Helping farmers navigate the green economy: A data-driven blueprint for net zero beef

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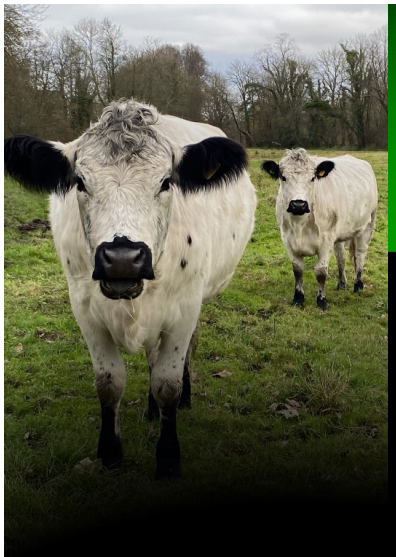

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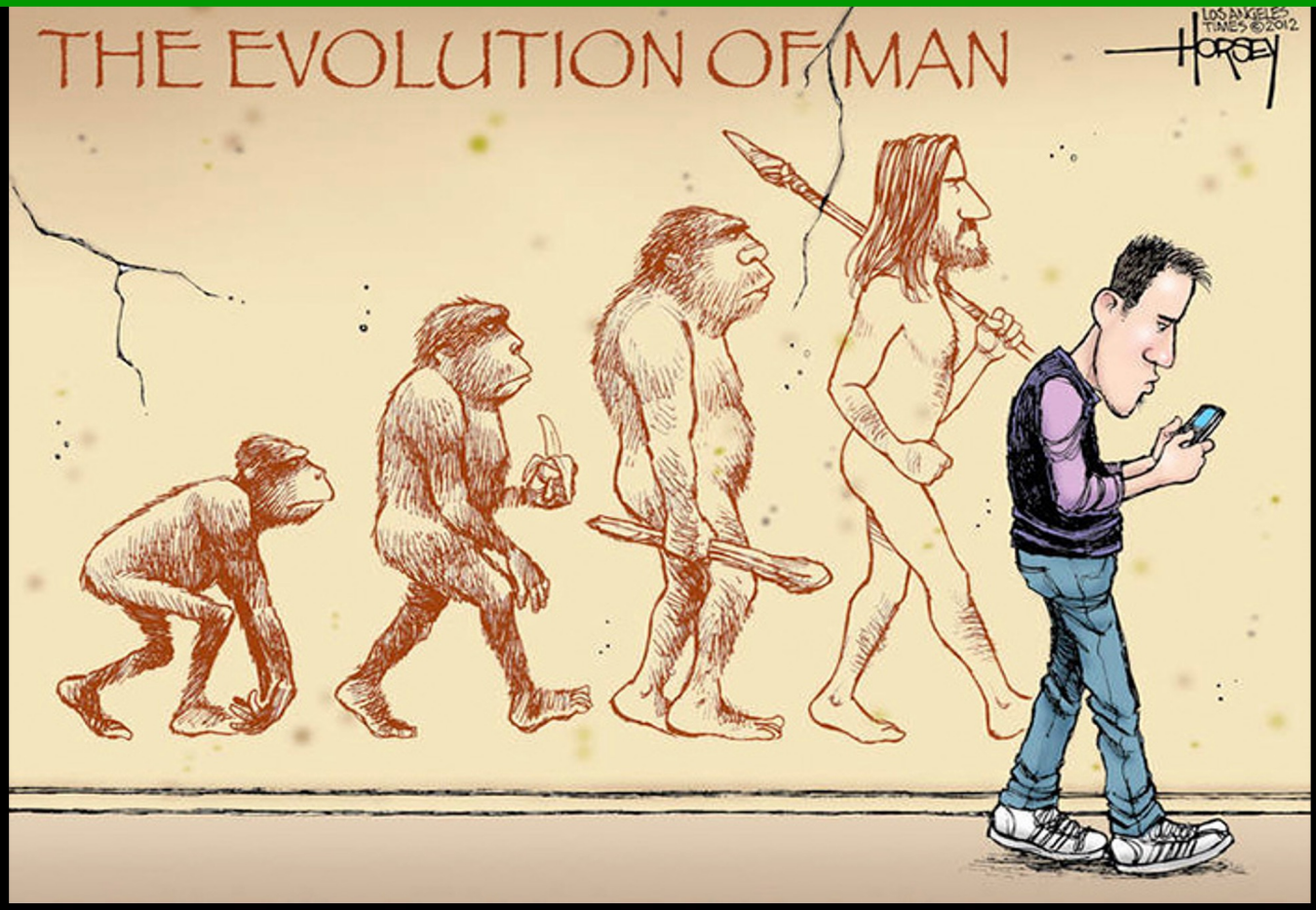
We've got the technology – now we need to use it to its potential



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Research objective

To identify data-driven strategies for improving profitability whilst reducing greenhouse gases?

Is there an optimal cattle slaughter age and weight that:

- **Maximises profitability**
- **Reduces enteric CH_4 emissions intensity**

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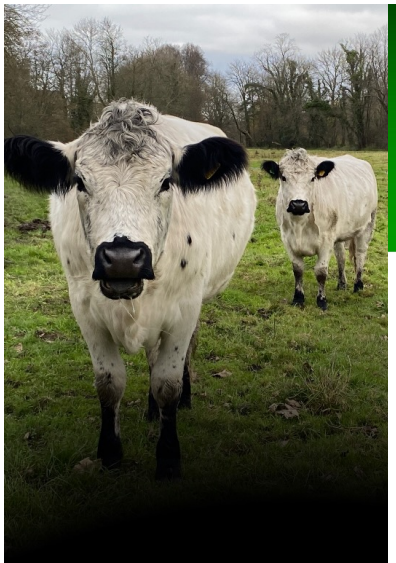

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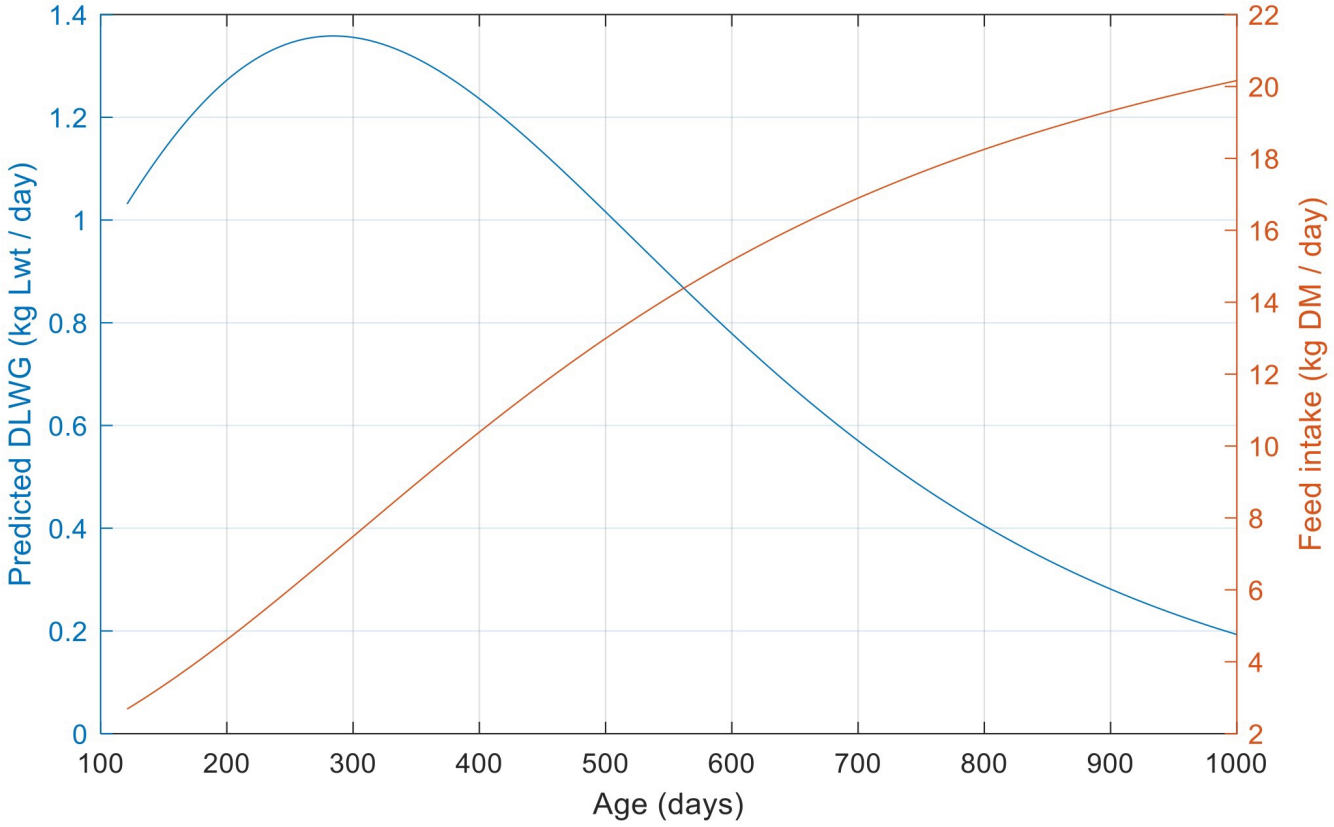
Efficiency declines after a plateau – keeping cattle longer ≠ profitable



Slaughtered at 541 days, 356 kg deadweight, O+3- carcass score; 0.47 RFI

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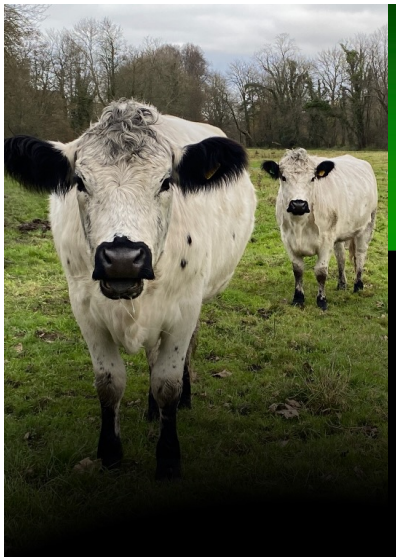

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Methodology: Cattle data

~750 cattle records

Start weight
Diet composition
Feed efficiency
Slaughter age/weight
Conformation/fat data

Daily liveweight gain
Feed intake
Carcass score
Enteric CH_4 emissions

Economic sustainability

Environmental sustainability

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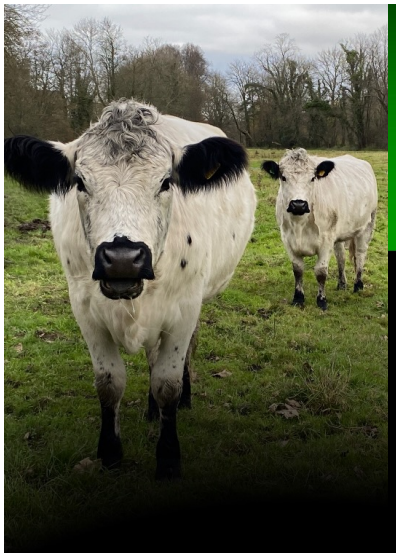

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Methodology: Economic and environmental analysis

- Daily gross margin calculated and aggregated to provide individual lifetime profit profile including typical beef finishing variable costs
- Sales income based on average GB prices 2019-2022 (steers & heifers 362.9 p/kg dwt, bulls 347.6 p/kg dwt) with ABP UK grid premiums & discounts applied
- Individual optimal age and weight at slaughter modelled to maximise profit on single-cycle (SCOM) or multi-cycle (MCOM) basis
- Daily enteric CH_4 emissions (g/d) calculated according to Escobar-Bahamondes *et al*. (2016), adjusted for grazing *vs*. housing.
- Enteric CH_4 emissions aggregated over lifetime (kg/head) and as emissions intensity (g/kg dwt)

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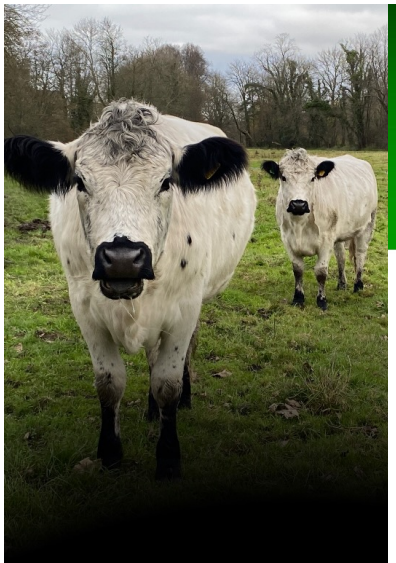
Source: Created by Jude L. Capper, 2023. Data from HAU/ABP/CIEL Project: Helping farmers navigate the green economy: A data-driven blueprint for UK beef farmers to move towards net zero. CH_4 emissions equation from Escobar-Bahamondes et al. https://doi.org/10.1139/cjas-2016-0042



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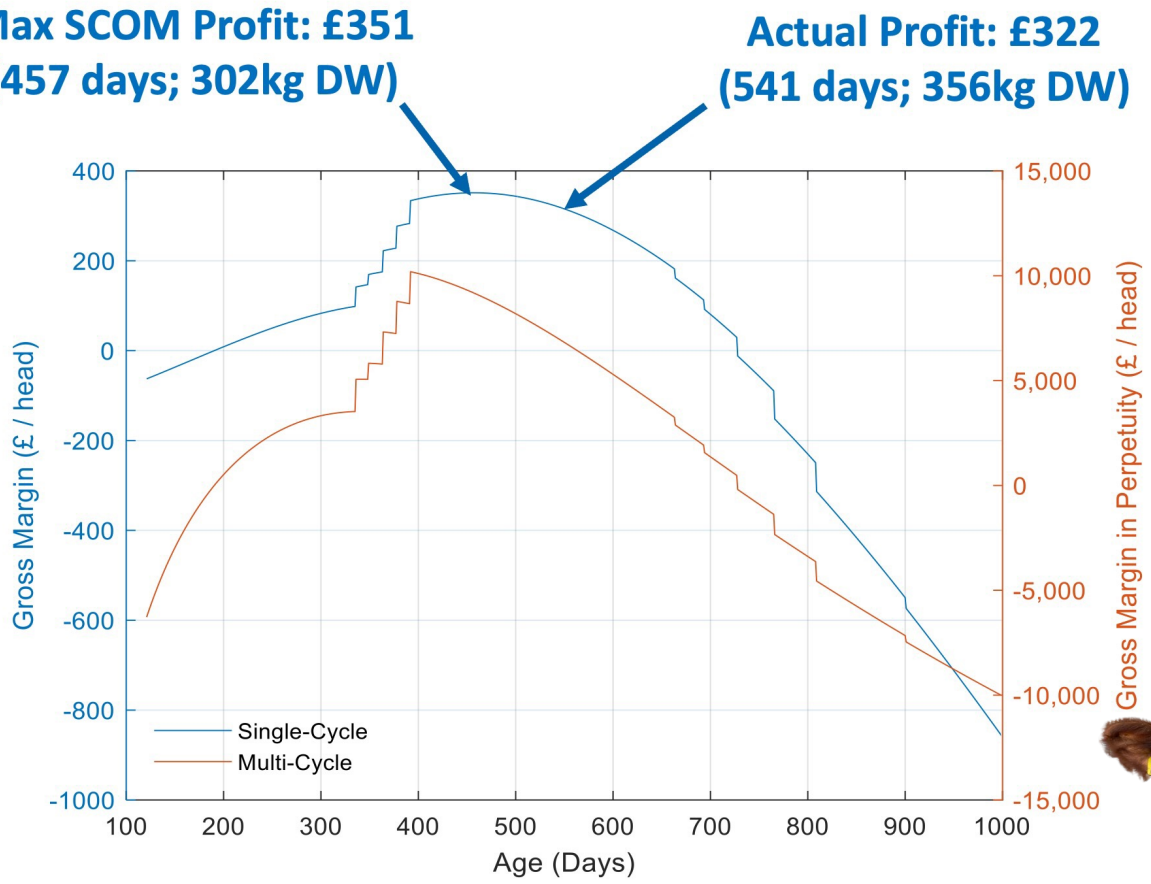
Economic analysis example



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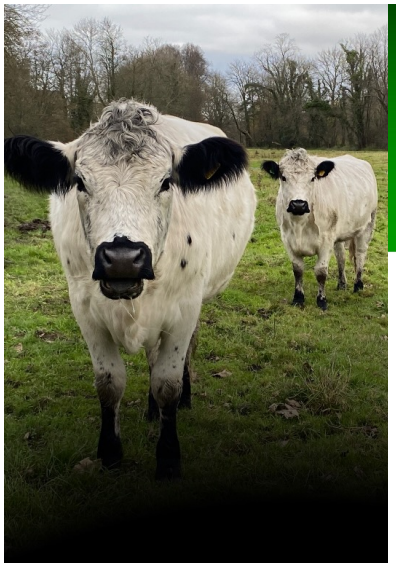

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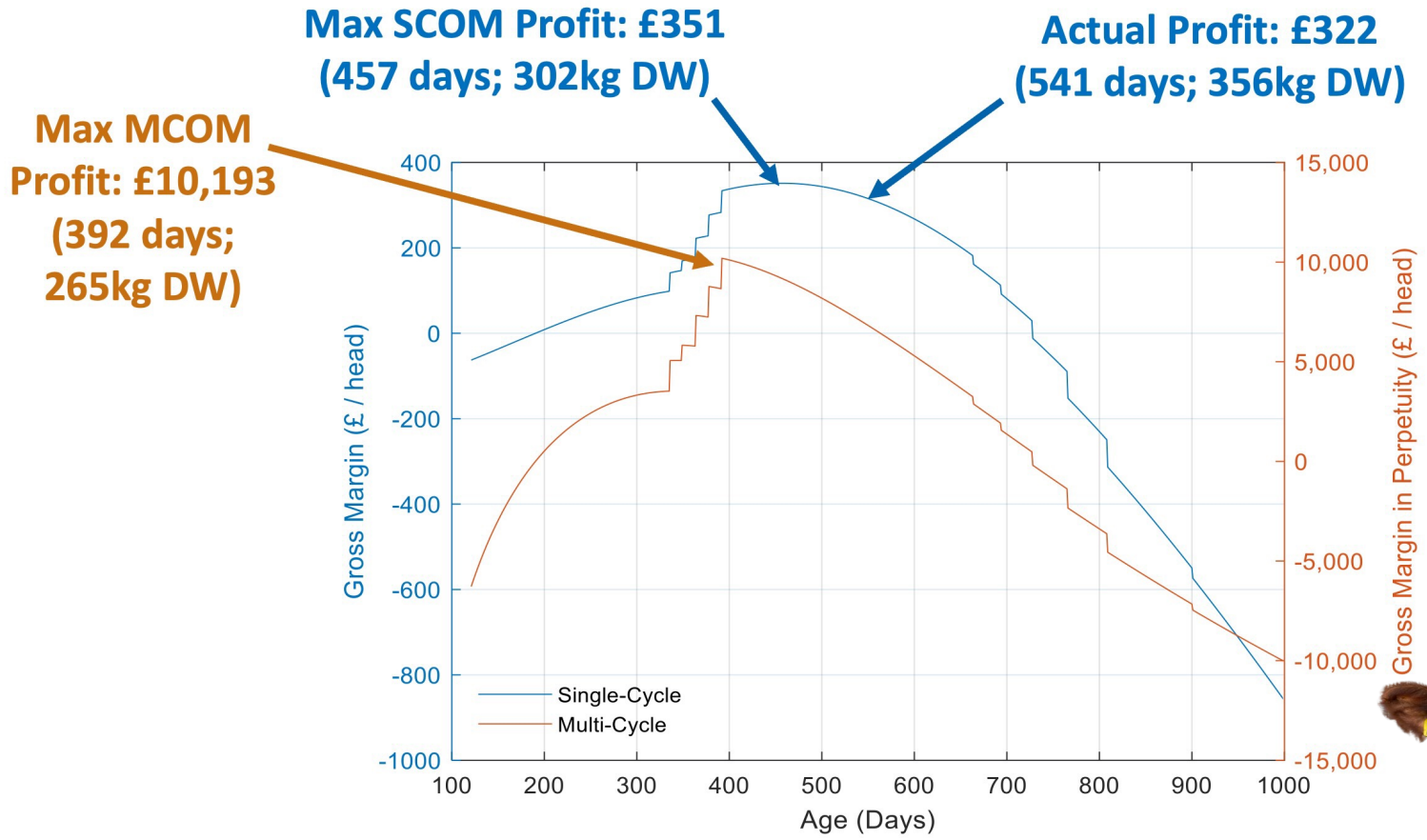

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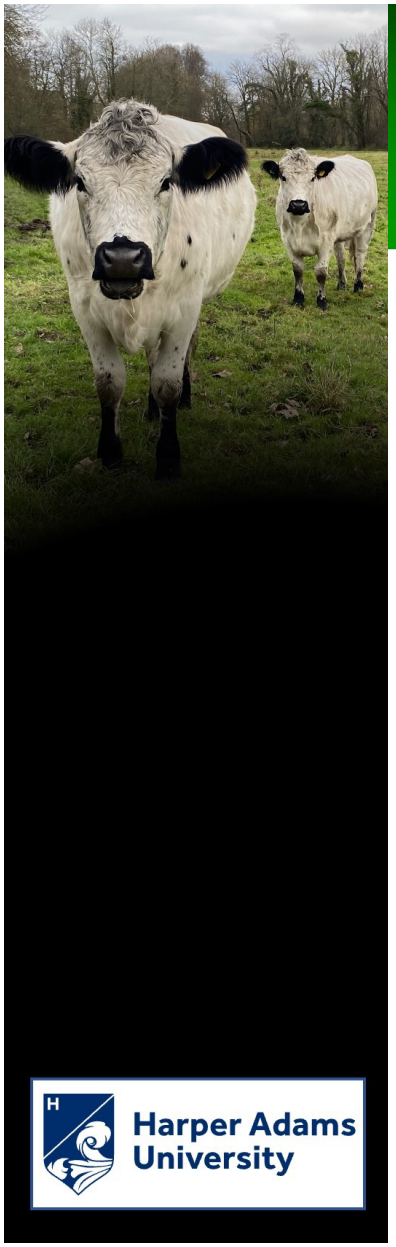

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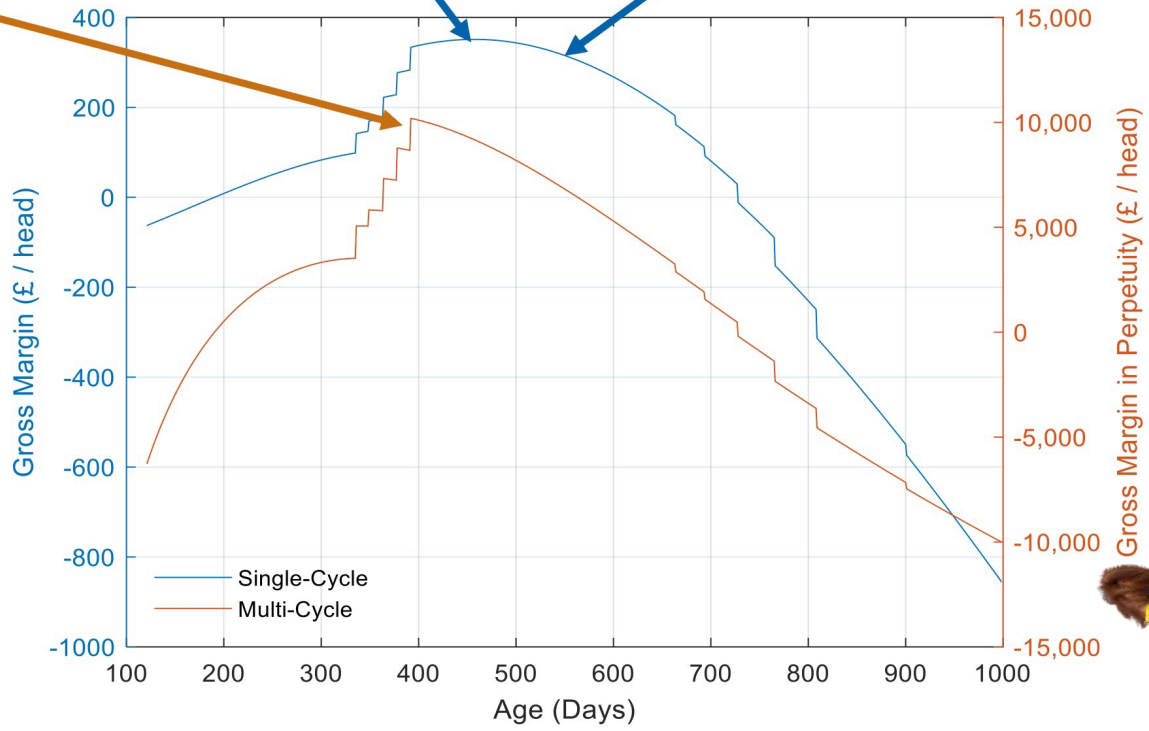
Economic analysis example

Max SCOM Profit: £351 (457 days; 302kg DW)

Actual Profit: £322 (541 days; 356kg DW)

Max MCOM Profit: £10,193 (392 days; 265kg DW)



MCOM profit gain compared to:

SCOM max: +£1015 (10% gain)

Actual: +£3112 (31% gain)

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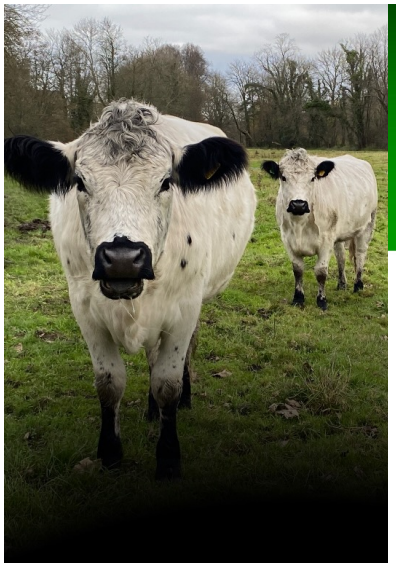

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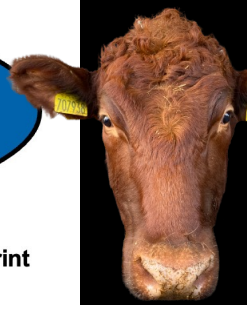
Results: Economic analysis

	Maximum Gross Margin (£/hd – finishing in perpetuity)		Slaughter weight (kg/head)		Slaughter age (days)	
	Mean	StDev	Mean	StDev	Mean	StDev
Actual	5094	3662	612	44	500	34
SCOM	7033	3442	531	53	438	44
MCOM	7372	3620	511	32	422	50

Changing from single-cycle to multi-cycle = 5% profit gain

Changing from actual to multi-cycle = 38% profit gain



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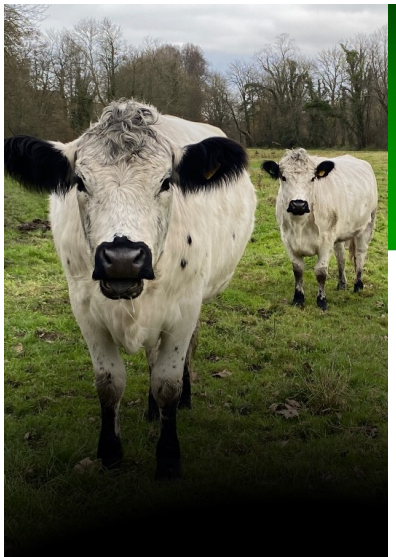

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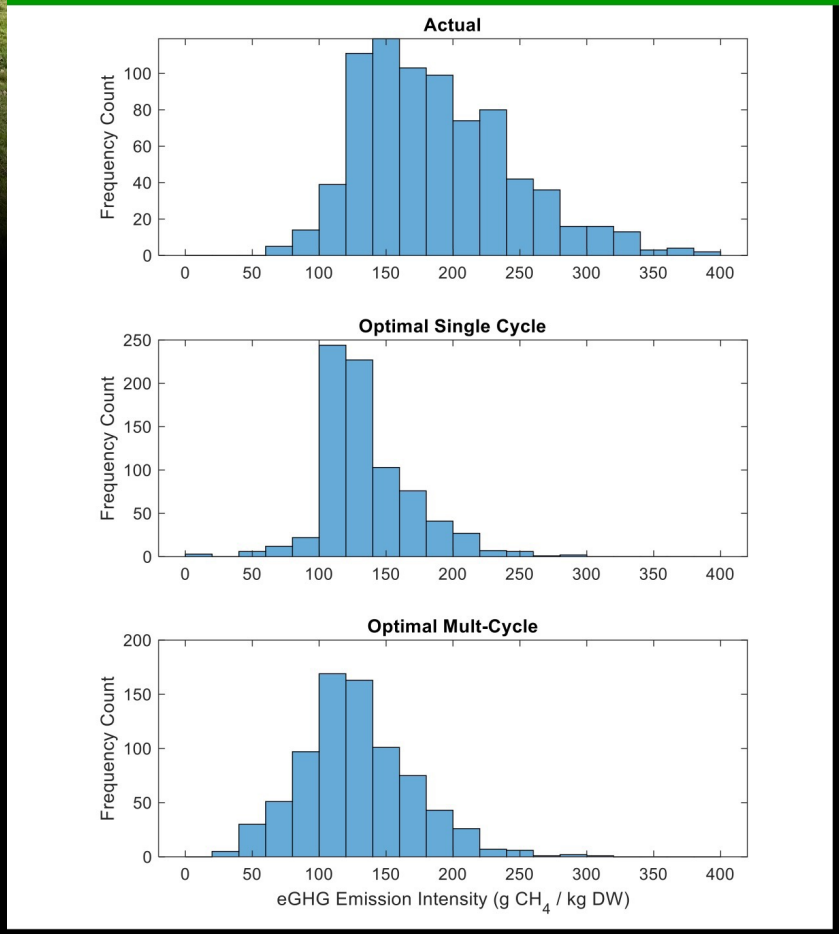
Results: Enteric methane emissions intensities reduced by SCOM and MCOM



Actual:
mean 188 g CH_4 per kg dwt

SCOM:
mean 135 g CH_4 per kg dwt
(-28%)

MCOM:
mean 127 g CH_4 per kg dwt
(-32%)

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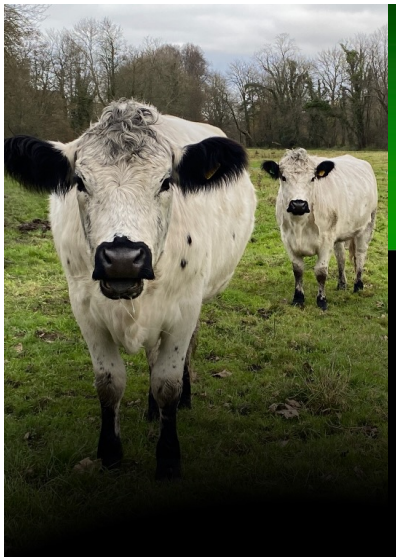

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Profitable Net Zero Beef? Key conclusions

Optimal (≠ heaviest) slaughter weight confers economic and environmental win:win

Greater variation emissions between individual cattle than between finishing system (housed vs. pasture)

Making multi-cycle decisions can considerably increase profits – but relies on data collection

Weighing cattle could pay dividends!

Next step – tool development

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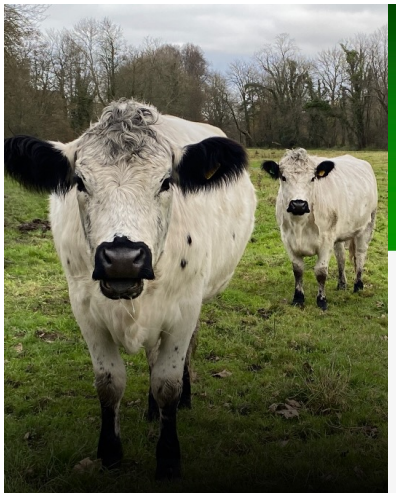

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Thank you!

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Questions?

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