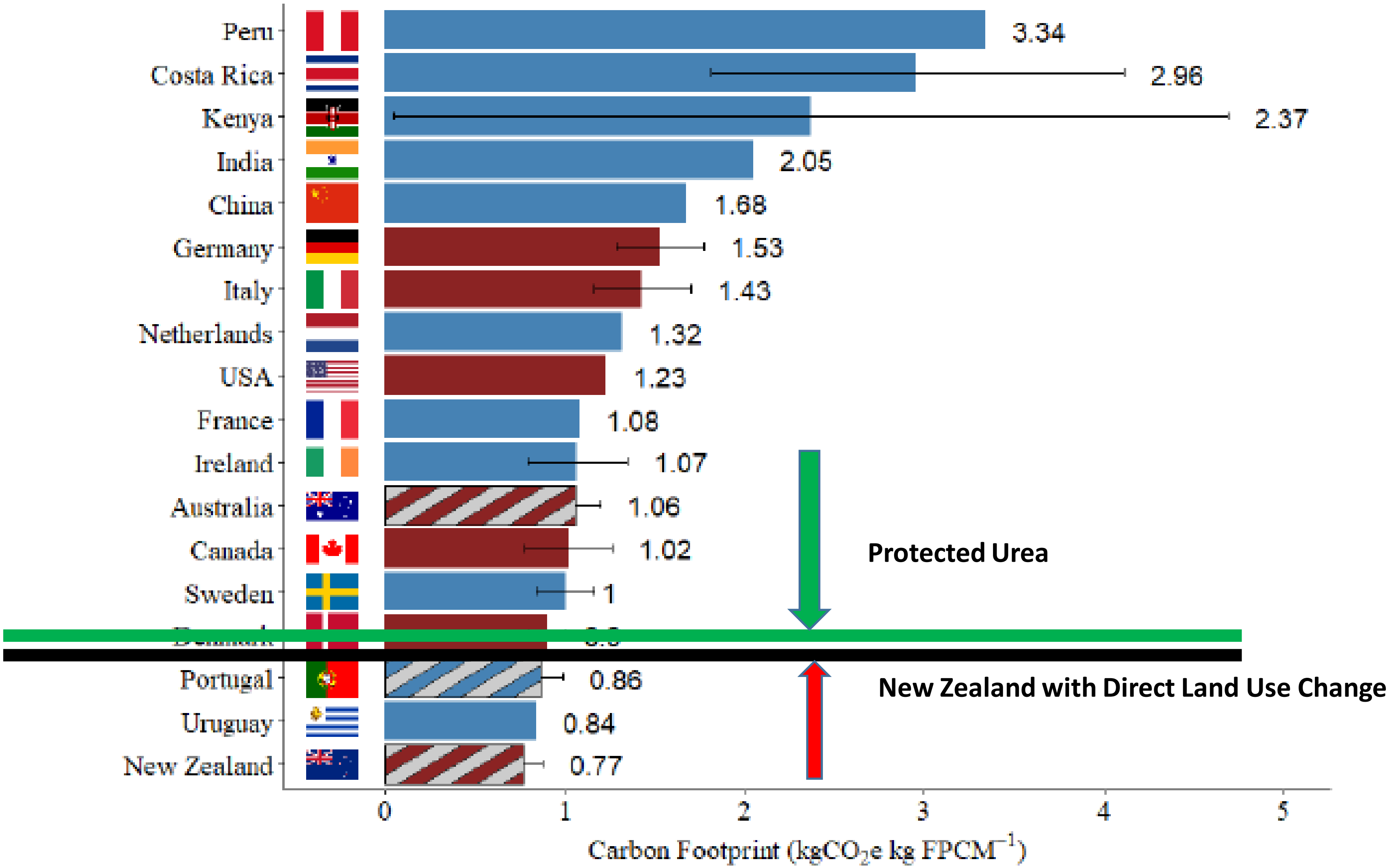
System - Outcomes

	Current	Target
GHG emissions intensity kg CO2e/kgFPCM (excl seq)	0.99	0.76
Nitrogen / Phosphorous use efficiency (%)	25/62	35/85
Biodiversity cover (% habitat area)	7	>10
Net Margin per Hectare (Includes interest, Depreciation & labour)	519	2,452
Net Margin per kg MS	0.58	1.84

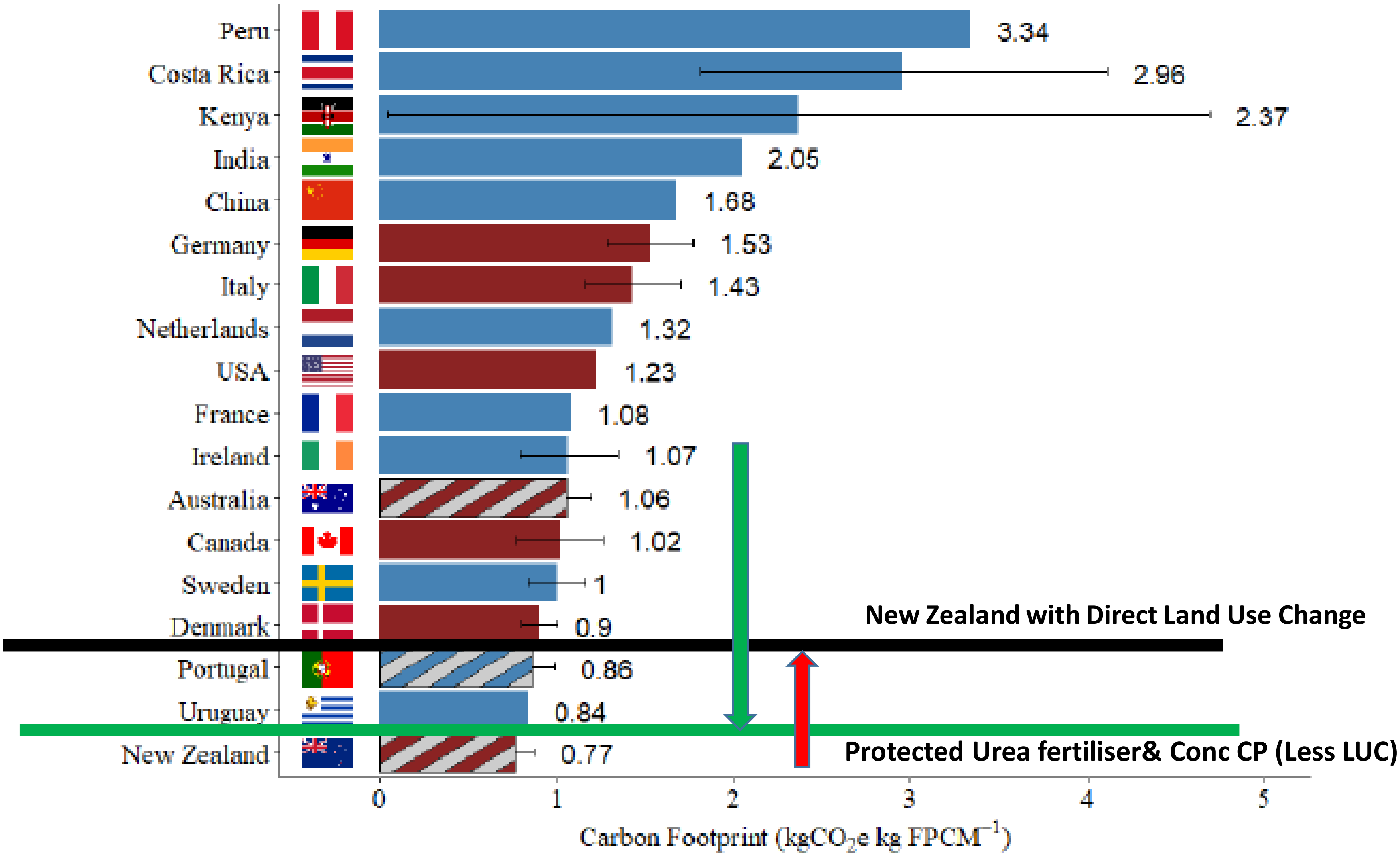
Carbon Footprint



Carbon Footprint



Carbon Footprint



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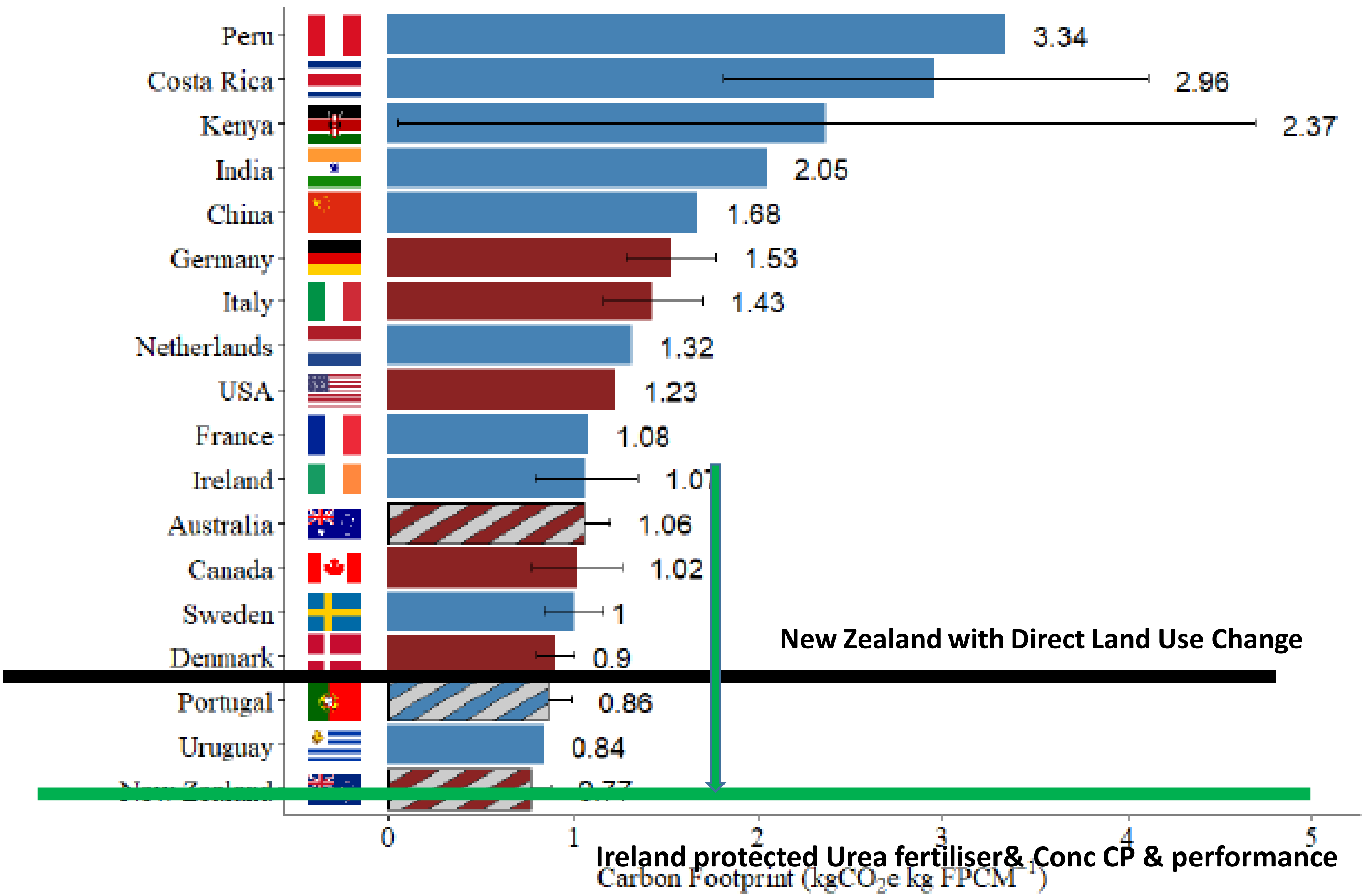

Soil and Carbon

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Review article

Carbon sequestration in the agricultural soils of Europe

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Full accounting of the greenhouse gas (CO_2, N_2O, CH_4) budget of nine European grassland sites

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Long-term nutrient fertilization and the carbon balance of permanent grassland: any evidence for sustainable intensification?

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Mitigating the greenhouse gas balance of ruminant production systems through carbon sequestration in grasslands

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The carbon sequestration of grassland soils – climate change and mitigation strategies

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Carbon sequestration determined using farm scale carbon balance and eddy covariance

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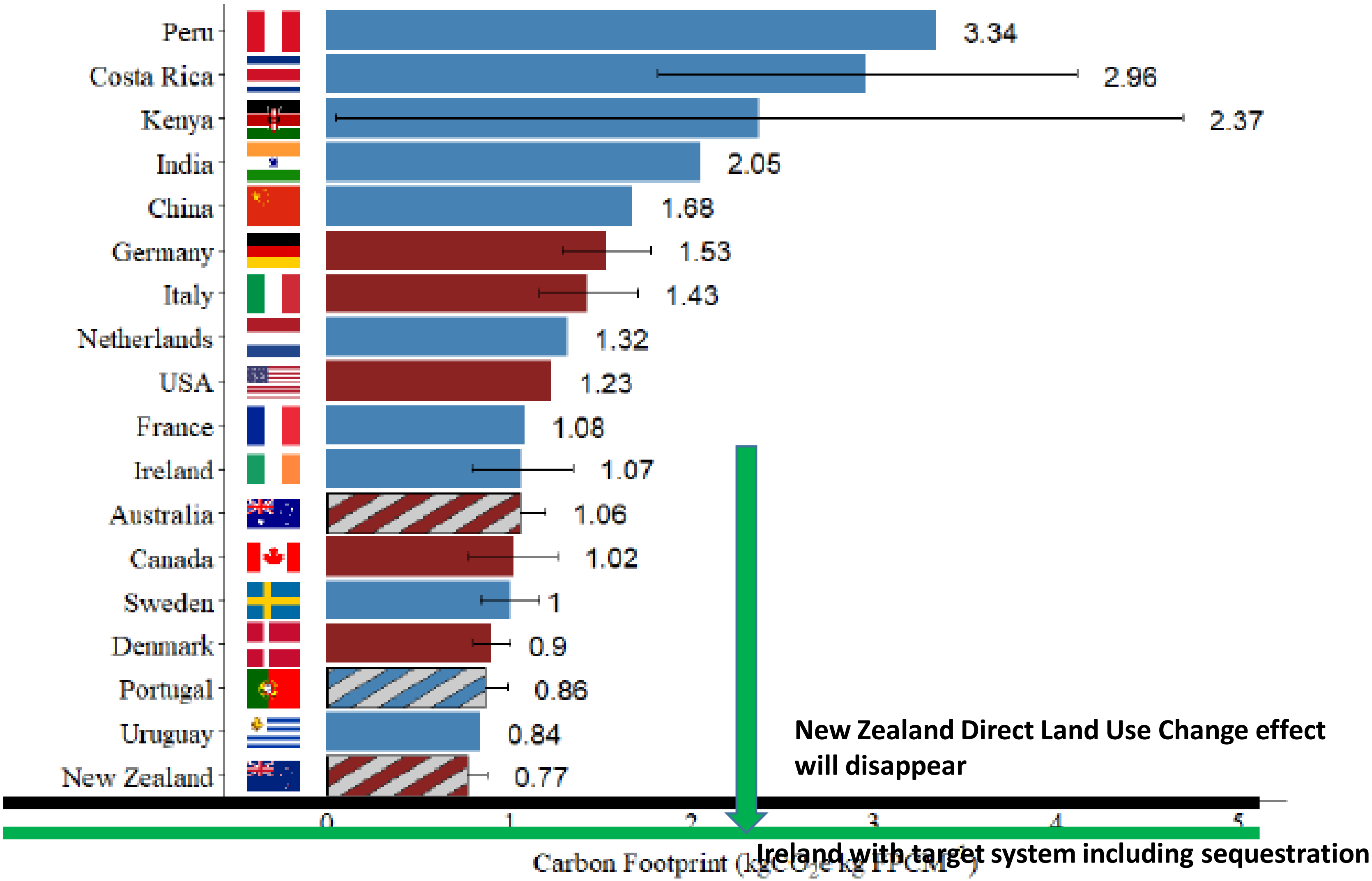
Carbon Footprint



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Long-term ecosystem carbon losses from silage maize-based forage cropping systems

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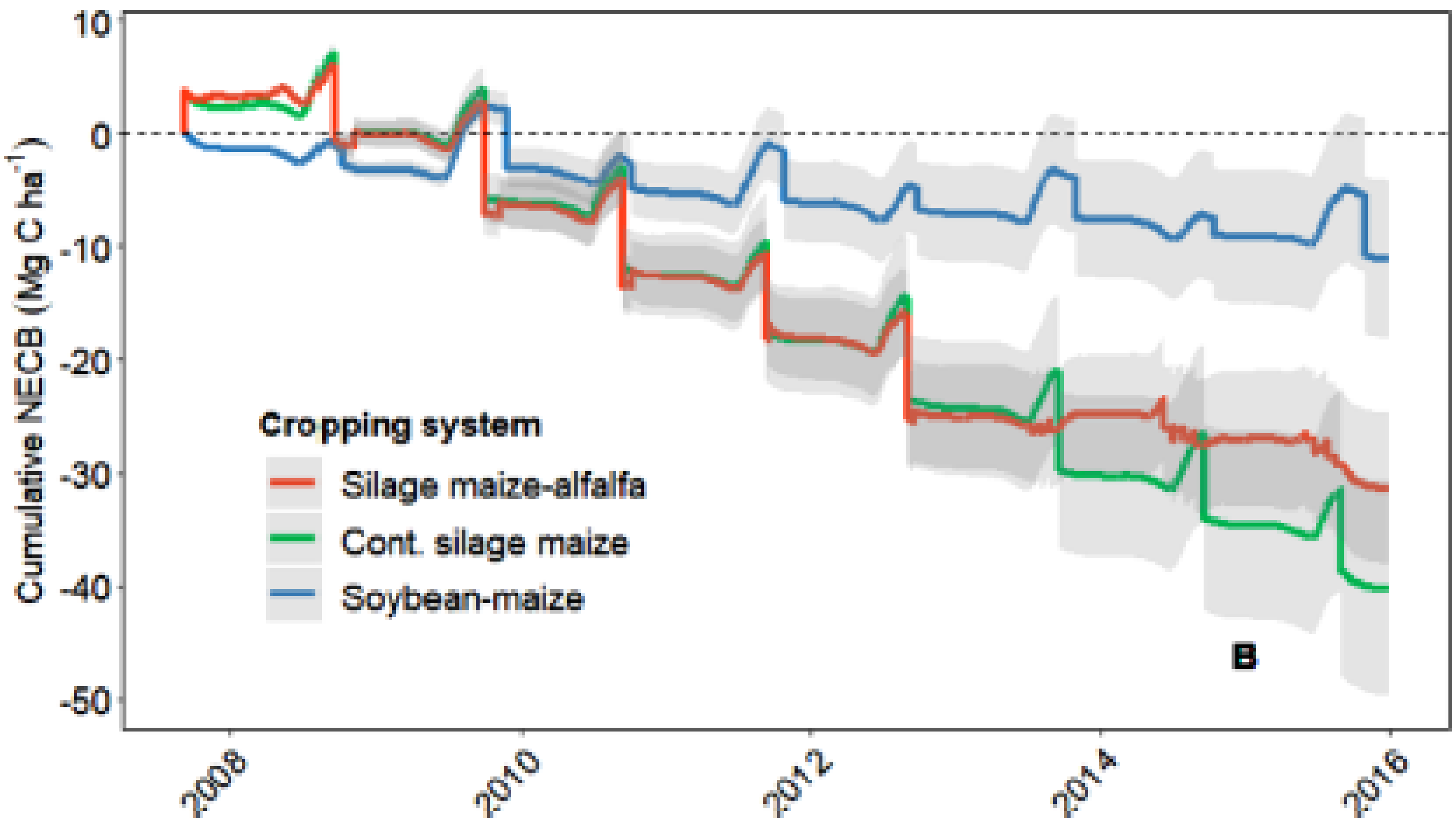
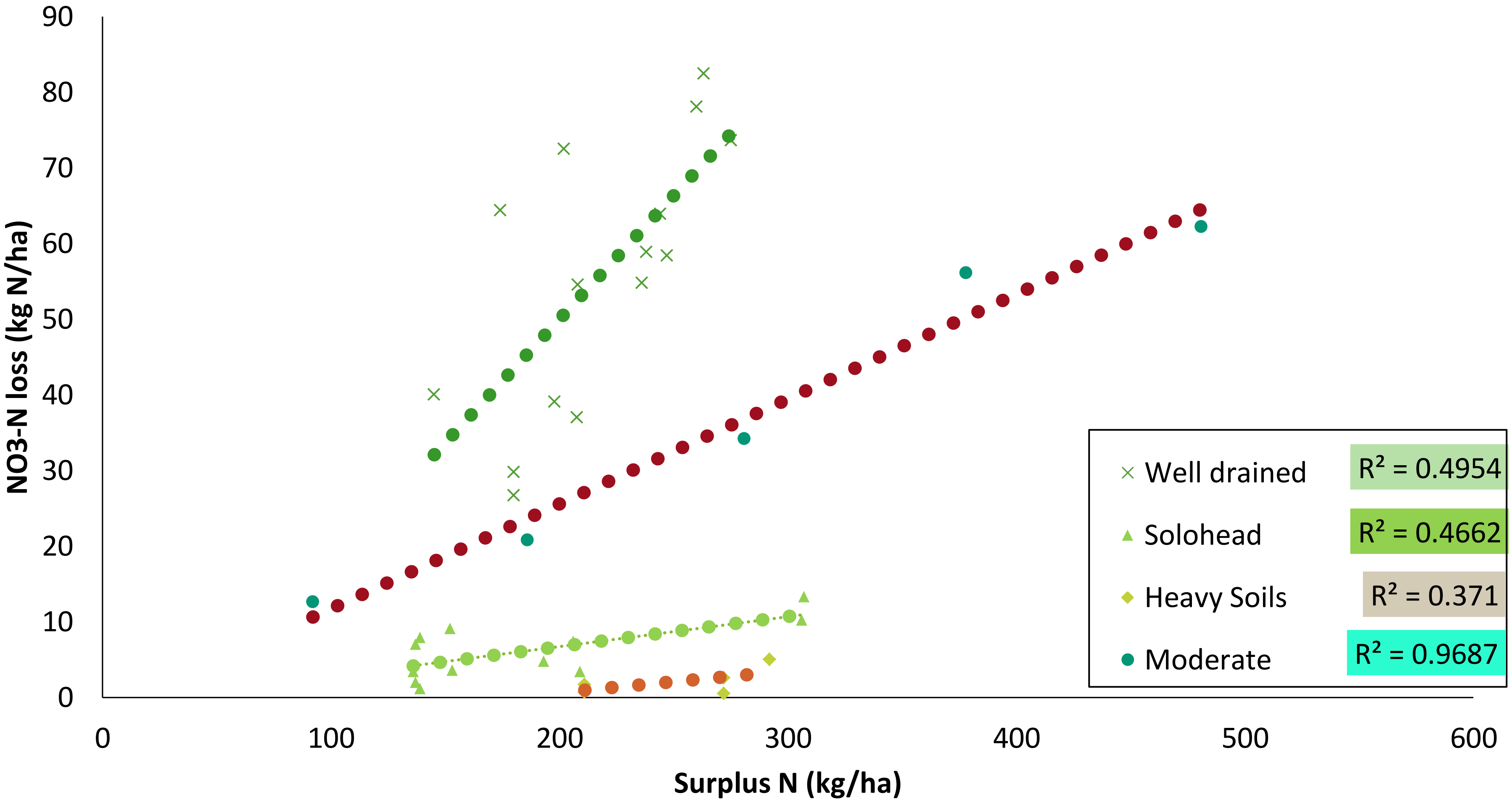


Methane

- Baseline – Very Little research at pasture
  - Poor understanding of the factors effecting methane in grass based systems
  - Grass quality, etc
- Inventories
  - Methane calculated based on energy intake
  - Methane reduction targets
    - Require a refocus on pasture
- Short Lived Gas
  - Oxidised within a 20 year cycle
  - Target Stable/slightly declining
    - No additional warming effect

N Surplus and N Loss



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Summary

- System is paramount to ensure sustainability
  - Grass based
  - Appropriate Stocking rate
  - Minimise supplementary and surplus nitrogen
  - Methane reduction targets – Harder to justify supplementary feed
- Win/Win scenarios reduce footprint and absolute emissions while increasing profitability
  - Research challenge
- Policy makers make policy – How the Industry responds is key to success?
- Climate neutrality
  - Stable/declining methane
  - N emissions reduced
  - Residual captured and stored

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