

The role of beef production in reducing the environmental burdens from livestock production

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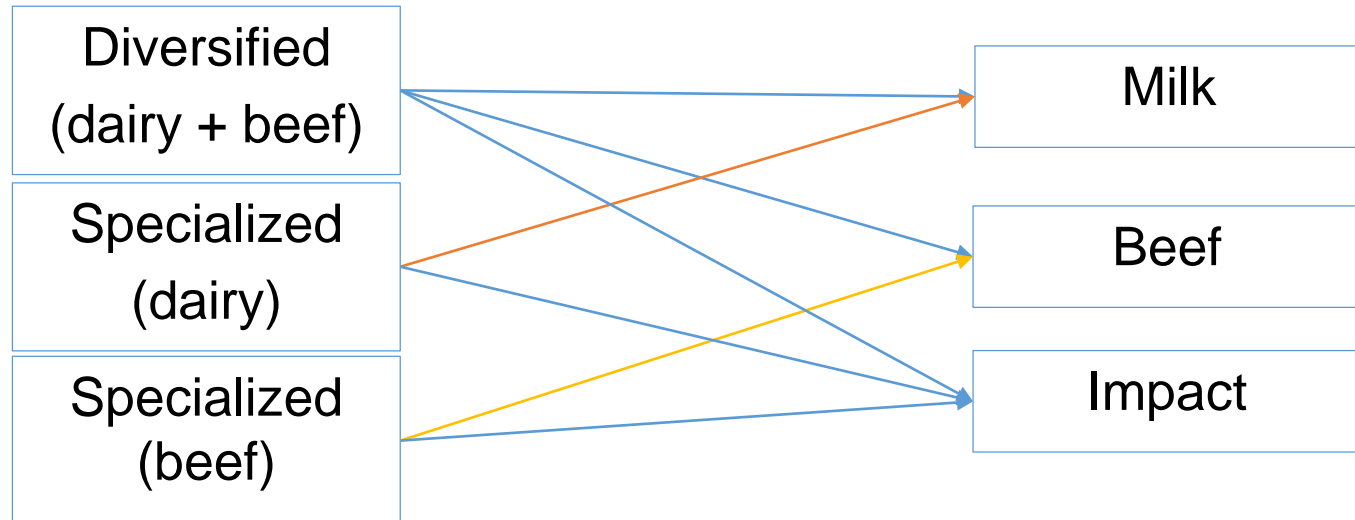


Introduction

Socio-economic
Policy

drive

Dairy farm consolidation
and intensification (C&I)

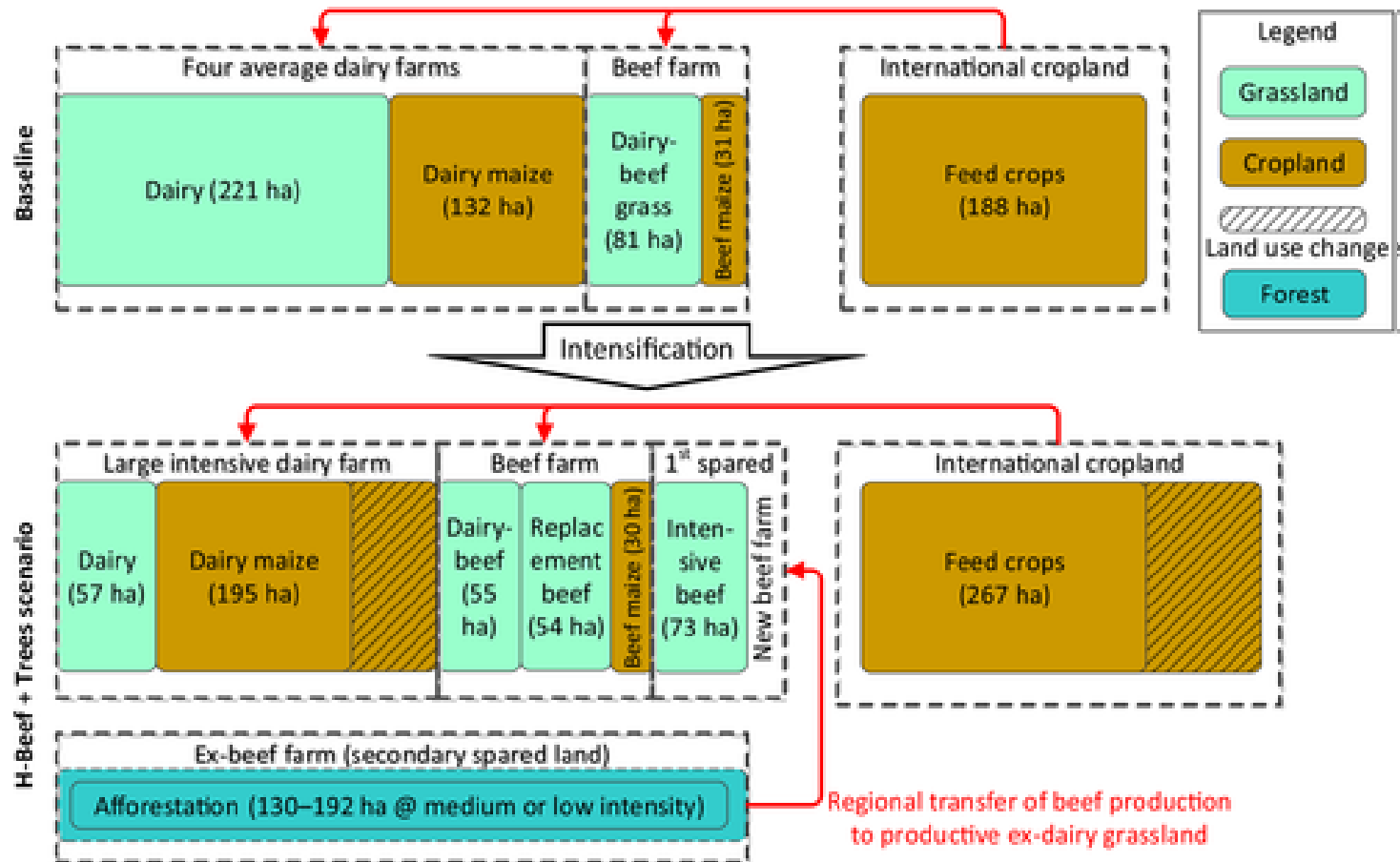


➤ Reduced environmental footprint / kg of milk

Introduction

Climate mitigation by dairy intensification depends on intensive use of spared grassland

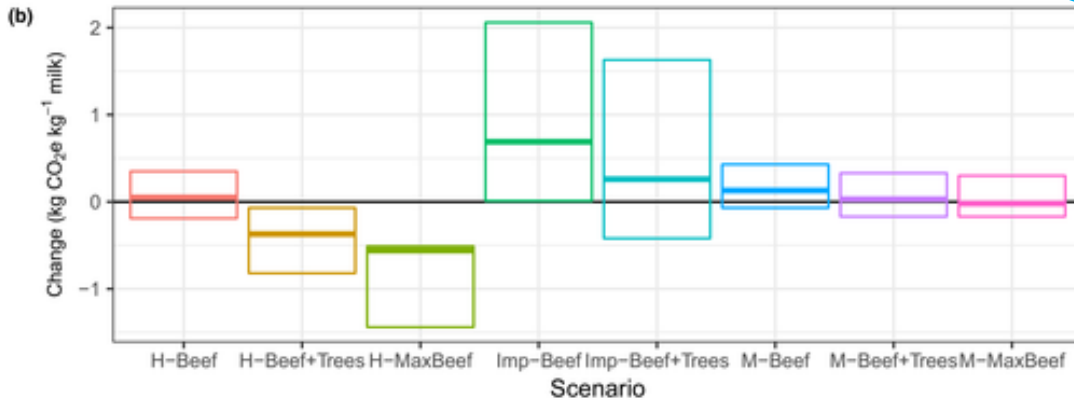
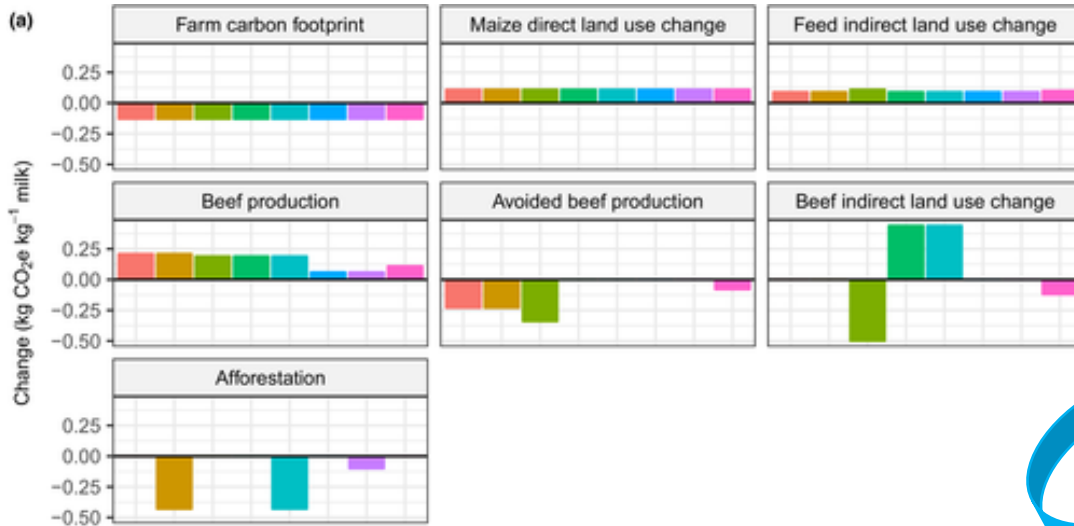
David Styles¹ | Alejandra Gonzalez-Mejia¹ | Jon Moorby² | Andreas Foskolos² | James Gibbons¹



Introduction

Climate mitigation by dairy intensification depends on intensive use of spared grassland

David Styles¹ | Alejandra Gonzalez-Mejia¹ | Jon Moorby² | Andreas Foskolos² | James Gibbons⁴



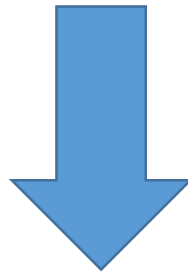
▭ H-Beef ▭ H-Beef+Trees ▭ H-MaxBeef ▭ Imp-Beef
▭ Imp-Beef+Trees ▭ M-Beef ▭ M-Beef+Trees ▭ M-MaxBeef



DEPENDENT on:
spared grassland
beef type

Introduction

- Scenario based study → “typical” farming systems
- Few real farms: Flysjo et al., 2012 → 23 farms

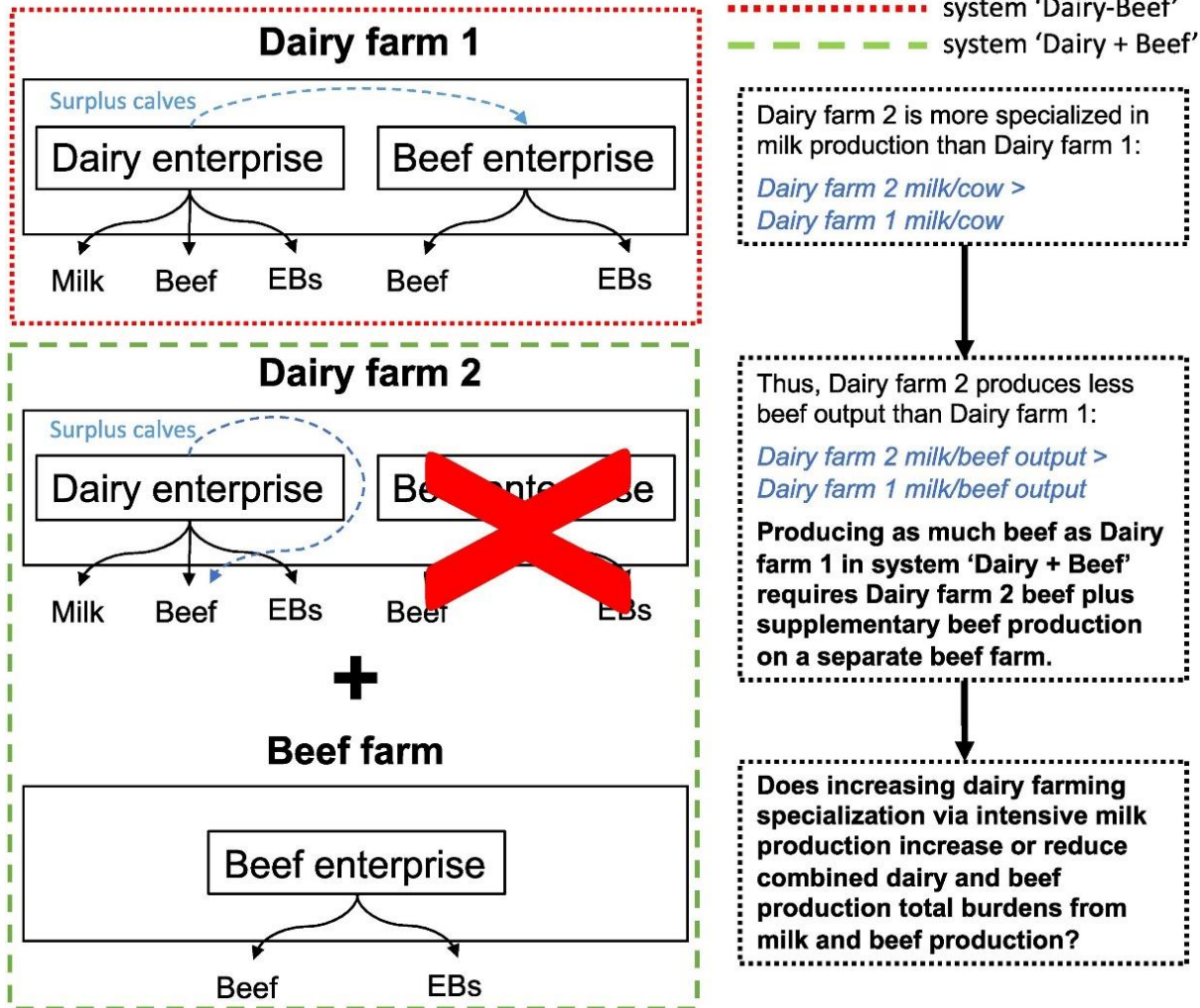


Farm Business Survey



Objective: estimate the environmental footprint of displacing beef output from dairy farms to beef farms using large 15-year dataset

Materials & Methods



Materials & Methods

➤ Farm Business Survey:

- ✓ an annual survey commissioned by the government (England and Wales)
- ✓ uses a sample of farms that is representative of the national population of farms in terms of farm type, farm size and regional location.
- ✓ includes >2,300 farms.
- ✓ Years 2001-2014



- ✓ 738 dairy → 3624 data points in 15 years
- ✓ 1887 suckler-beef → 10,340 data points in 15 years

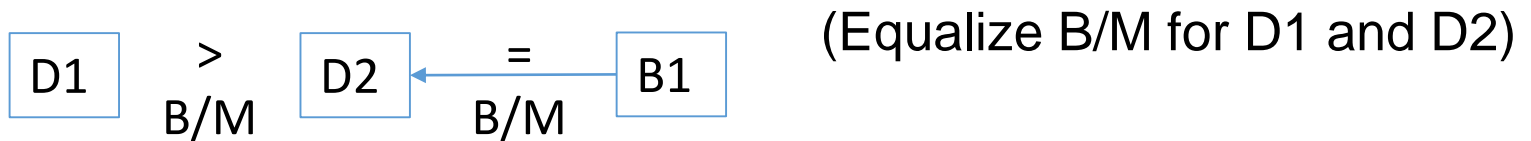
➤ Functional Unit (Vellinga and de Vries, 2018):

1 L milk and X g of LWG

Materials & Methods

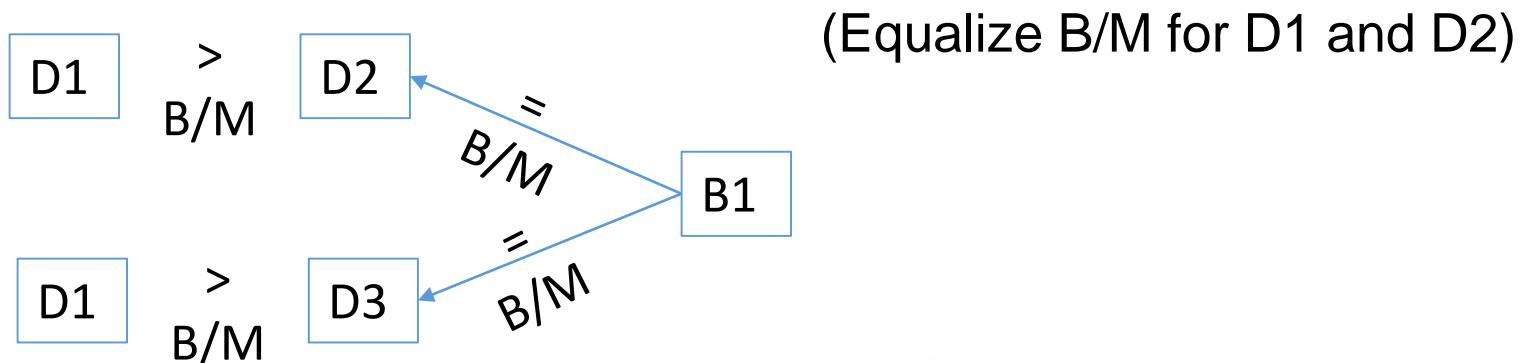
Sensitivity Analysis → beef : milk

- Step 1 → 2 dairy farms + 1 beef farm



Environmental burdens for D1 and D2(+B1)

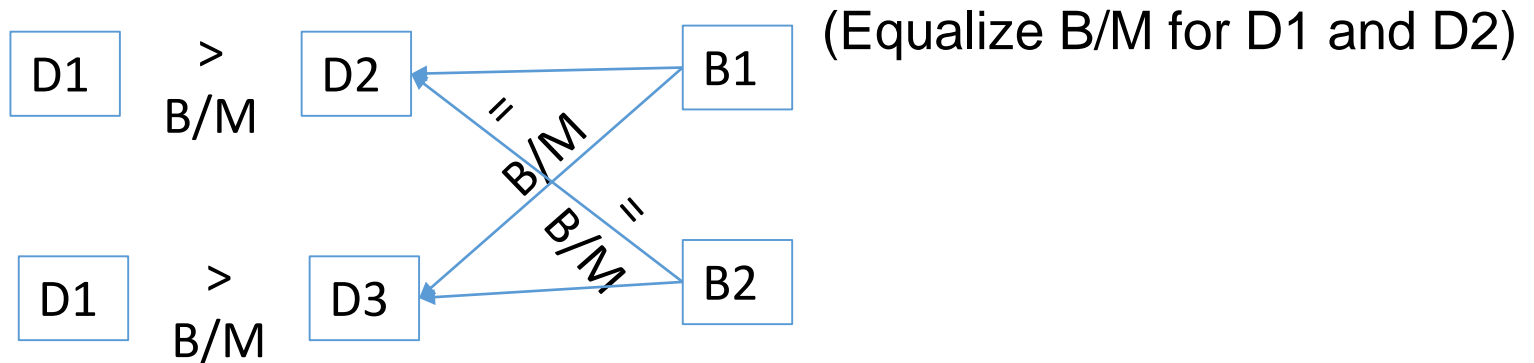
- Step 2 → 2 dairy farms + 1 beef farm + 1 dairy



Materials & Methods

Sensitivity Analysis → beef : milk

➤ Step 3 → 3 dairy farms + 2 Beef farms

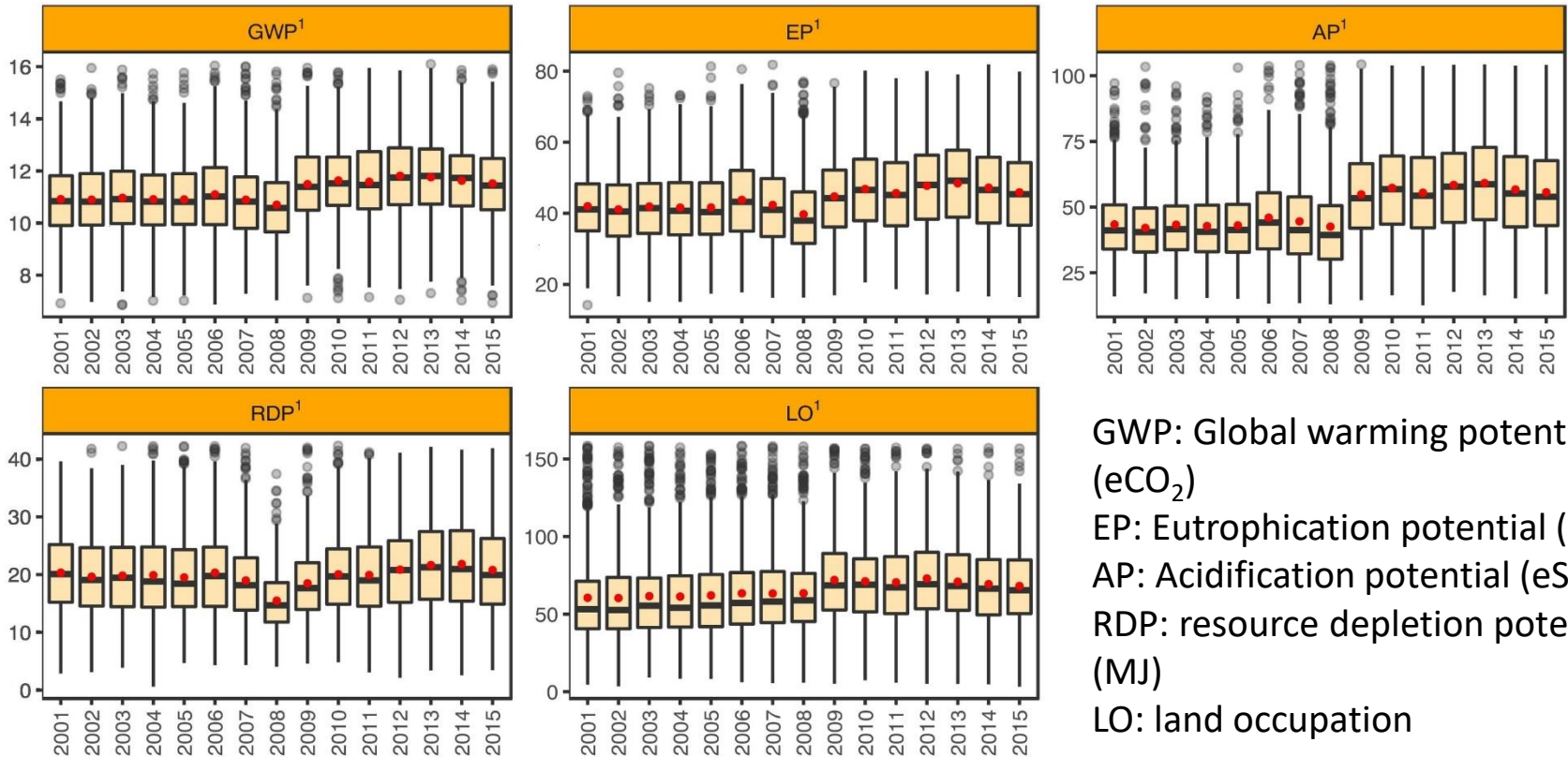


Environmental burdens for D1 and D2(+B1) AND D2(+B2) AND D3(+B1) AND D3(+B2)

➤ Step 4 → 738 dairy farms + 1887 Beef farms

Results

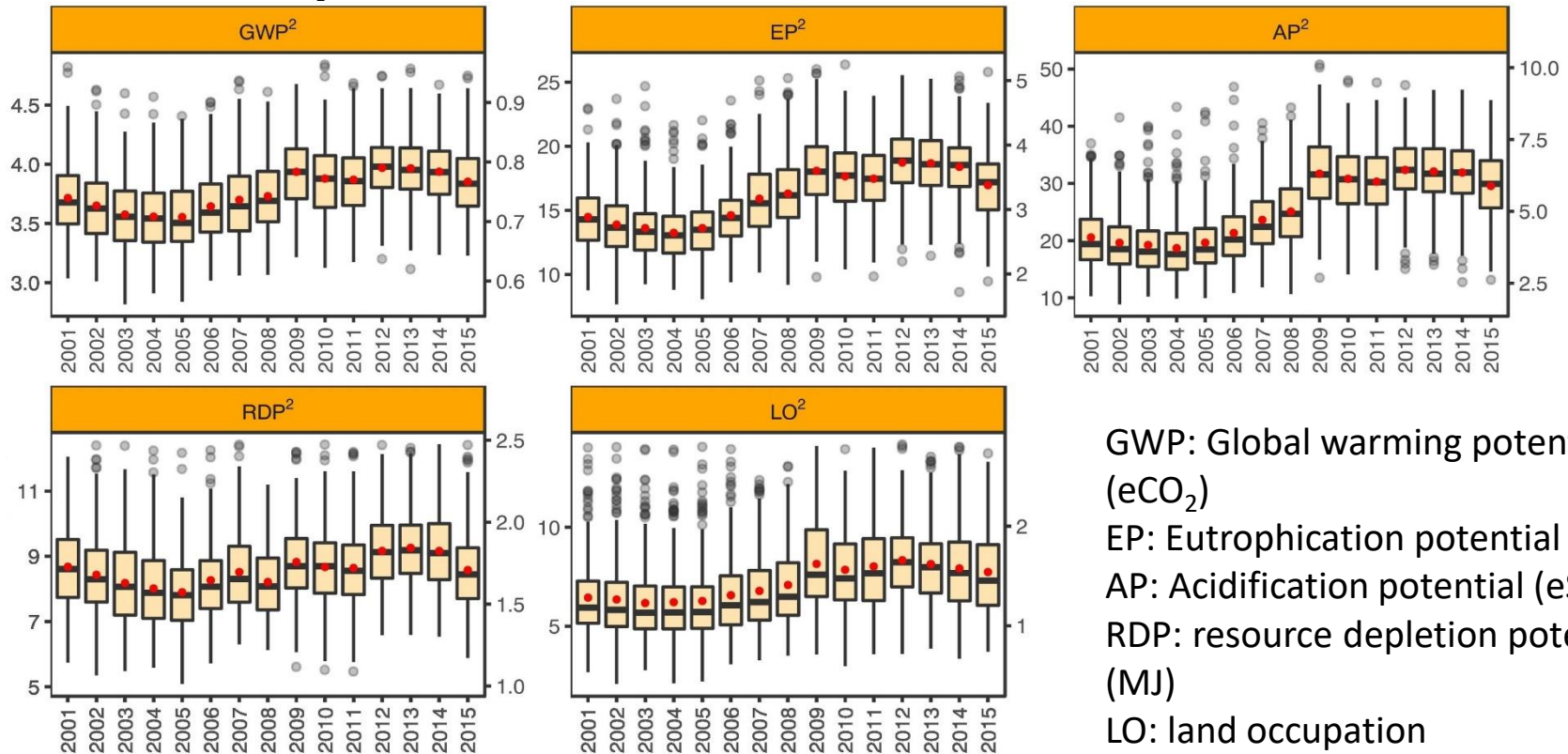
- LCA of suckler-beef farms



GWP: Global warming potential (eCO₂)
EP: Eutrophication potential (ePO₄)
AP: Acidification potential (eSO₂)
RDP: resource depletion potential (MJ)
LO: land occupation

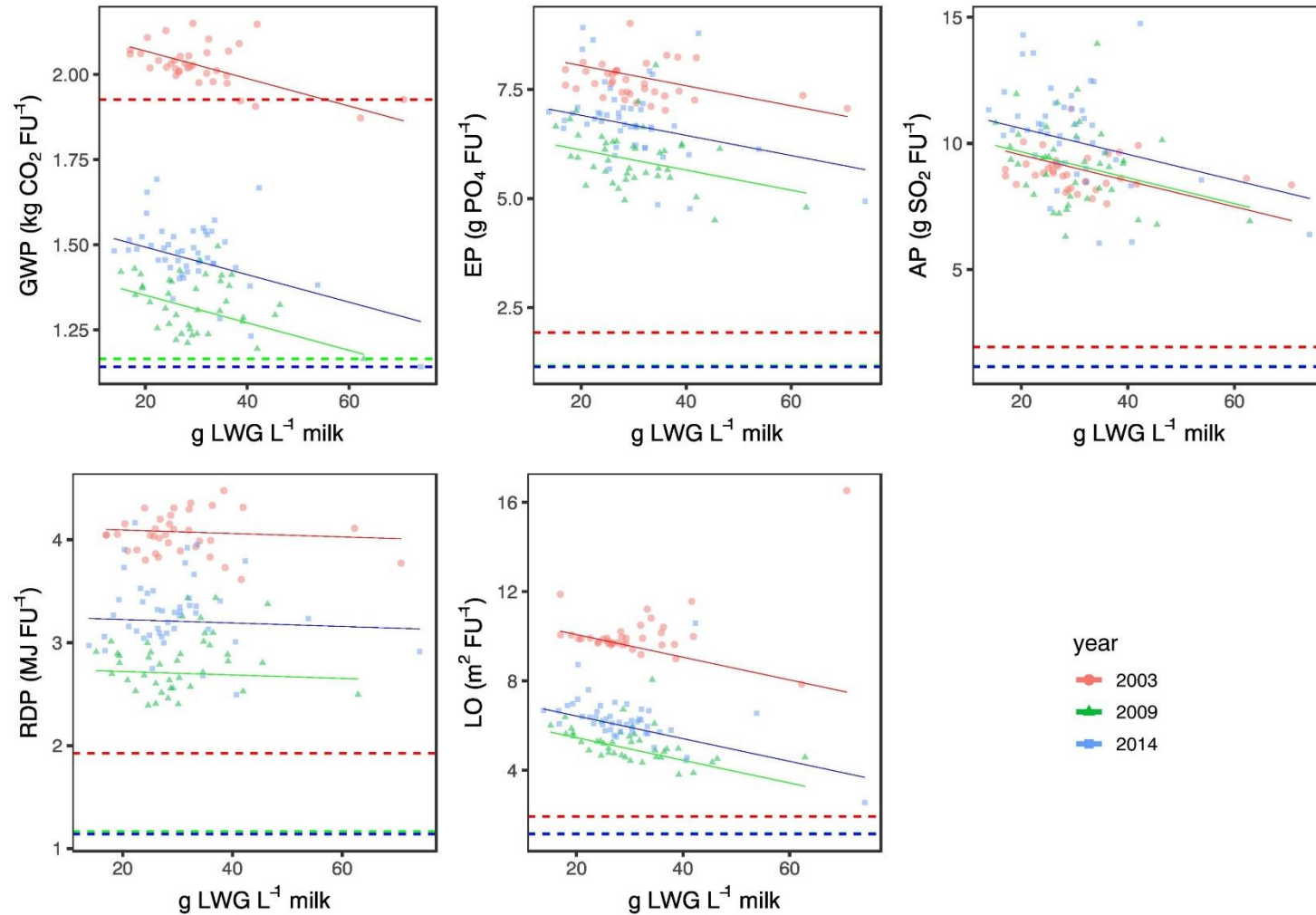
Results

- LCA of dairy farms



GWP: Global warming potential (eCO₂)
 EP: Eutrophication potential (ePO₄)
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Results



Conclusions

- Suckler-beef system is the dominant system in the UK – Europe
- When the Dairy farm intensifies the beef output is reduced
- When the suckler-beef system is used to substitute the beef from the dairy, the environmental burdens increase

The effect of ongoing global trends in dairy farm intensification and specialization can be mitigated by

- (i) increasing beef output per unit of milk achievable without a large change in a dairy farm's management; and
- (ii) sustainable intensification of displaced beef production

Acknowledgements

National
Research
Network for Low
Carbon Energy
and Environment
(NRN-LCEE)

CLEANER COWS

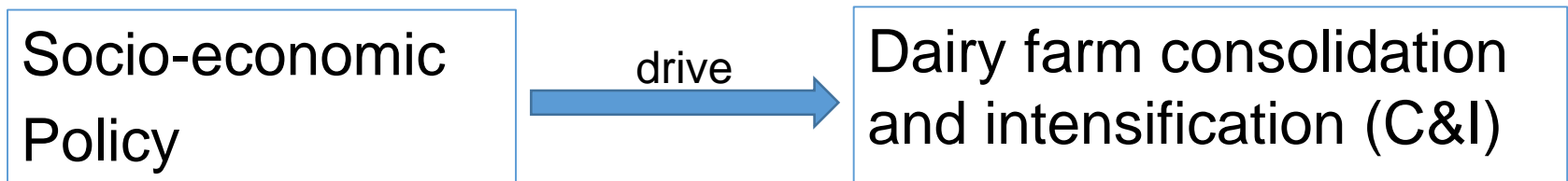
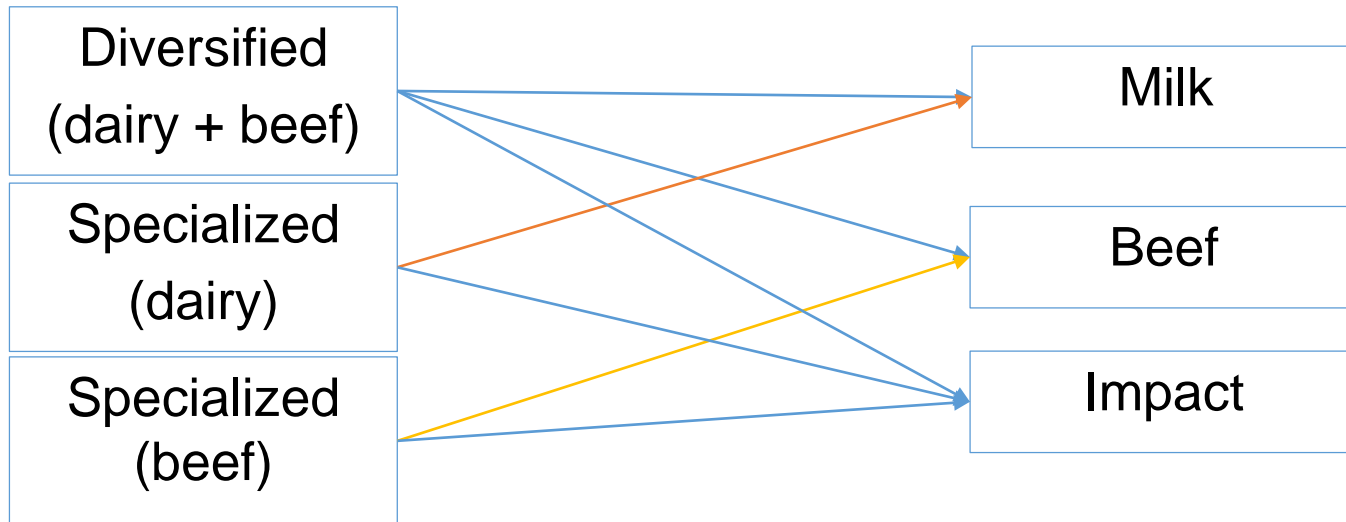
*Consequential Life Cycle Assessment of
Environmental and Economic Effects of
Dairy and Beef Consolidation and
Intensification Pathways*

Thank you for your attention!

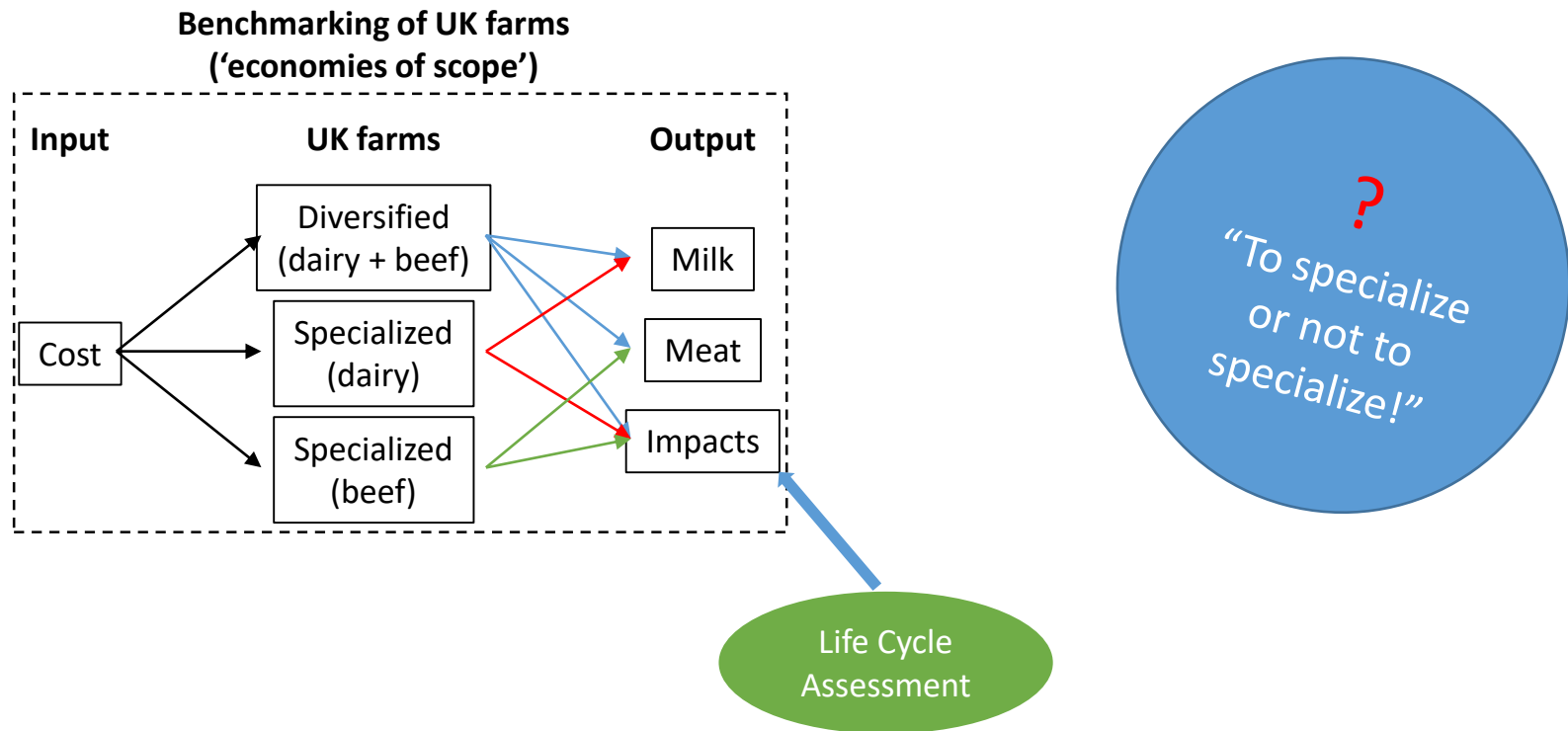
Introduction



increasing public awareness

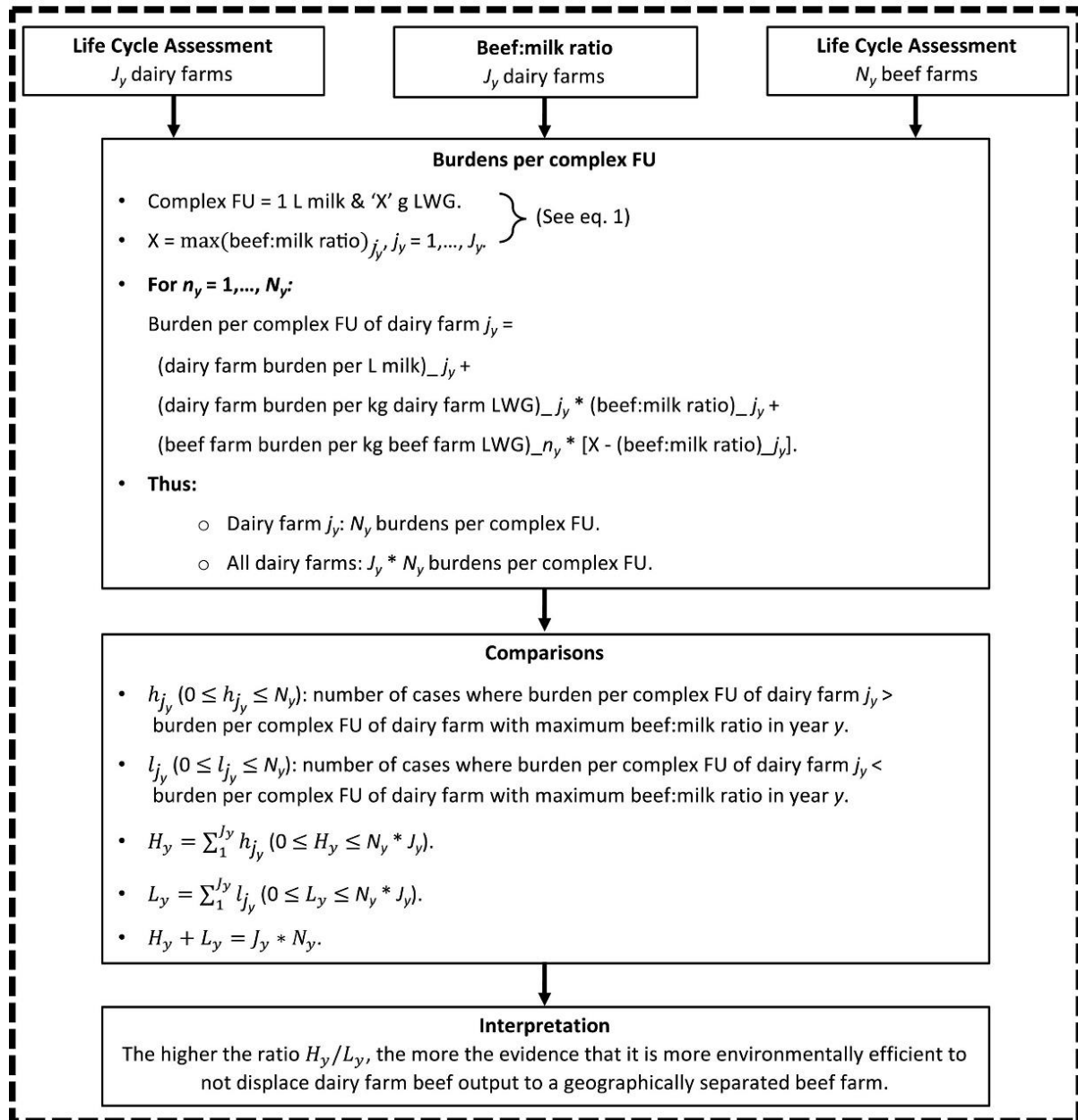


Efficient *and* sustainable farms



Algorithm

For year $y = 1, \dots, Y$:





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Abstract

Graphical abstract

Keywords

1. Introduction

2. Material and methods

3. Results

4. Discussion

5. Conclusions

Declaration of Competing Interest

Acknowledgements

Appendix A. Supplementary data



ELSEVIER

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Diversification not specialization reduces global and local environmental burdens from livestock production

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