 

VistaMilk

GHG Emissions

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Dairy Research Ireland
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Overview

- Background
- Emissions
- Methane

Grass fed – Protein efficiency

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$$\textbf{Total Efficiency} = \frac{\text{Proteins produced (whole carcasses, milk)}}{\text{Proteins consumed by livestock (total feed)}}$$

$$\textbf{Net Efficiency} = \frac{\textbf{Human edible}\text{ proteins produced}}{\textbf{Human edible}\text{ proteins consumed}}$$

Net efficiency

Net producer

1

Net consumer

0

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

→ What is human-edible ?

Laisse et al., 2018

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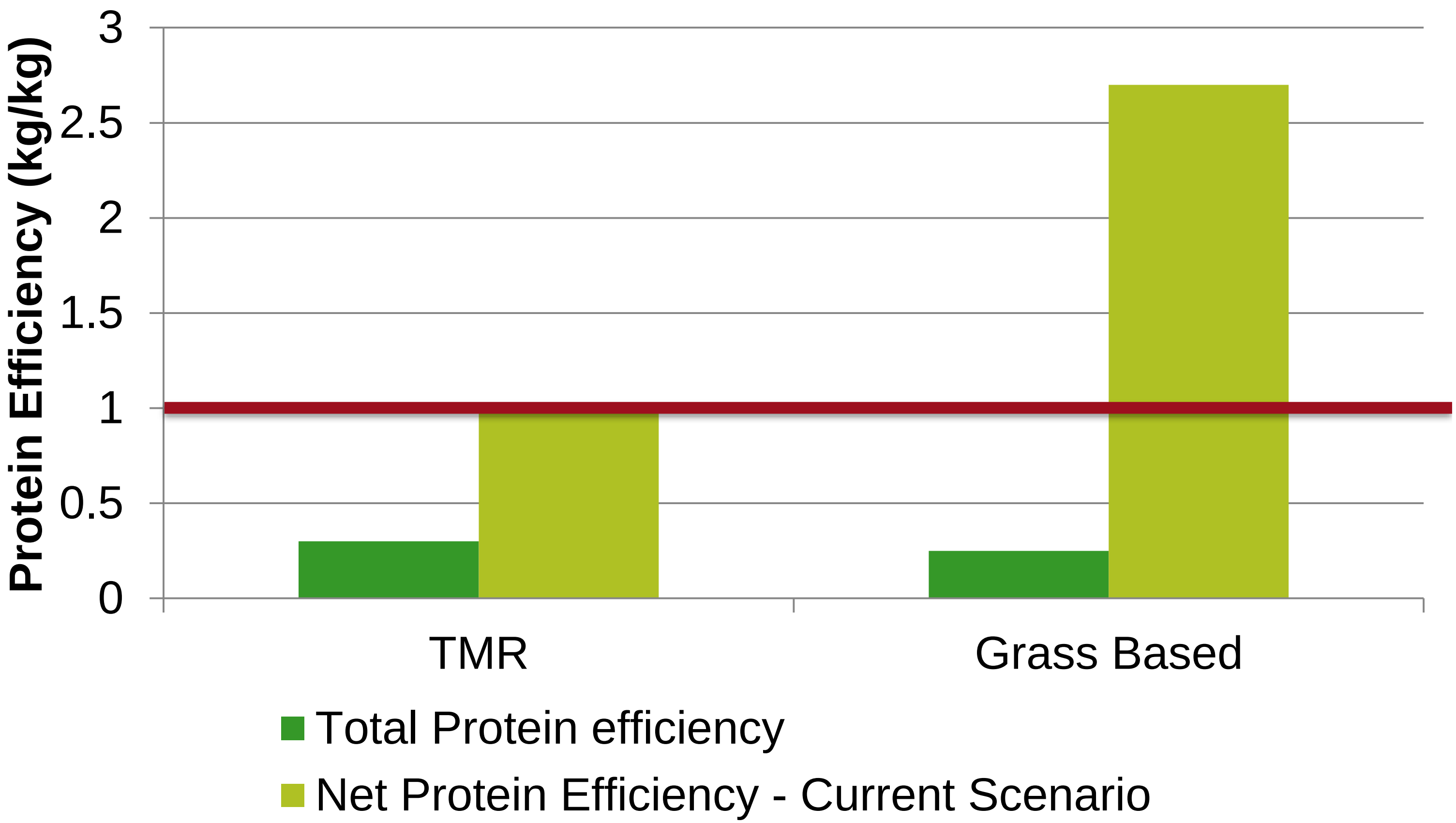
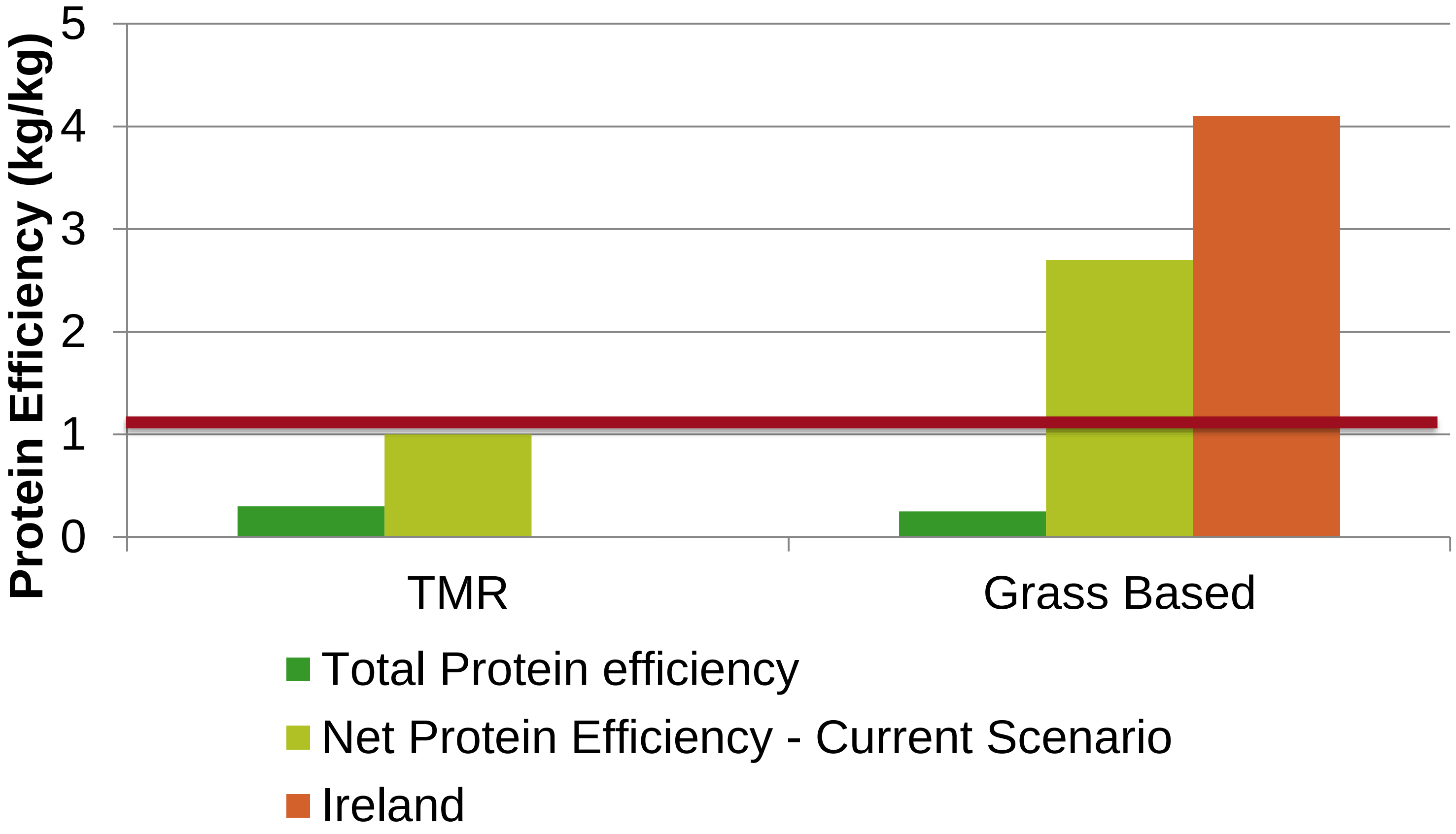
Grass fed – Protein efficiency



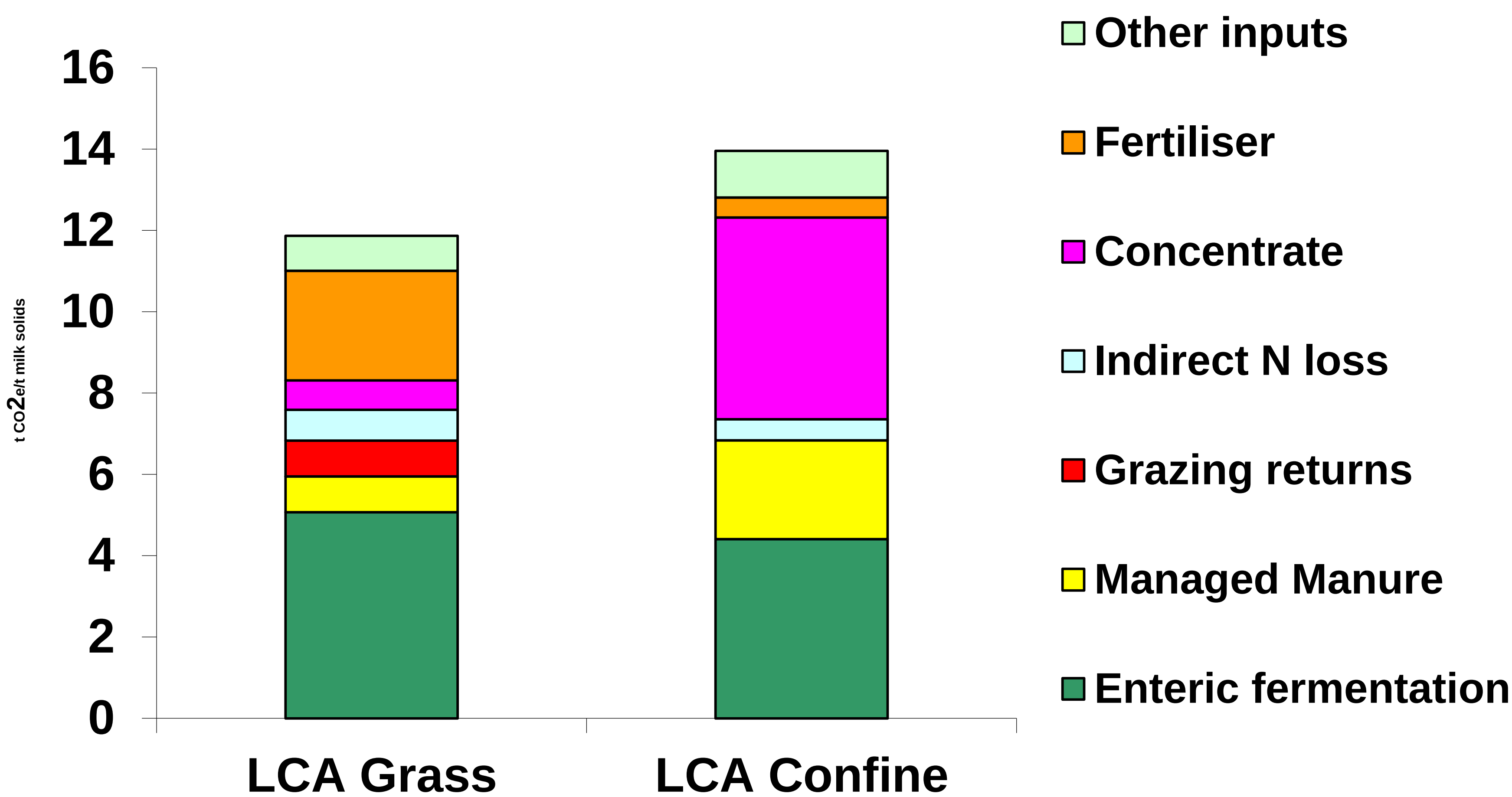
Laisse et al., 2018

Grass fed – Protein efficiency



Grass fed – Environmental Sustainability

Effect of method and system on GHG emissions



Agricultural Systems 107 (2012) 33–46
Contents lists available at SciVerse ScienceDirect
Agricultural Systems
journal homepage: www.elsevier.com/locate/agsy

A life cycle assessment of seasonal grass-based and confinement dairy farms

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Animal (2012), 6:9, pp 1512–1527 © The Animal Consortium 2012
doi:10.1017/S1751731112000316

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Evaluation of the effect of accounting method, IPCC *v.* LCA, on grass-based and confinement dairy systems' greenhouse gas emissions

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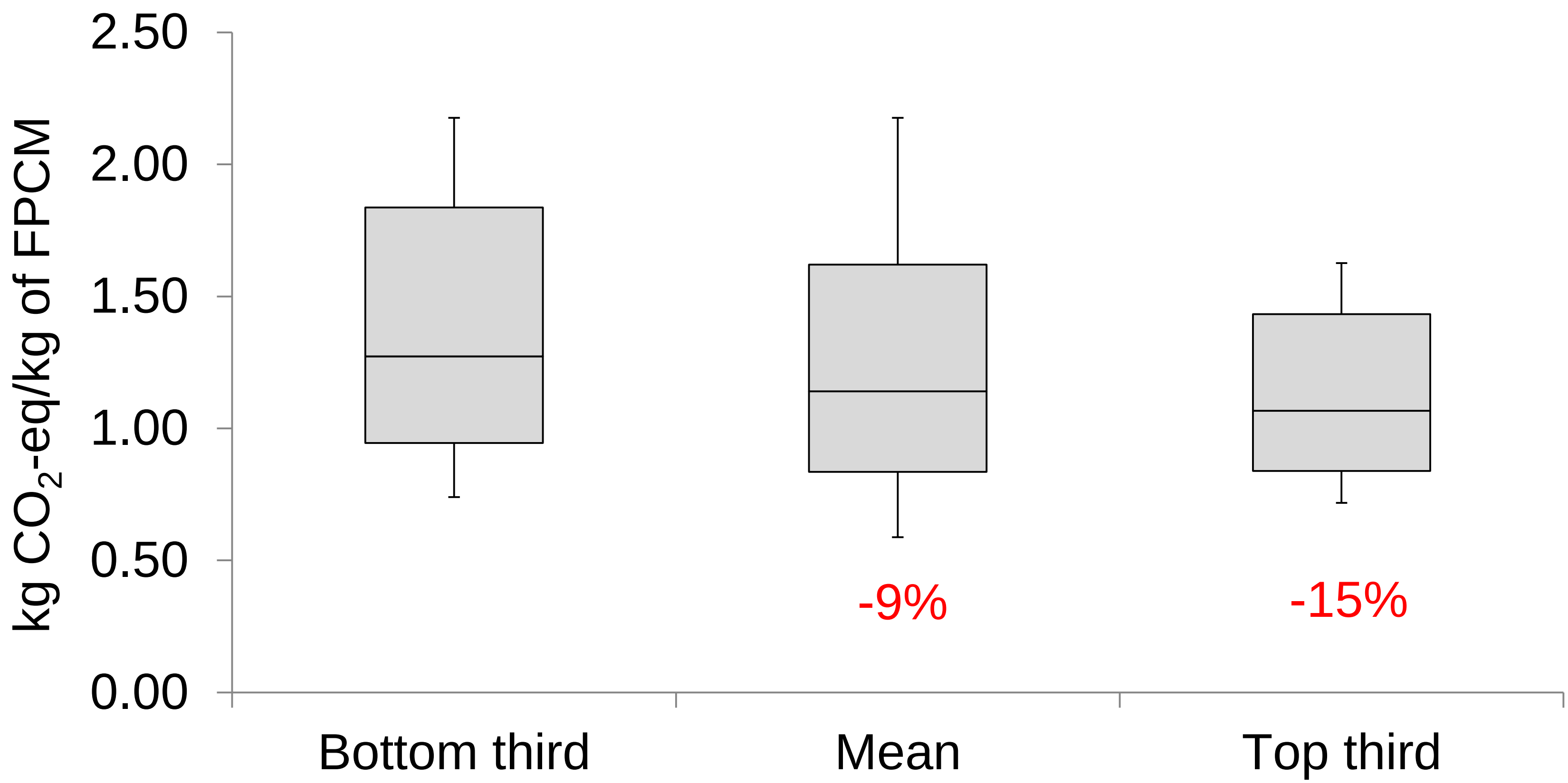
Farm profit and carbon footprint of milk



J. Dairy Sci. 98:7394–7407
http://dx.doi.org/10.3168/jds.2014-9222

Relating the carbon footprint of milk from Irish dairy farms to economic performance

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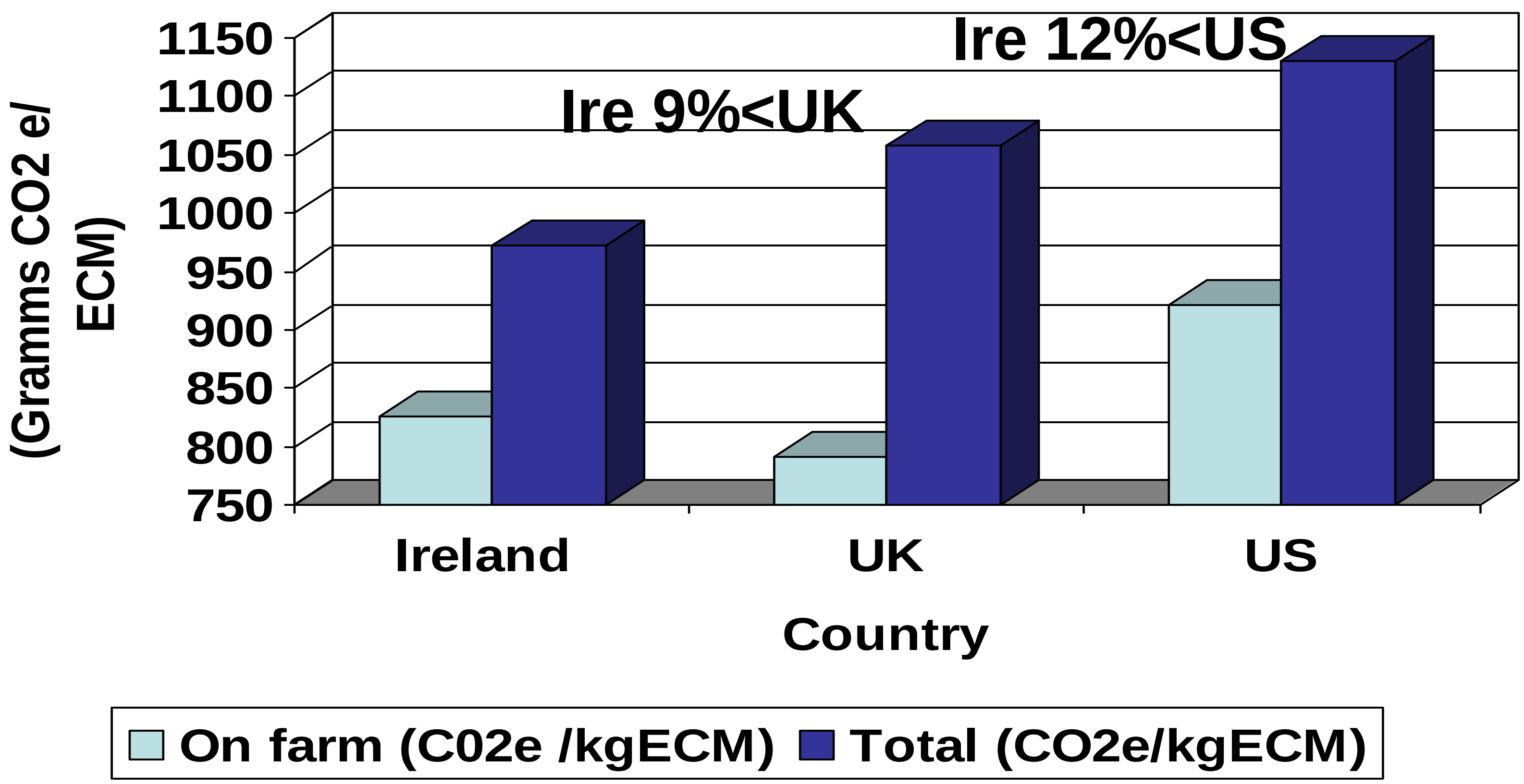
How does Ireland Compare?



J. Dairy Sci. 97:1835–1851
http://dx.doi.org/10.3168/jds.2013-7174

A case study of the carbon footprint of milk from high-performing confinement and grass-based dairy farms

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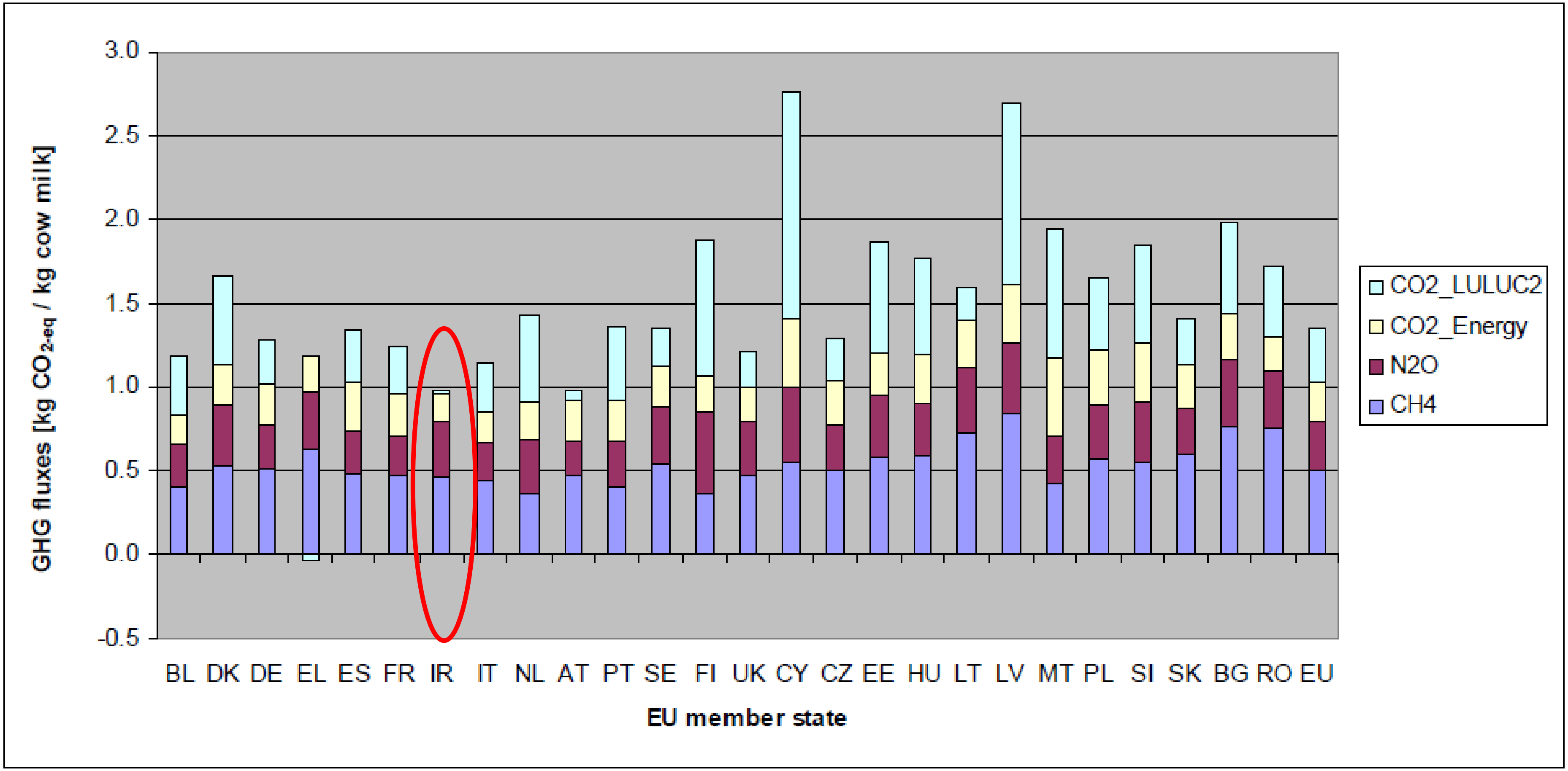
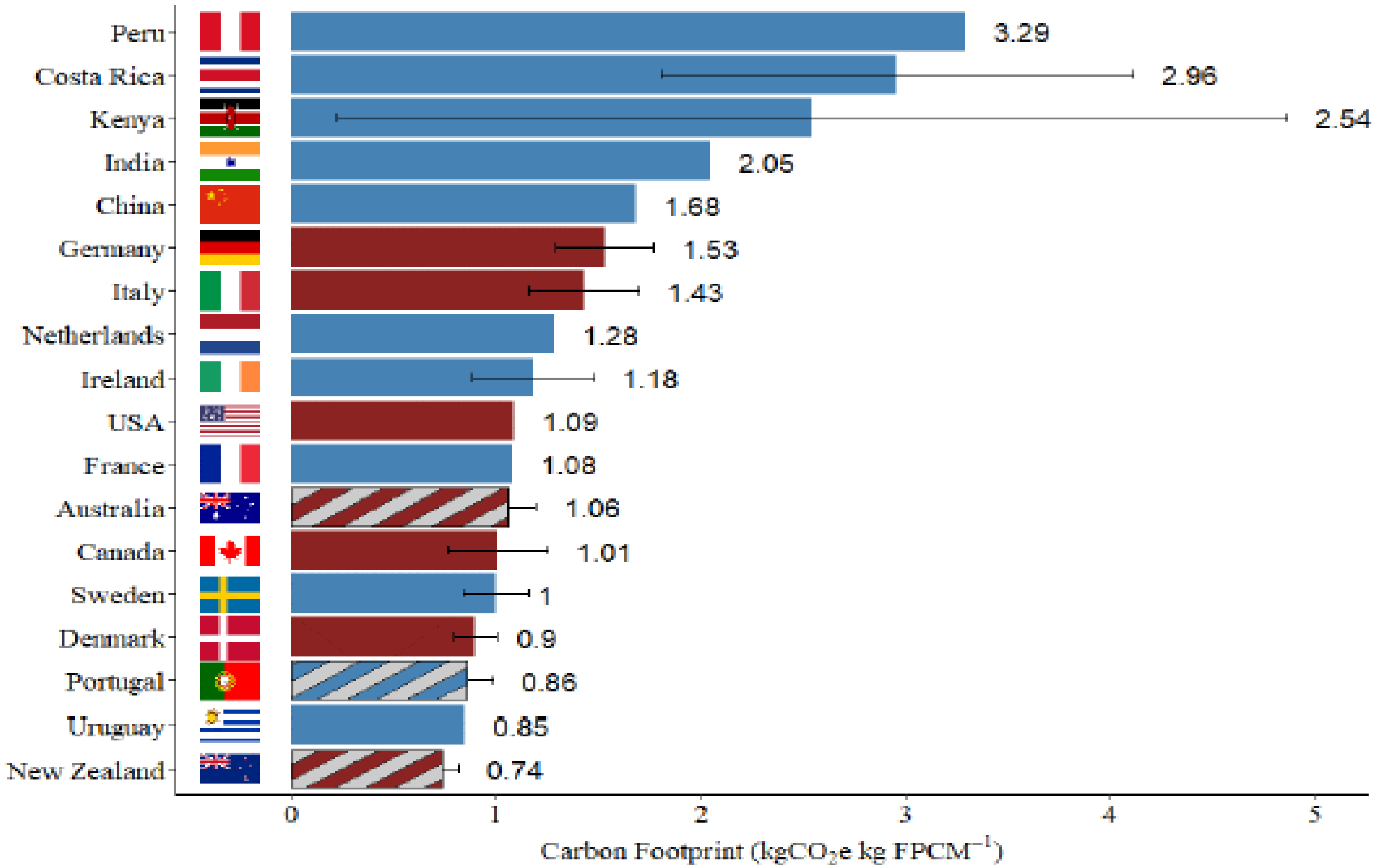
Emissions per kg milk produced in different EU countries



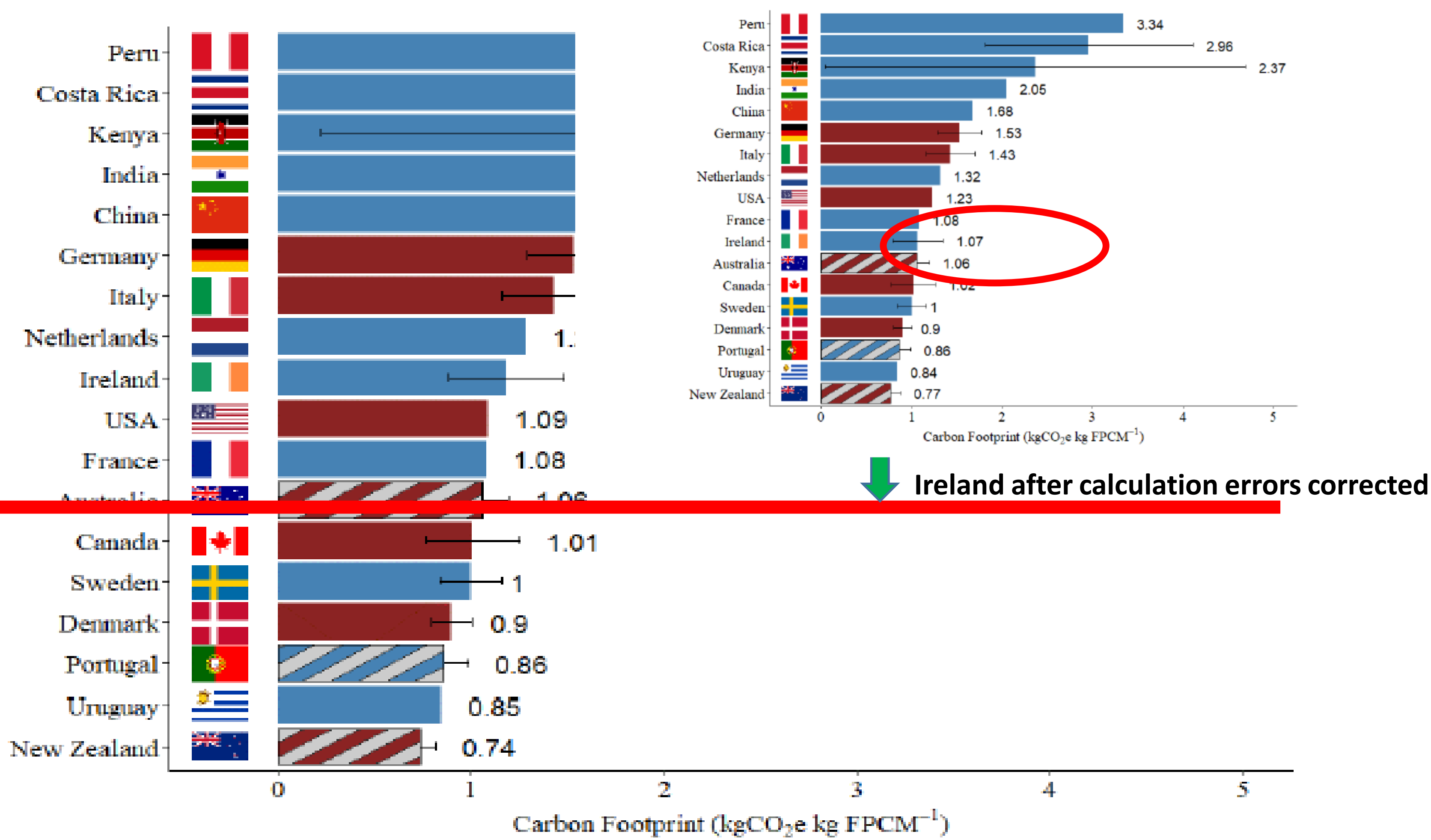
Source: Evaluation of the livestock sector's contribution to the EU GHG emissions (GGELS) **EC, Joint Research centre, 2010.**

Carbon footprint of Milk by Country



Carbon footprint of Milk by Country - Errors

12



Recalculation of the Irish Footprints

- New country specific emission factors have been developed for Ireland by Teagasc research over the past number of years
- Now included in the national GHG inventory compiled by EPA
- New Carbon footprints calculated
  - 1.13 becomes <1.0 kgs CO2e per kg FPCM

Emission Factor	Old	New	Reference
Dung kg of N2O-N/ kg N excreted	0.02	0.0031	Krol et al. 2016
Urine kg of N2O-N/ kg N excreted	0.02	0.0118	Krol et al. 2016
CAN kg of N20-N/ kg N applied	0.01	0.0149	Harty et al. 2016
Urea kg of N2O-N/kg N applied	0.01	0.0028	Harty et al. 2016
CAN fertiliser production CO2e/kg N	7.11	3.71	Brentrup et al. 2016
Urea fertiliser production CO2e/kg N	4.66	3.50	Brentrup et al. 2016

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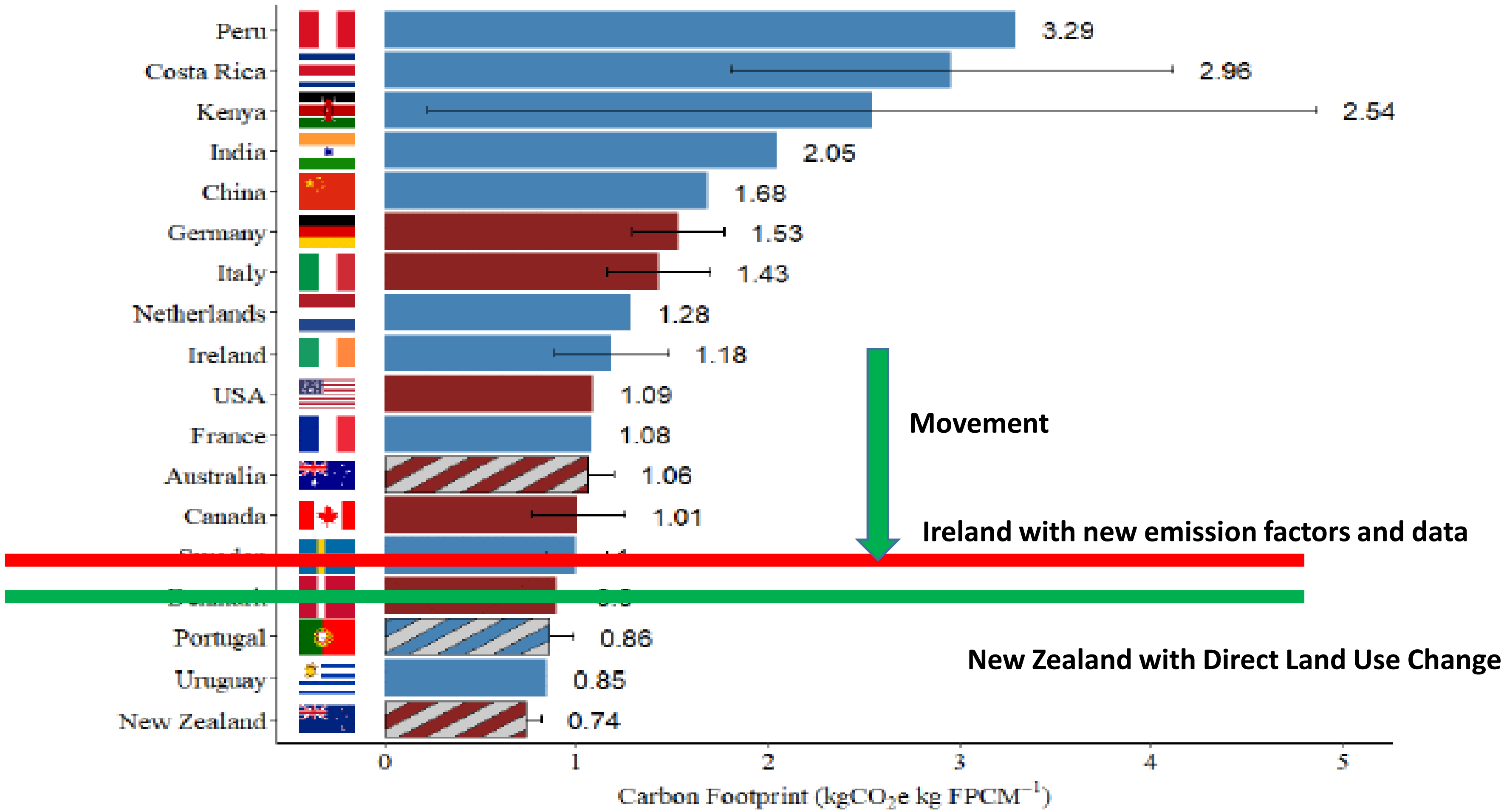
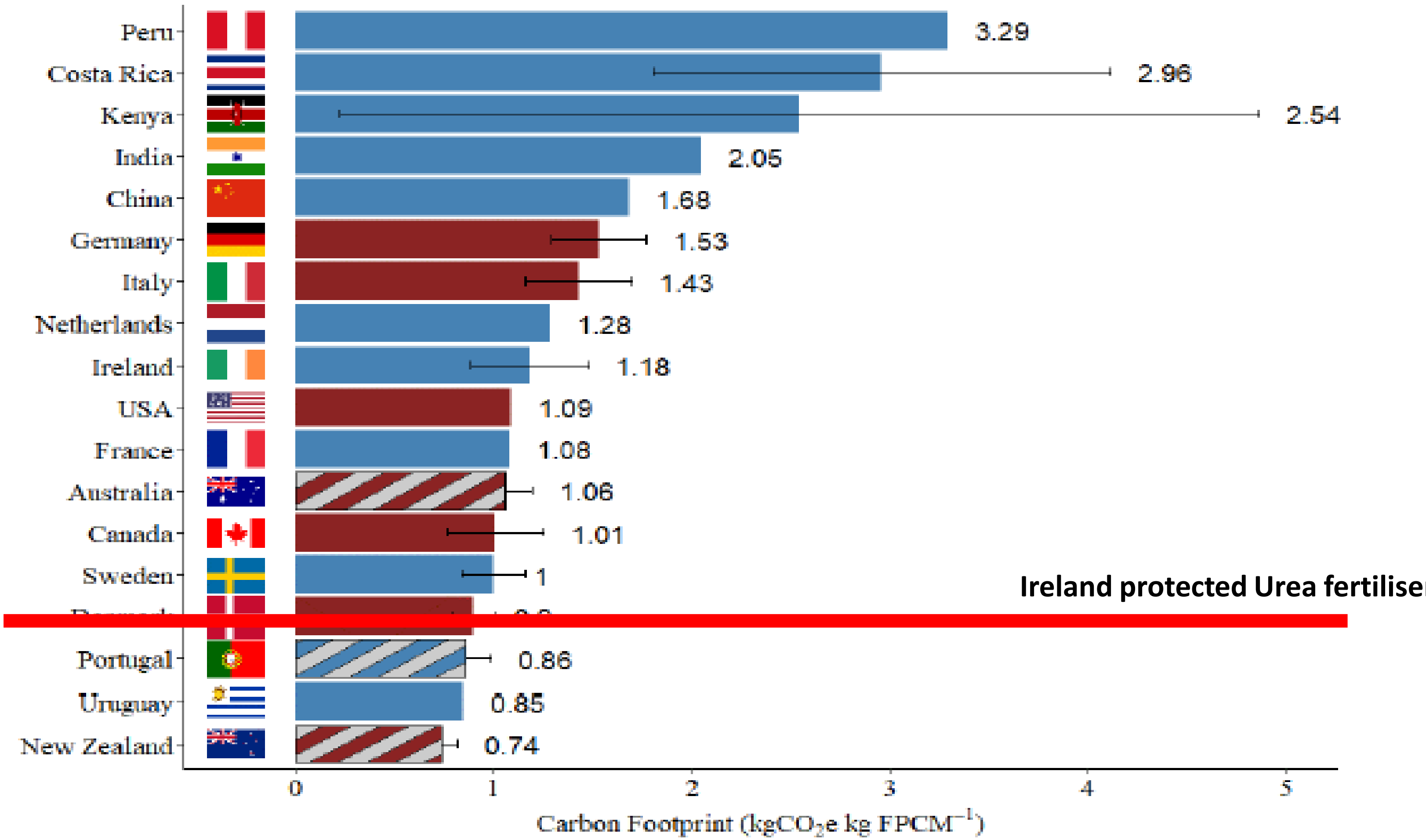
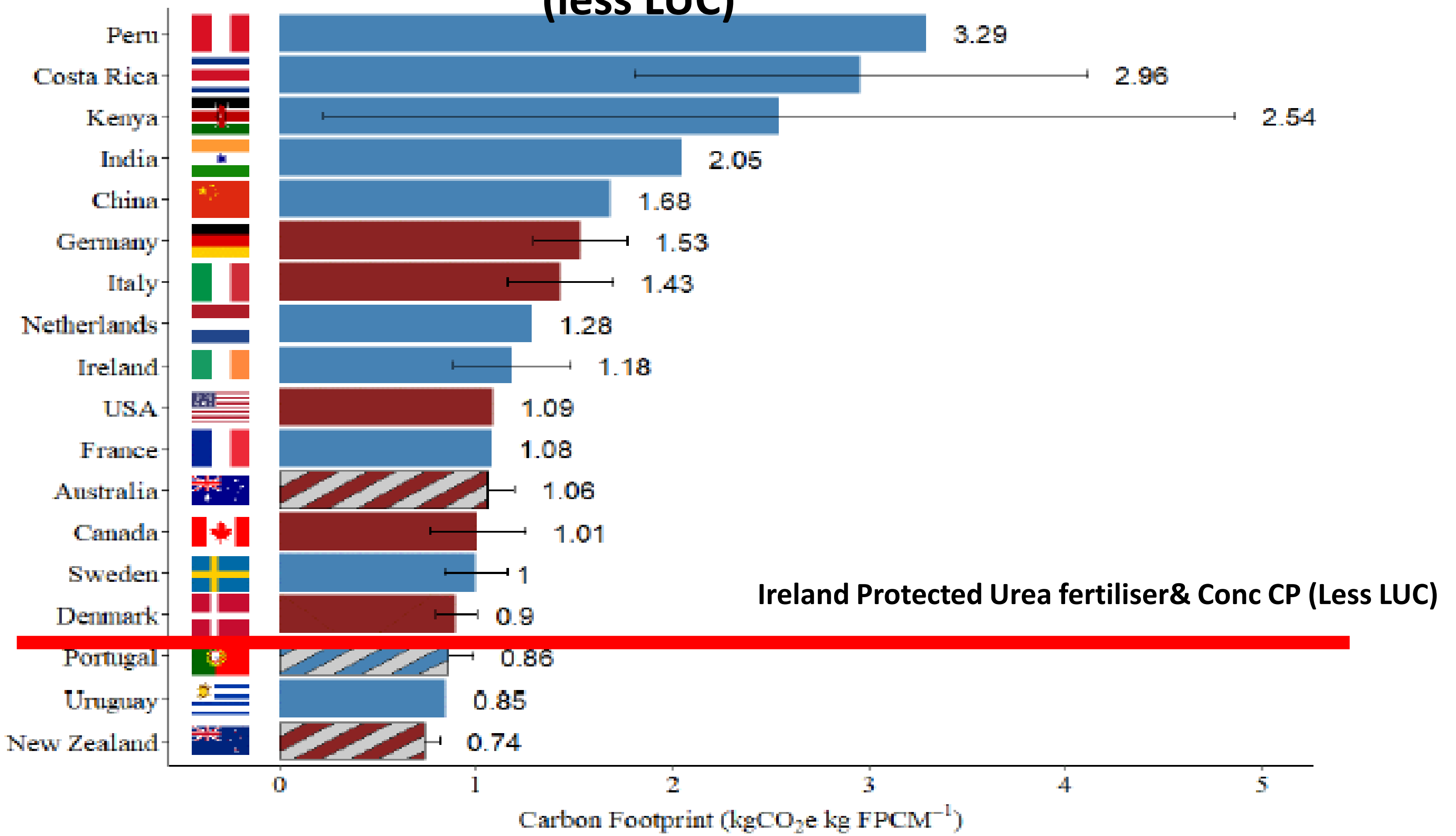
Carbon footprint of Milk by Country –Recalculation of Irish numbers



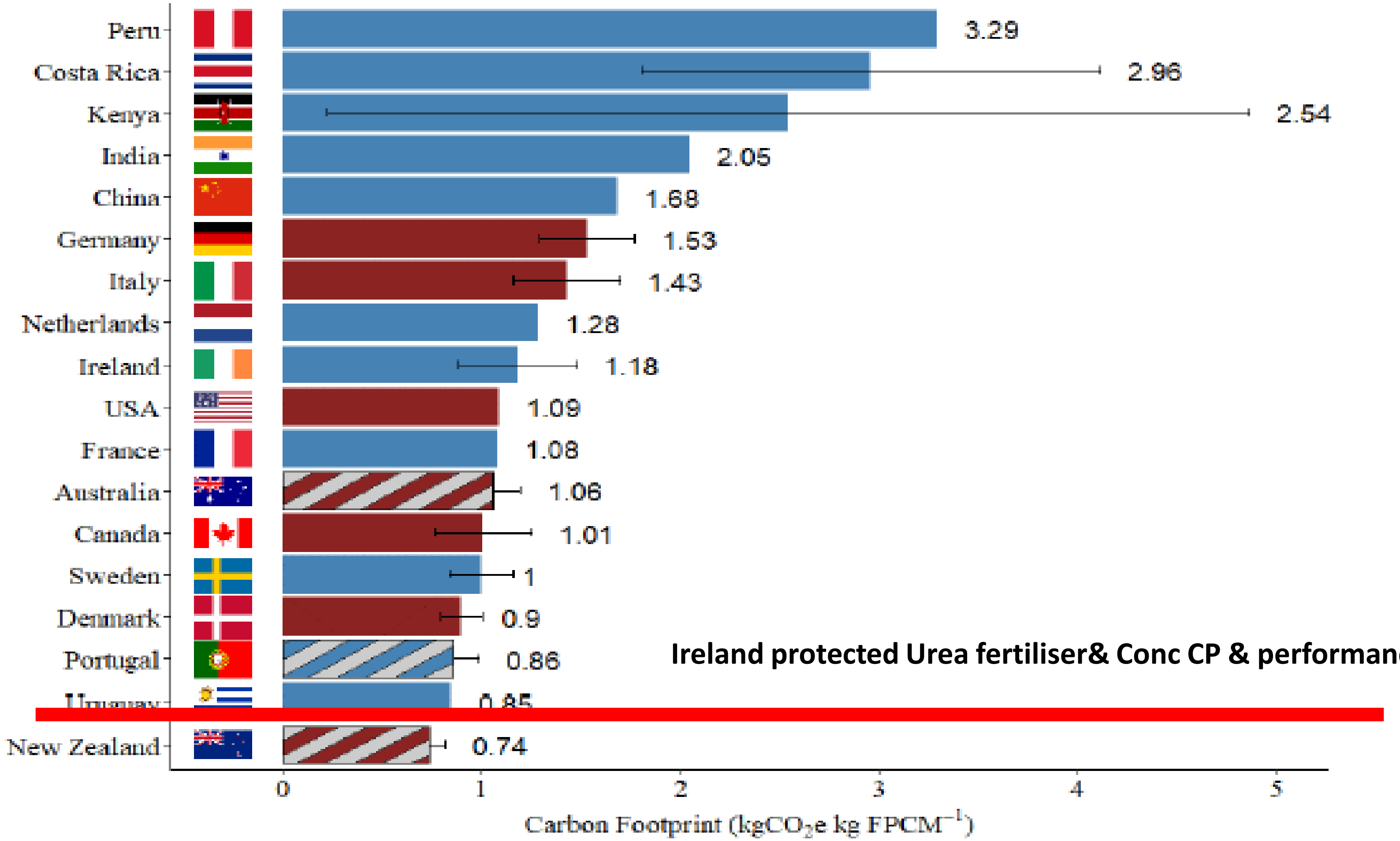
Carbon footprint of Milk by Country – Future protected Urea



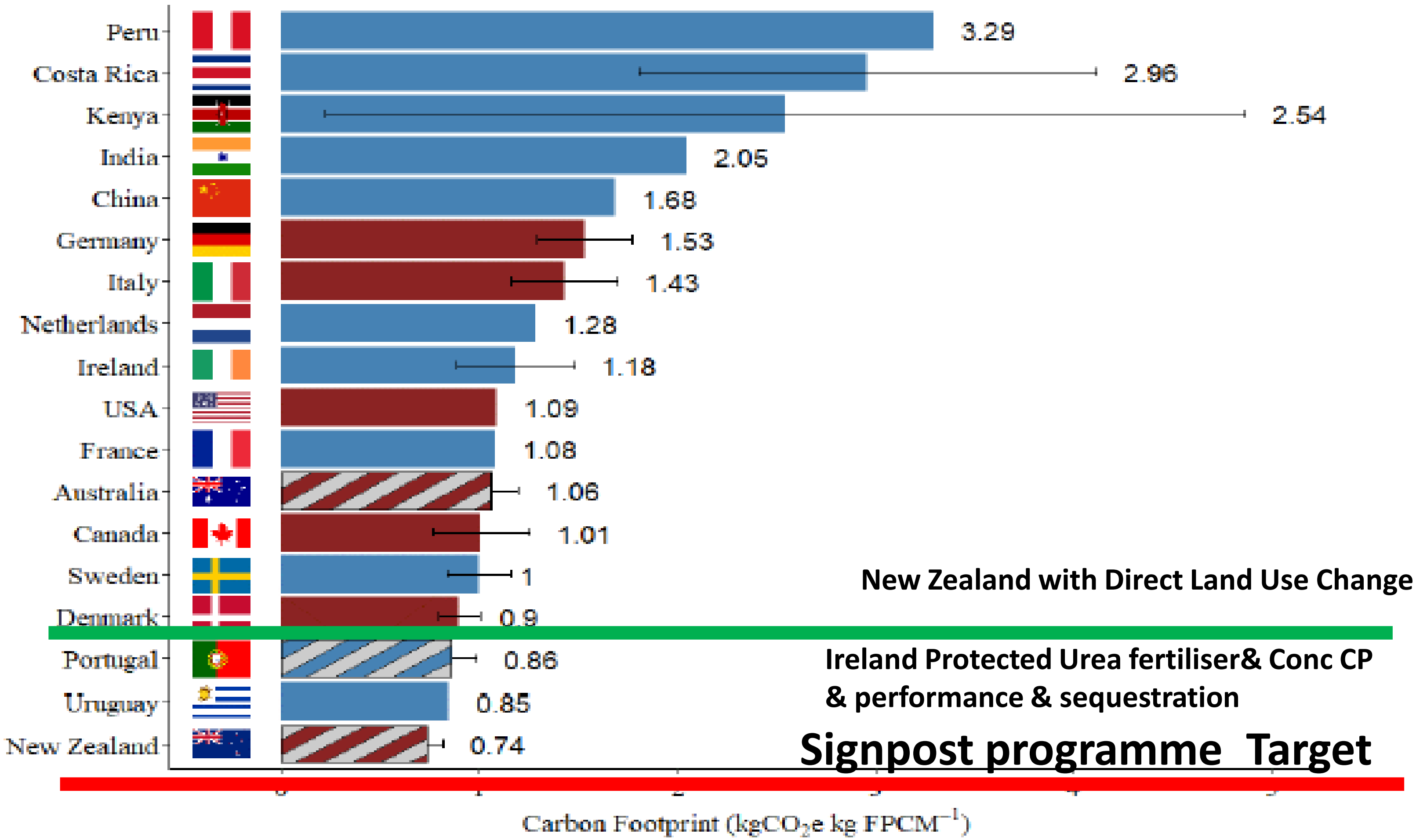
Carbon footprint of Milk by Country – Future protected Urea + lower CP feed (less LUC)



Carbon footprint of Milk by Country – Future protected Urea + lower CP feed (less LUC)+ performance from grass



Carbon footprint of Milk by Country – Future Protected Urea + lower CP feed (less LUC)+ performance from grass+ sequestration



Further strategies

- Mitigation
- Methane
  - Biogenic Methane
    - Metrics GWP100 versus GWP*
  - Measurement
  - System
  - Additives

Mitigation strategies

- Footprint
  - Efficiency measures
  - Reduce footprint but could be associated with static or increased absolute emissions (e.g. genetics)
- Absolute emissions
  - Reduce total emissions
  - Footprint?
- Win/Win scenarios reduce footprint and absolute emissions

Further strategies

- Mitigation
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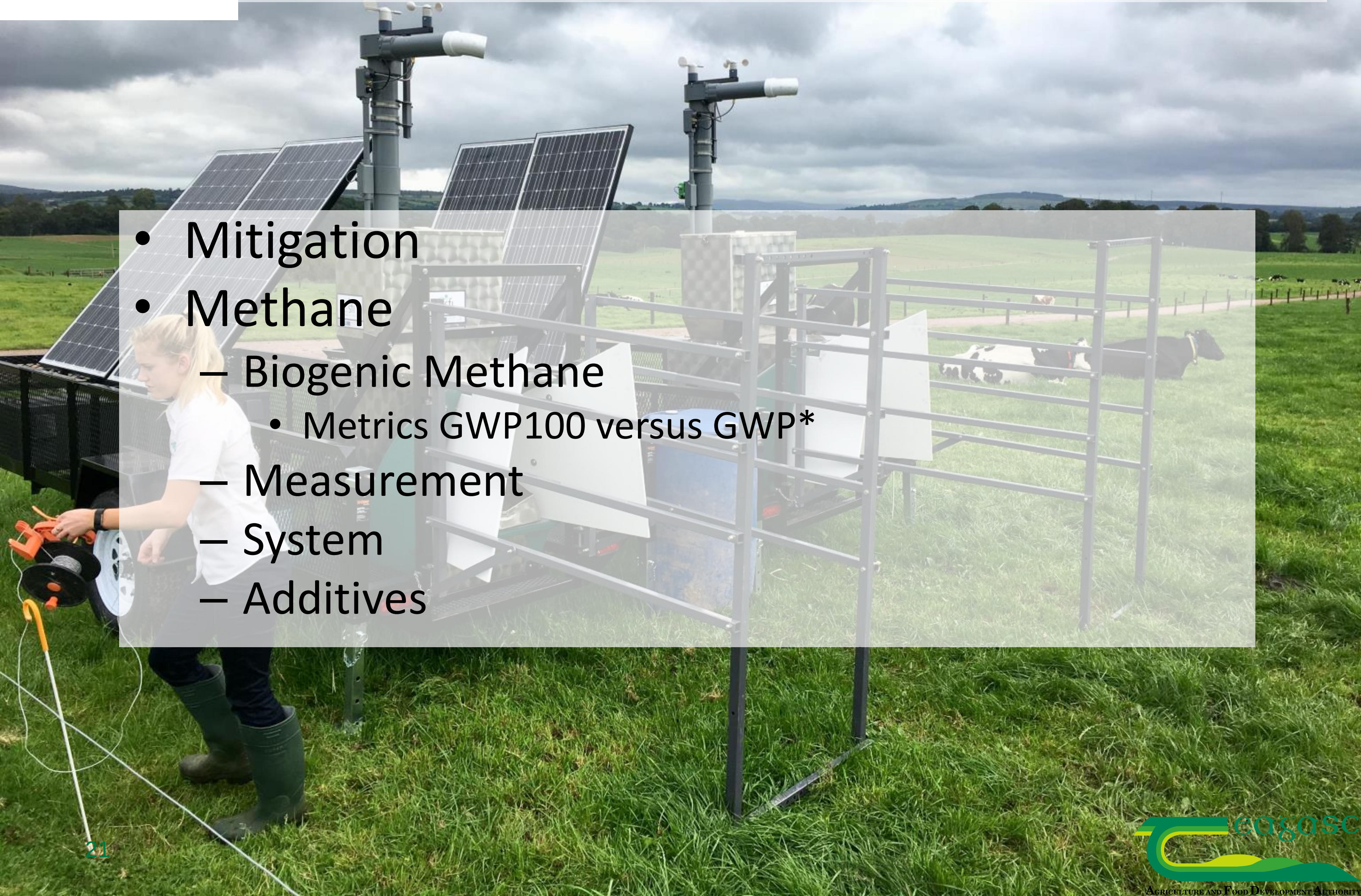


Biogenic Methane

- *Biogenic Methane is* emitted from biological processes including livestock.
  - Plants absorb carbon dioxide through the process of photosynthesis
  - Ruminants are then able to break down indigestible cellulose in their rumens
  - carbon that makes up the cellulose is converted to methane
  - After circa 12 years, the methane is converted to carbon dioxide and the cycle starts again.
- In the case of fossil fuel the CO_2 produced is new carbon – Stored for a very long time
- In a situation where methane is constant the same amount of methane that is being produced is being oxidised and therefore there is Little ADDITIONAL warming effect

Biogenic Methane Metric GWP*

- Currently all calculations use GWP100
  - Brings everything to 100 year periods
  - Methane has a multiplier of 28
  - Nitrous oxide 265
- Relatively new metric GWP*
  - Reflects that methane has a half life of 12 years
  - It has a higher multiplier effect at 84

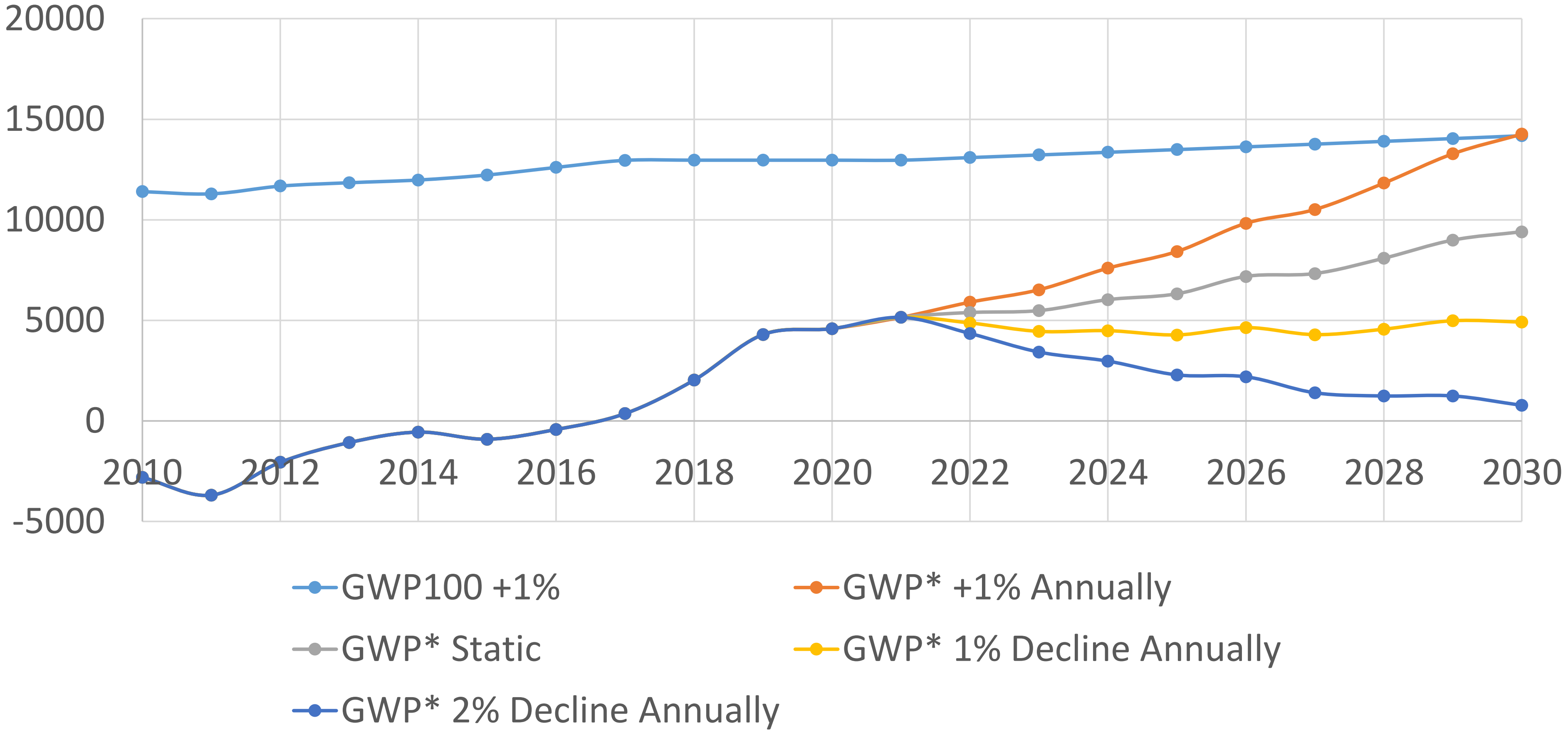
Biogenic Methane GWP 100

	Livestock*000	Methane (*000 tonnes)	Methane CO2e (*000)
2018	6,594	518.8	12,970
2017	6,674	518.5	12,963
2016	6,613	504.4	12,610
2015	6,422	489.4	12,235
2014	6,243	479.4	11,985
2013	6,309	474.0	11,850
2012	6,253	467.3	11,683
2011	5,925	451.9	11,298
2010	5,918	456.3	11,408
2009	6,232	465.9	11,648
2008	6,304	474.0	11,850
2007	6,248	475.5	11,888
2006	6,340	484.7	12,118
2005	6,390	487.8	12,195
2004	6,212	493.6	12,340
2003	6,223	494.6	12,365
2002	6,333	497.1	12,428
2001	6,408	503.1	12,578
2000	6,330	506.2	12,655
1999	6,558	530.3	13,258
1998	6,952	547.7	13,693

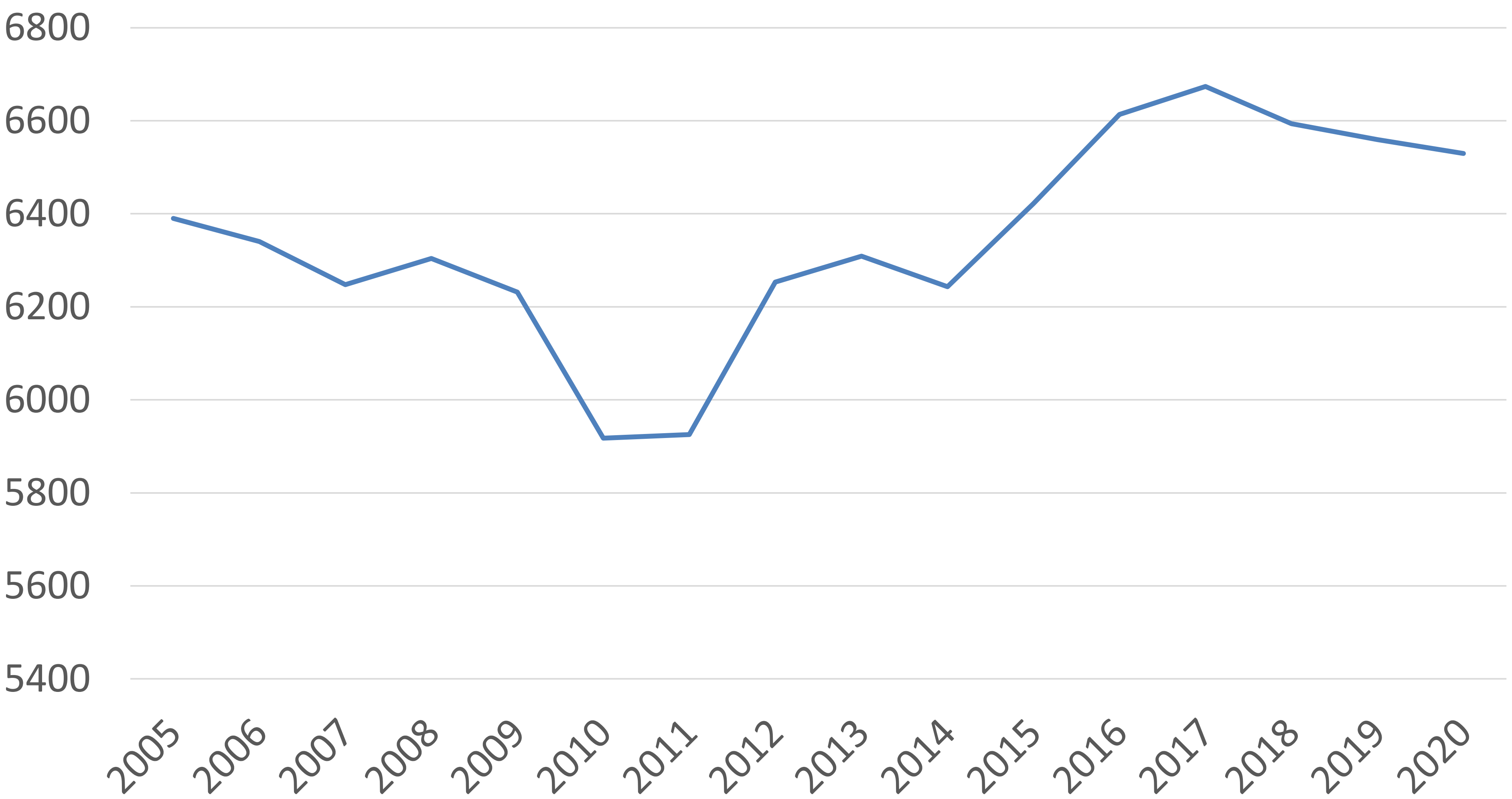
Biogenic Methane (GWP*)

	Livestock*000	Methane (*000 tonnes)	Methane CO2e (*000)	Methane GWP* (*000)
2018	6,594	518.8	12,970	2,032
2017	6,674	518.5	12,963	366
2016	6,613	504.4	12,610	- 423
2015	6,422	489.4	12,235	-908
2014	6,243	479.4	11,985	- 555
2013	6,309	474.0	11,850	- 1,076
2012	6,253	467.3	11,683	- 2,056
2011	5,925	451.9	11,298	- 3,690
2010	5,918	456.3	11,408	- 2,799

Biogenic Methane GWP* and GWP100



Cattle numbers December



Biogenic Methane

- The importance of methane mitigation increases under GWP* metrics
- Methane effects are magnified
- Significant focus needed on methane
  - System – baseline
  - Genetics
  - Age
  - Additives

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