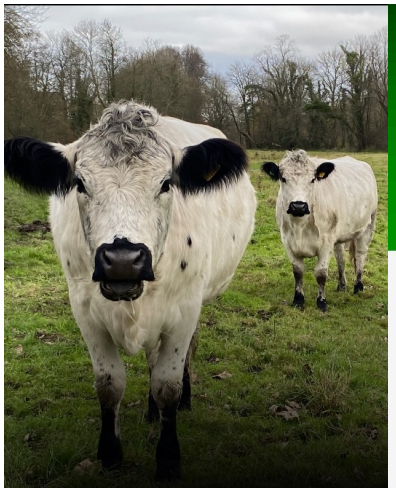
Net Zero for Red Meat Producers

5th October 2023

Source: Jude L. Capper, 2023

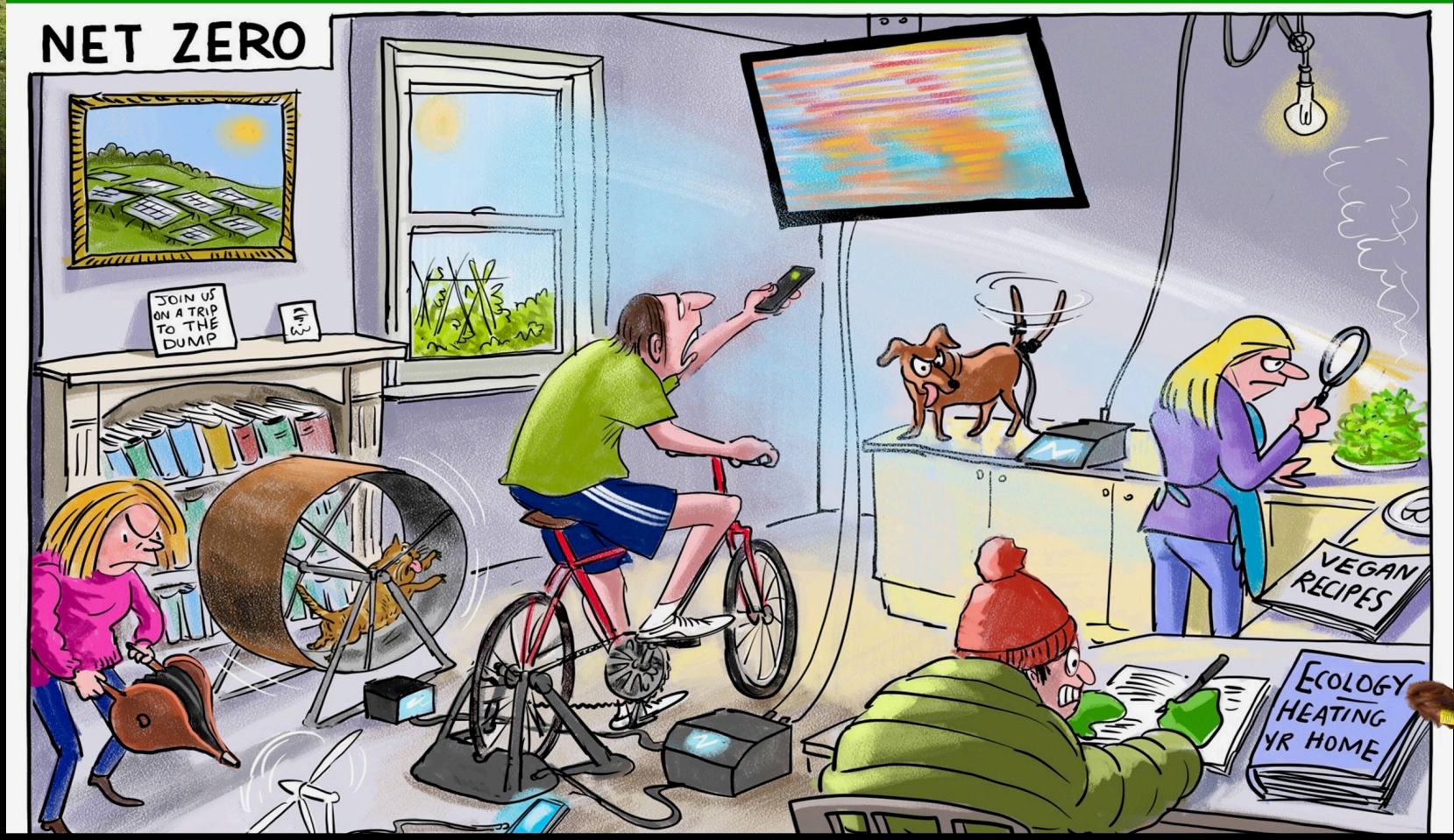
Net Zero for Red Meat Producers

Harper Adams University



S

Net Zero is a clear priority



Source: Created by Jude L. Capper, 2023. Cartoon from: https://twitter.com/Cartoon4sale/status/1384537729460056067?s=20

Net Zero for Red Meat Producers

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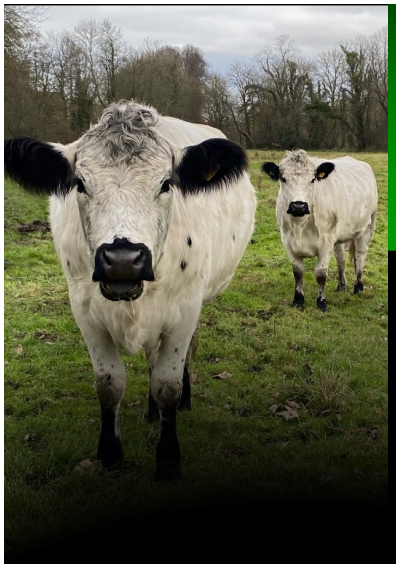
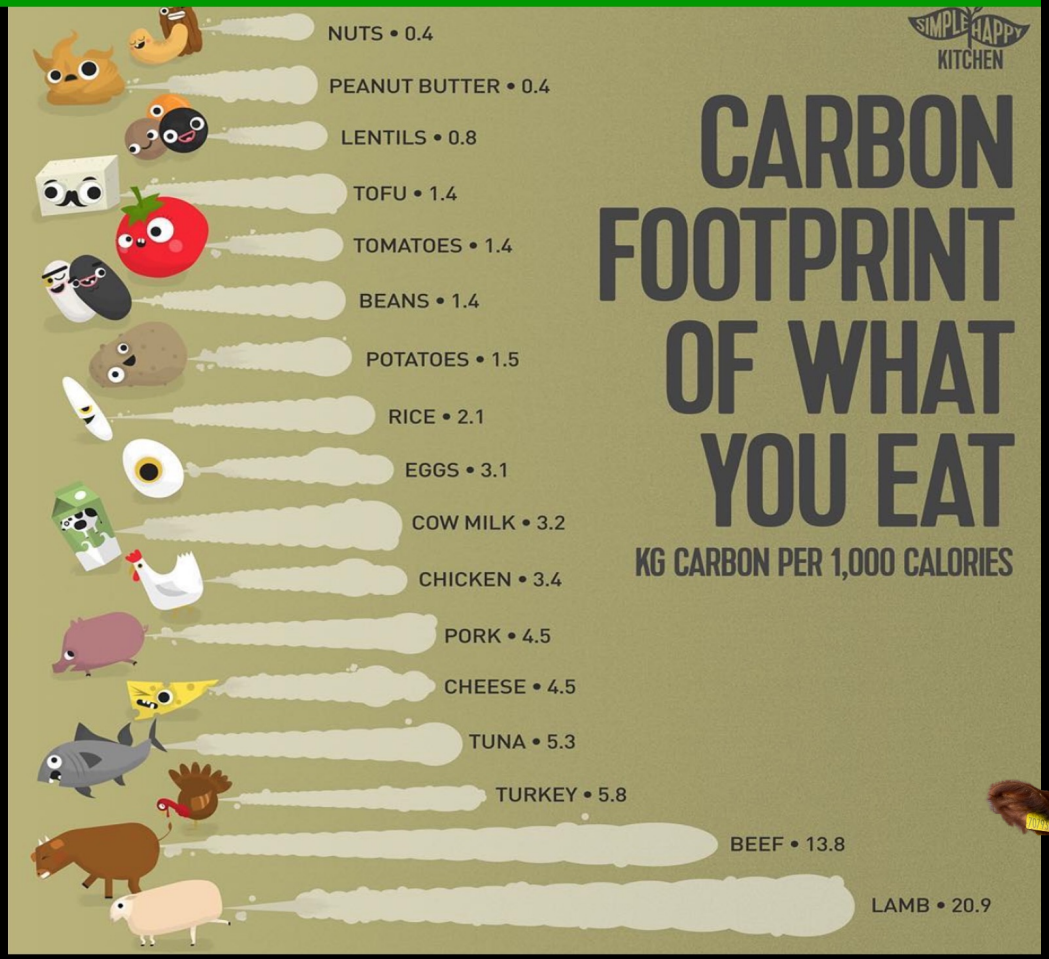


B

Global averages are meaningless

The carbon footprints of the foods we eat vary considerably – global average figures are inappropriate when food production is regional



Source: Created by Jude L. Capper, 2023. Infographic from https://www.instagram.com/simple_happy_kitchen/

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COM

Do 706,965 Veganuary participants in 2023 amount to more than a hill of beans?

- Total is equal to 1.95x the population of Coventry
- If all participants were based in the UK they would comprise 1.05% of the population
- Average of 3,663 per participating country
- 60% of participants already vegan, vegetarian or pescatarian

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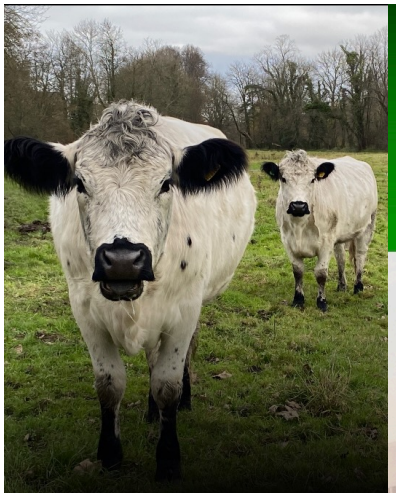
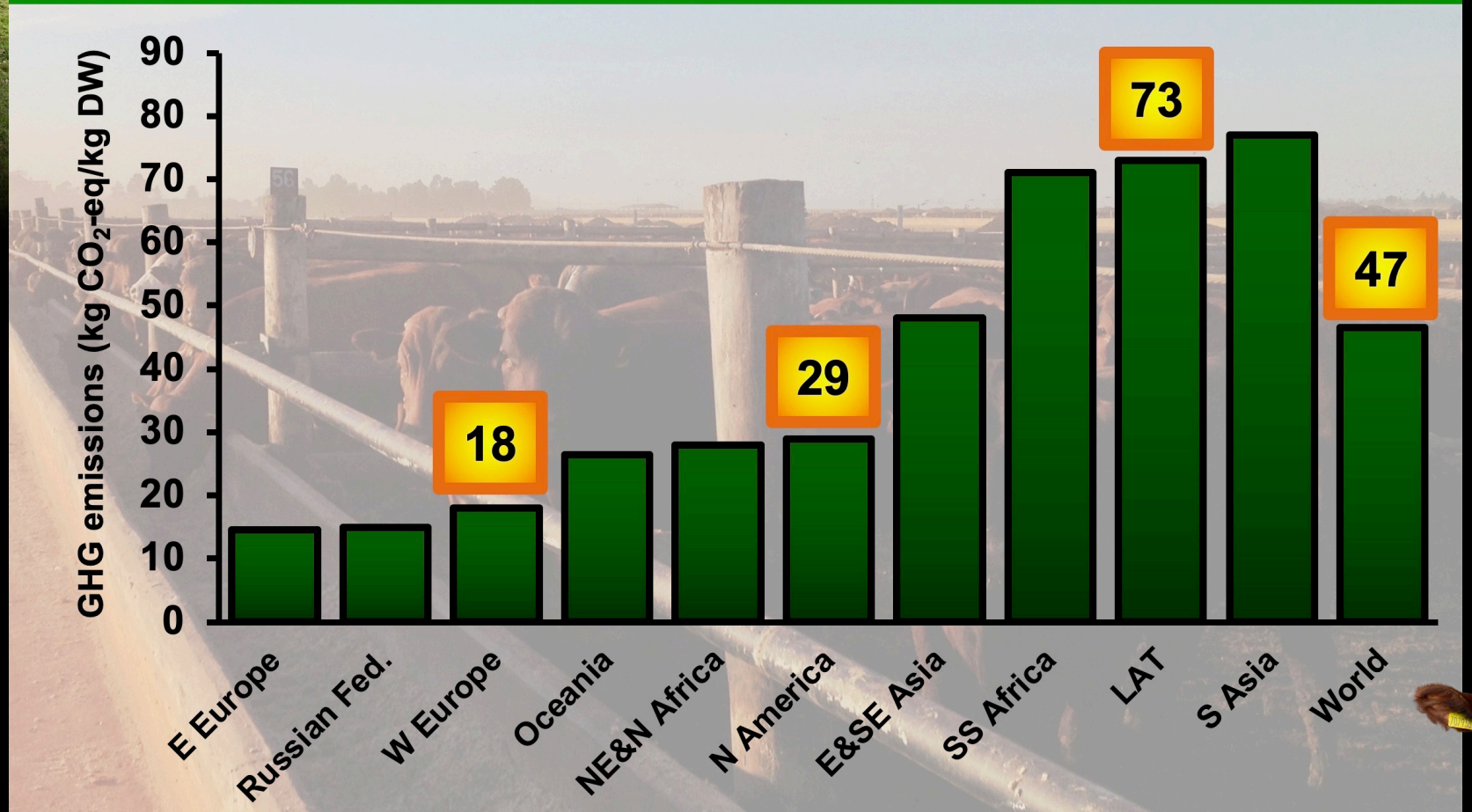
Source: Created by Jude L. Capper, 2023. Information from: https://veganuary.com/blog/

Net Zero for Red Meat Producers



B

The carbon footprint of beef production varies across the globe



Source: Created by Dr. Jude L. Capper, 2020; data from Gerber et al. (2013) Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities. FAO, Rome, Italy.

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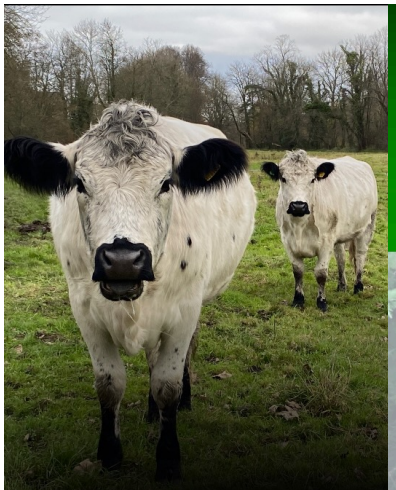

B

Improving animal productivity reduces the environmental impact of milk and meat

Total livestock
Total time

Land
Water
Fuel
GHG

Growth rate
Meat yield
Milk yield

£££

Net Zero for Red Meat Producers

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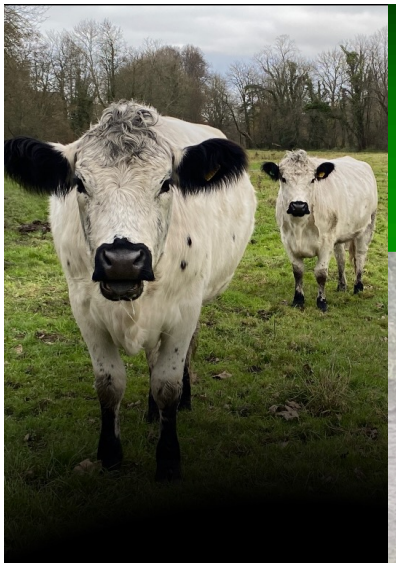
Source: Created by Dr. Jude L. Capper, 2020. Data from: Capper, JL. 2015. Sustainability and One Health. In: Cockcroft, P. *Bovine Medicine.* Wiley-Blackwell, Oxford, UK.



B

Reducing age at slaughter has both economic and environmental benefits

	23 mo	26 mo
Birth weight	40 kg	40 kg
Slaughter weight	670 kg	670 kg
Total gain	630 kg	630 kg
Age at slaughter	23 months	26 months
Daily liveweight gain	0.90 kg/d	0.80 kg/d
Maintenance feed needed	702 days	793 days

Source: Created as an example by Dr. Jude L. Capper, 2021.

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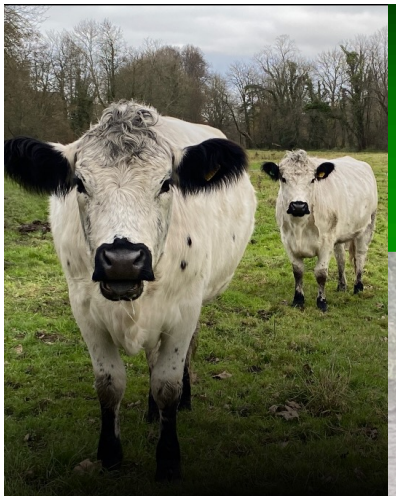
Net Zero for Red Meat Producers



B

Reducing age at slaughter has both economic and environmental benefits

91 fewer days of feed, land and greenhouse gases. Opportunity cost?

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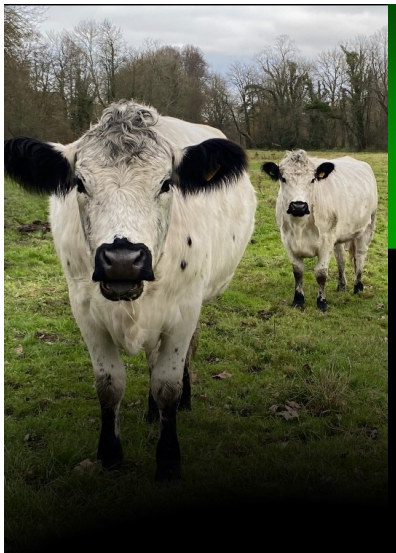

B

Finishing cattle earlier improves profit and cuts the carbon footprint

Modelling study involving 777 Angus cattle finished at ABP research farm.

Finishing at ideal time (not heaviest weight) improved profit by 45% and cut carbon footprints by 32%

Net Zero for Red Meat Producers

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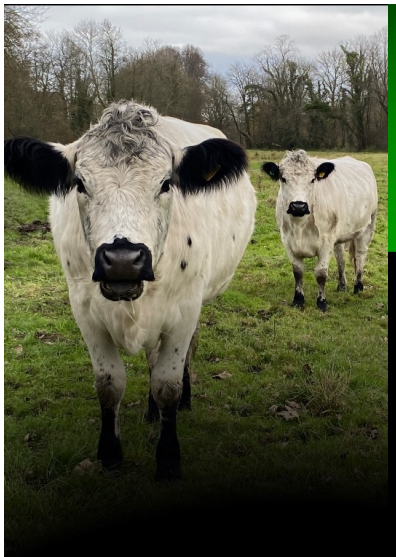
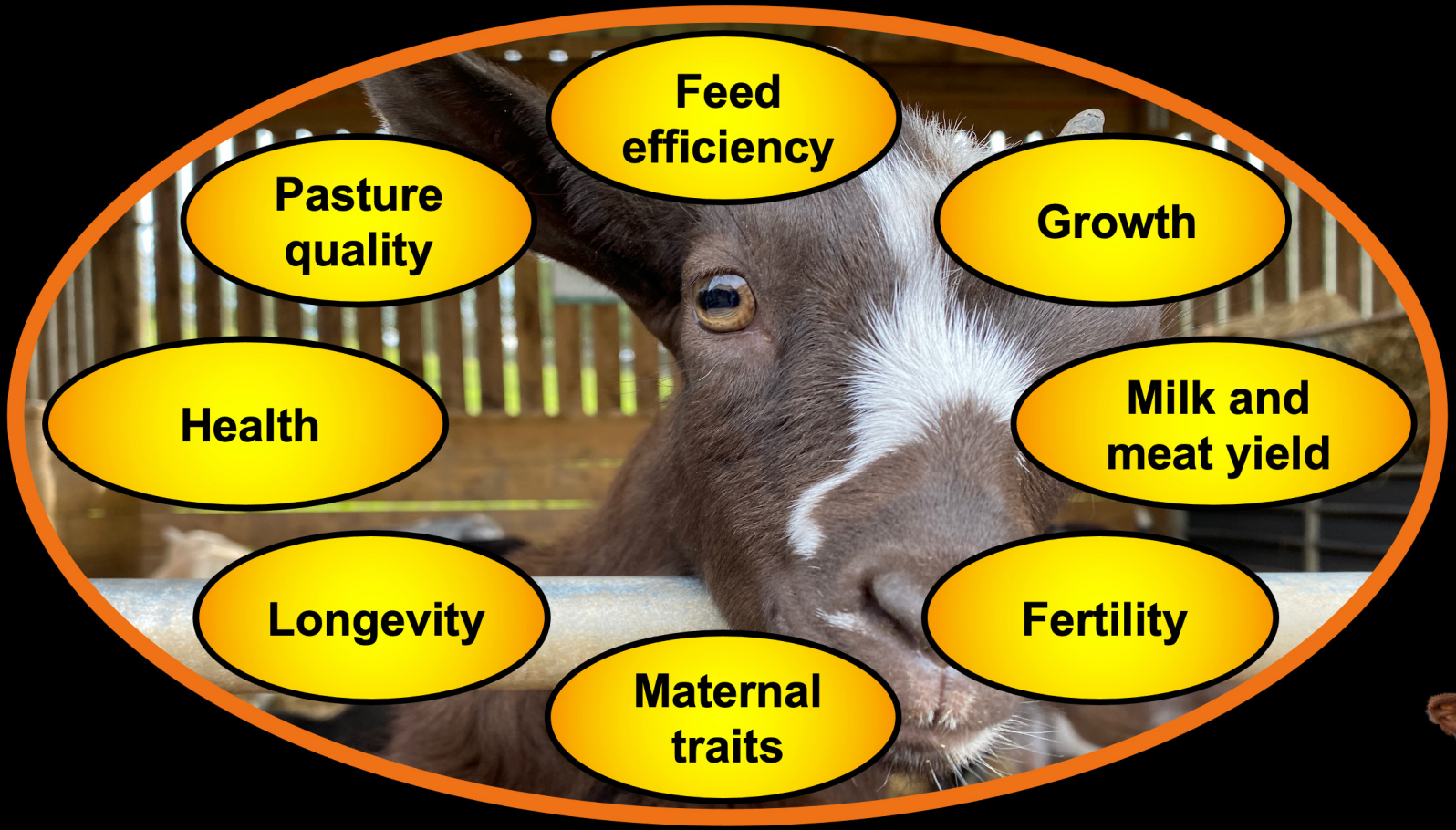
Source: Created by Jude L. Capper, 2023. Data from: Capper et al. 2023. Helping farmers navigate the green economy: A data-driven blueprint for net zero beef. British Society of Animal Science Annual Meeting. https://doi.org/10.1016/j.anscip.2023.01.515



B

Improving key performance indicators reduces environmental impacts



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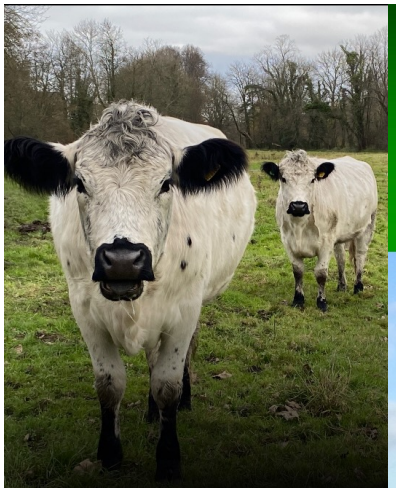
Source: Created by Dr. Jude L. Capper, 2021



B

Major sustainability challenge for the sheep industry – keeping lambs alive

Source: Created by Dr. Jude L. Capper, 2021

Harper Adams University

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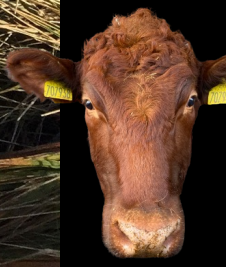


B

Data is sparse, but some key opportunities highlighted to decrease GHG

Finish lambs earlier = 16-24%

Lamb ewes as hoggets = 9-13%

Select for low methane = 8-10%

Select for litter size = 5-9%

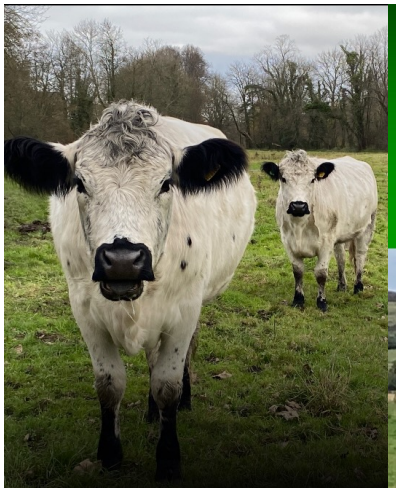
Improve ewe longevity = 1-6%

Note: Results are from multiple studies

Net Zero for Red Meat Producers

Harper Adams University

Source: Created by Dr. Jude L. Capper, 2021. Data from Jones et al. (2014) Journal of Agricultural Science: 152, 288–308.



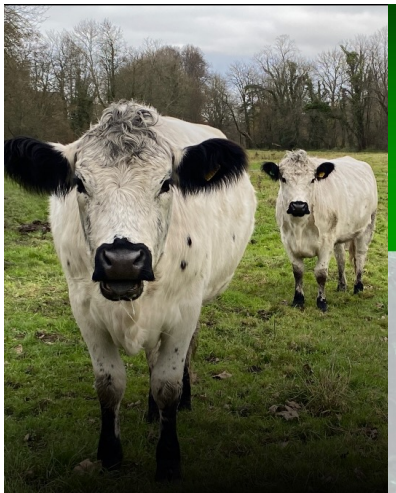
B

Can livestock farms reach net zero?

Source: Created by Jude L. Capper, 2023

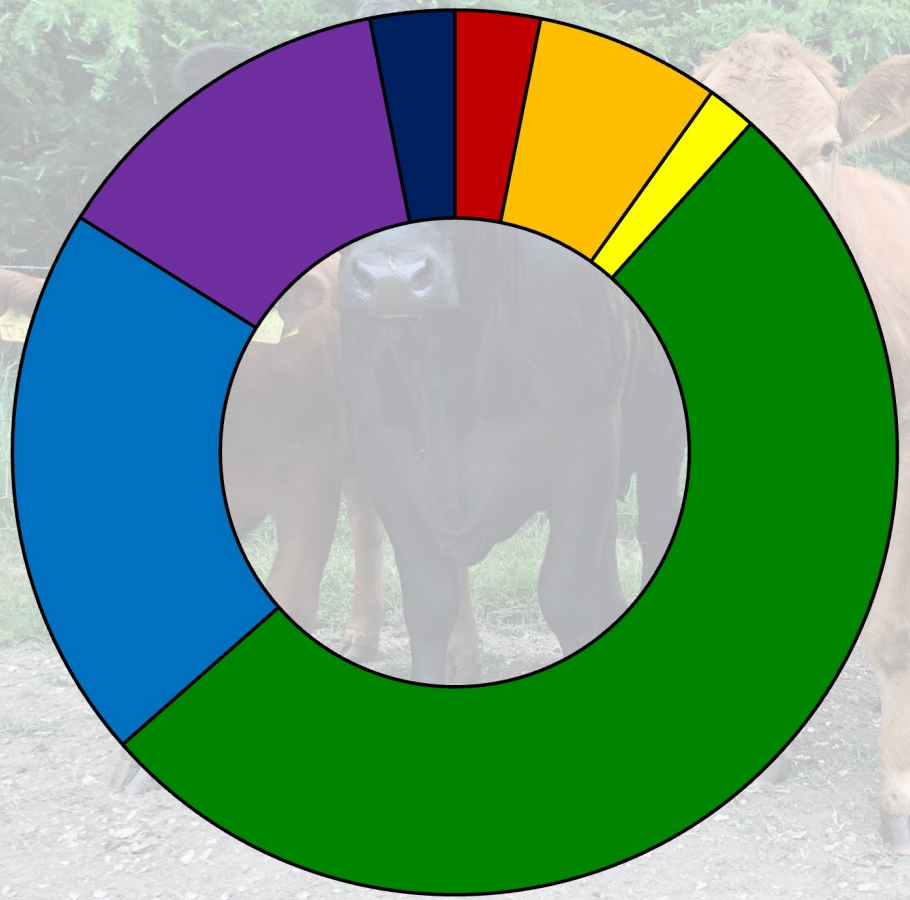
Harper Adams University

Net Zero for Red Meat Producers



B

Example carbon footprint - beef



- Fuels
- Feed
- Bedding
- Enteric fermentation
- Manure
- Fertiliser
- Other

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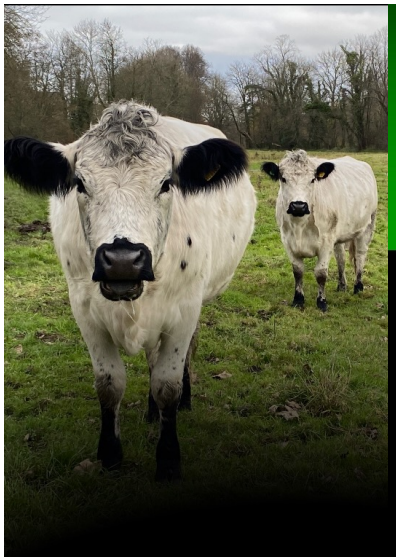
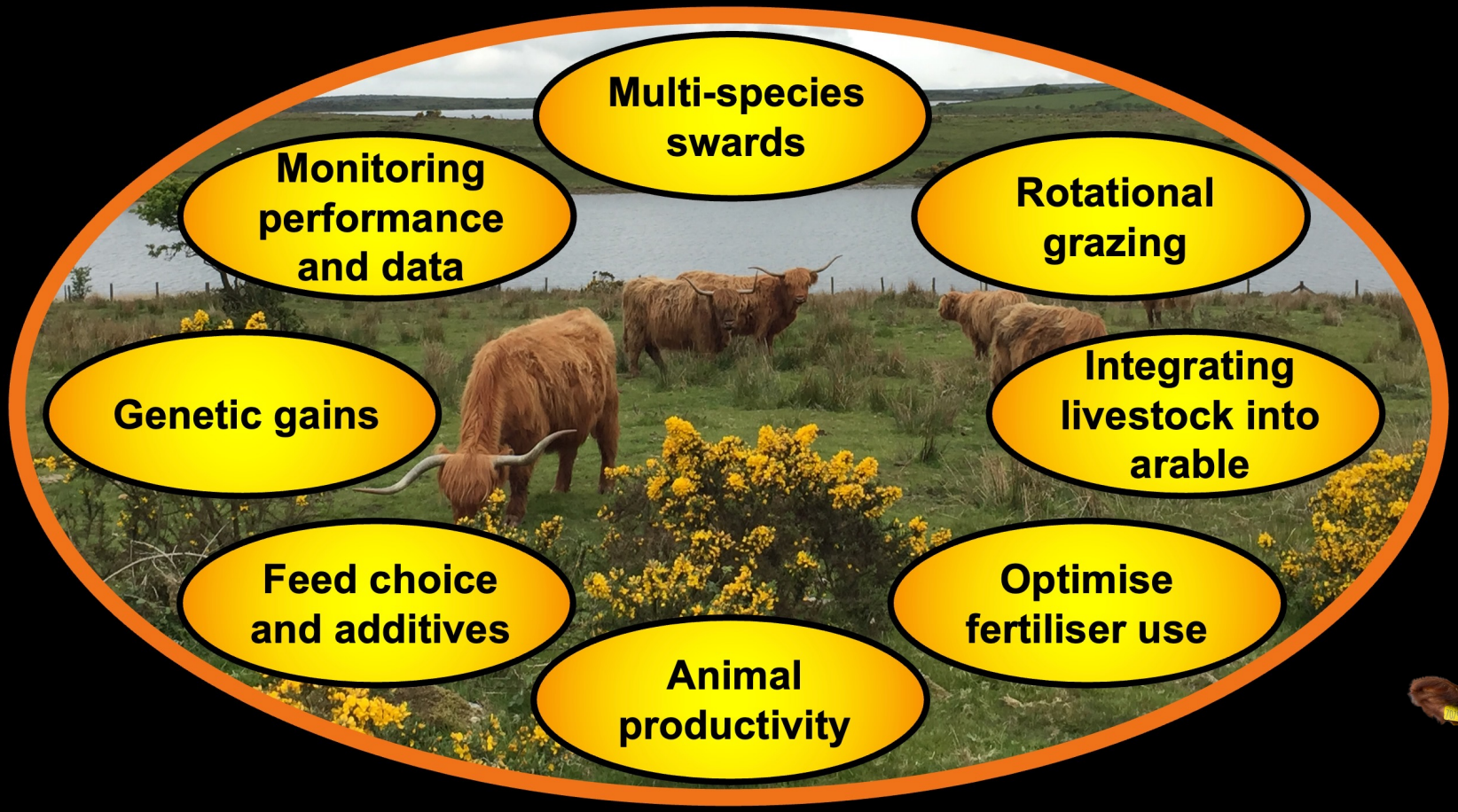
Source: Created by Jude L. Capper, 2023. GHGe depicted are for Agrecalc average suckler beef operations that finishing their cattle as of 3/10/23.



B

Key actions that can be implemented on farm to reduce carbon footprints



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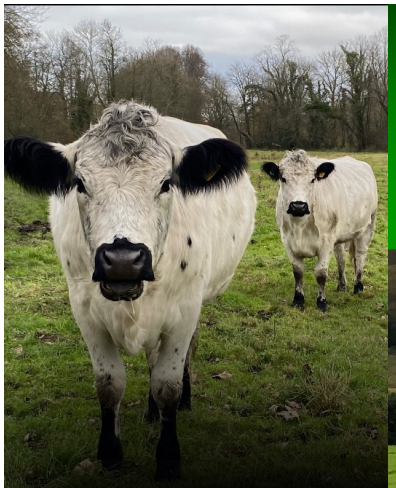
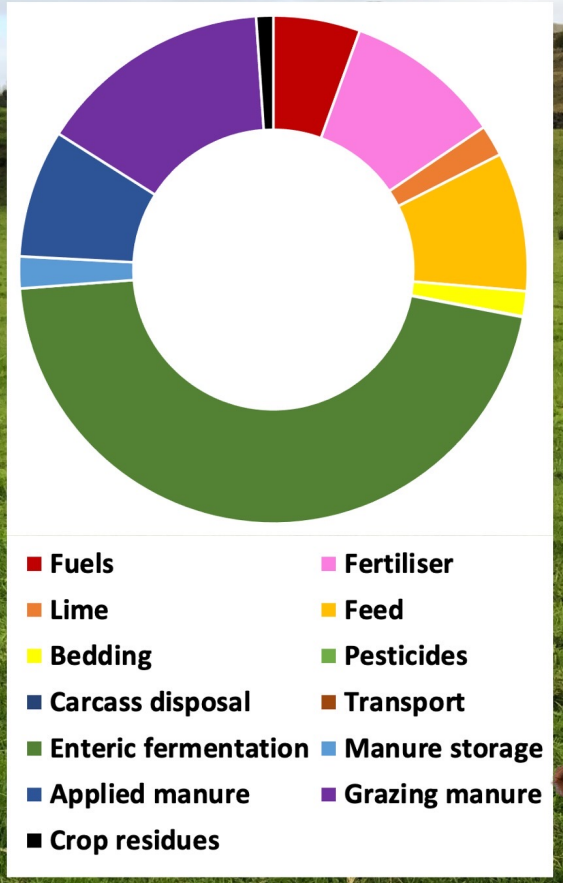
Source: Created by Jude L. Capper, 2023



S

Standard footprinting tool urgently needed across the industry



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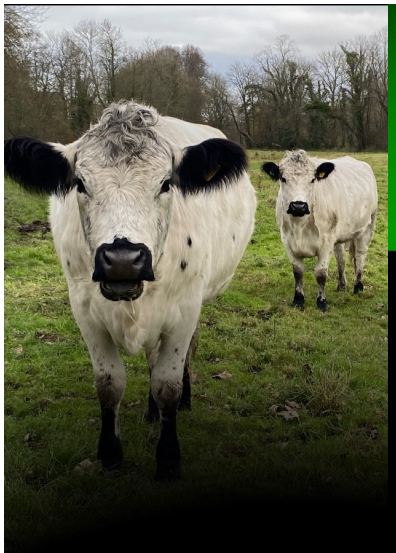
Source: Created by Jude L. Capper, 2023. Example carbon footprint results based on a beef finishing farm.



B

GHG benefits of dairy-beef now recognized – sucklers will need to demonstrate benefits

Annual requirements of one suckler cow:

- **3,954 kg feed DM**
- **20,047 litres water**
- **2,459 kg CO_2**

Need to justify these impacts *vs.* beef from dairy.

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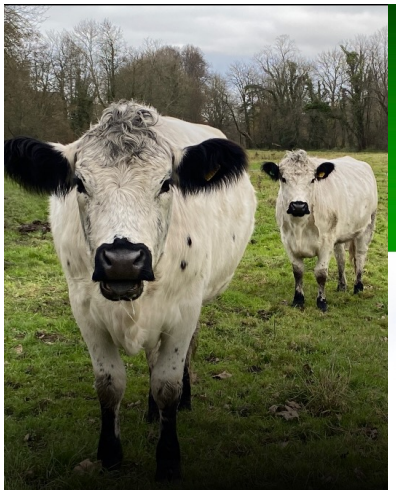
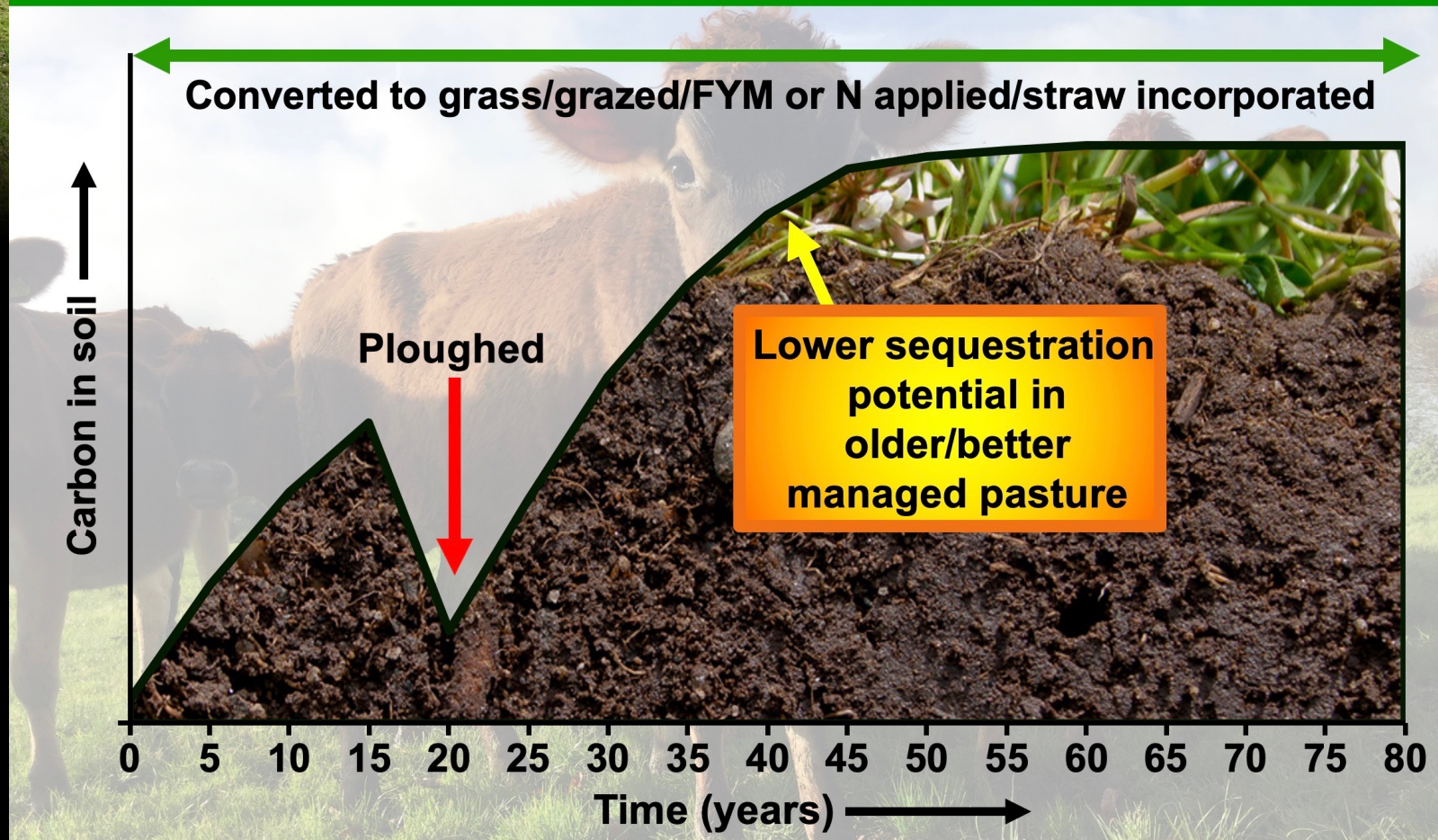
Source: Created by Jude L. Capper, 2023. Calculation based on feed and water requirements of one Angus cow weighing 544 kg producing 7.8 kg of milk per day, with calf weaned at 207 days of age.



Carbon sequestration offers promise – but isn't a magic bullet



Source: Created by Dr. Jude L. Capper, 2020 as an example of soil carbon sequestration. Data from: Poulton et al. (2017) *Global Change Biology.*

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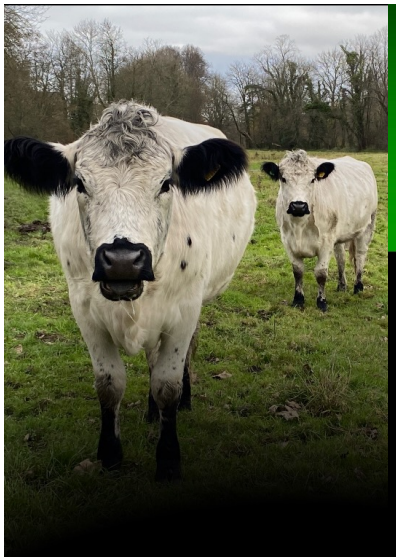
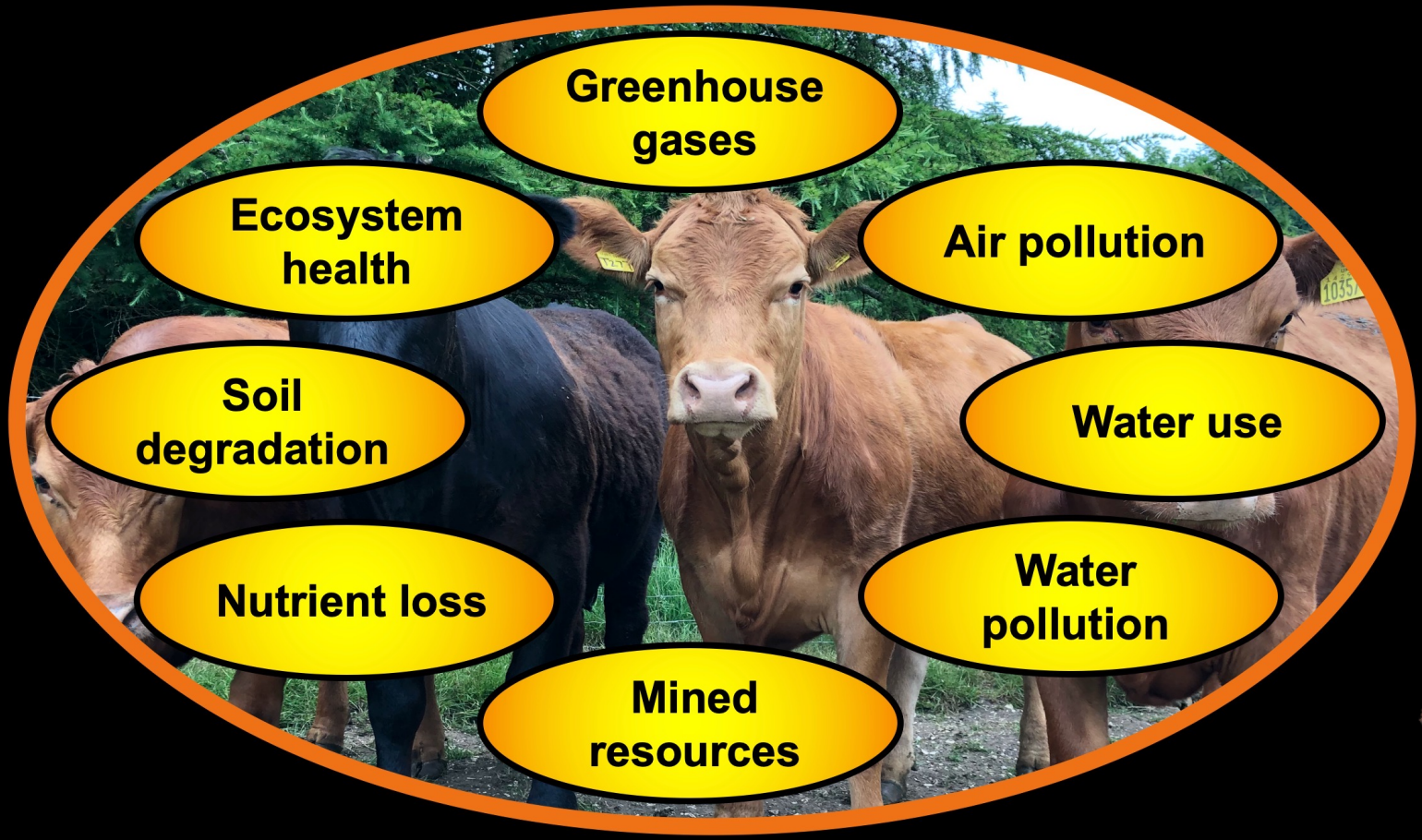


B

Environmental impacts are not limited to greenhouse gas emissions



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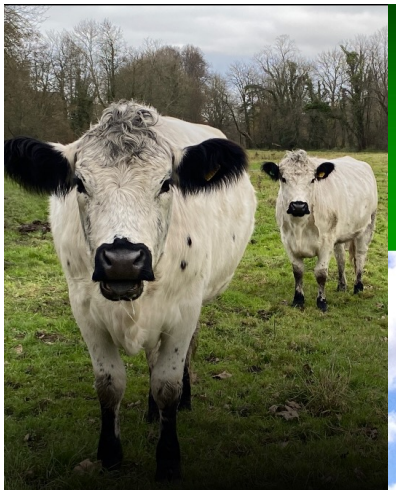

S

Can we grow human food crops everywhere?

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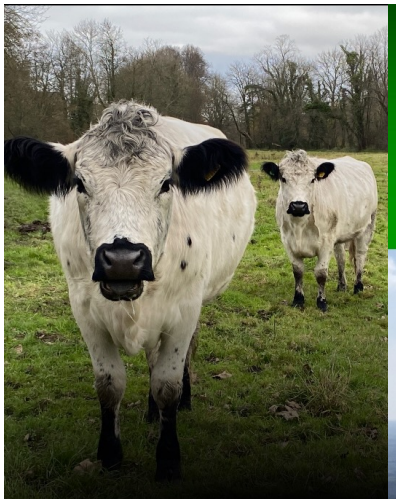
Source: Created by Jude L. Capper, 2023



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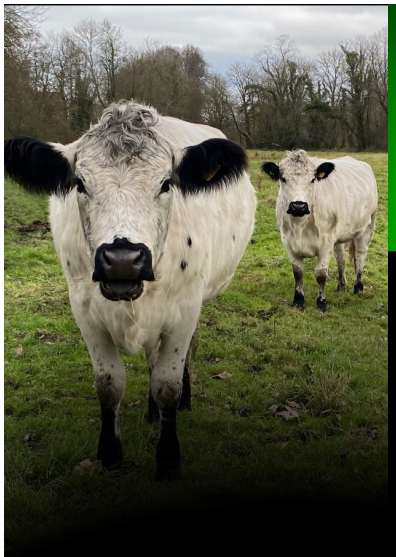

S

>60% of UK land is not suitable for growing arable crops

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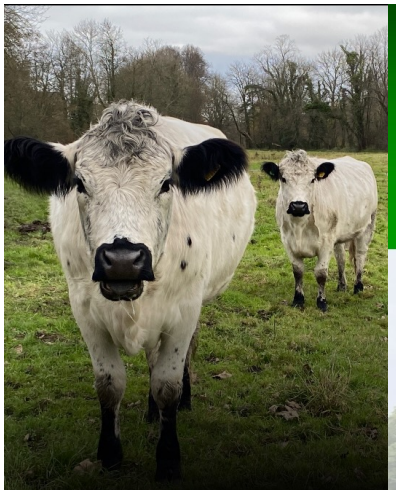
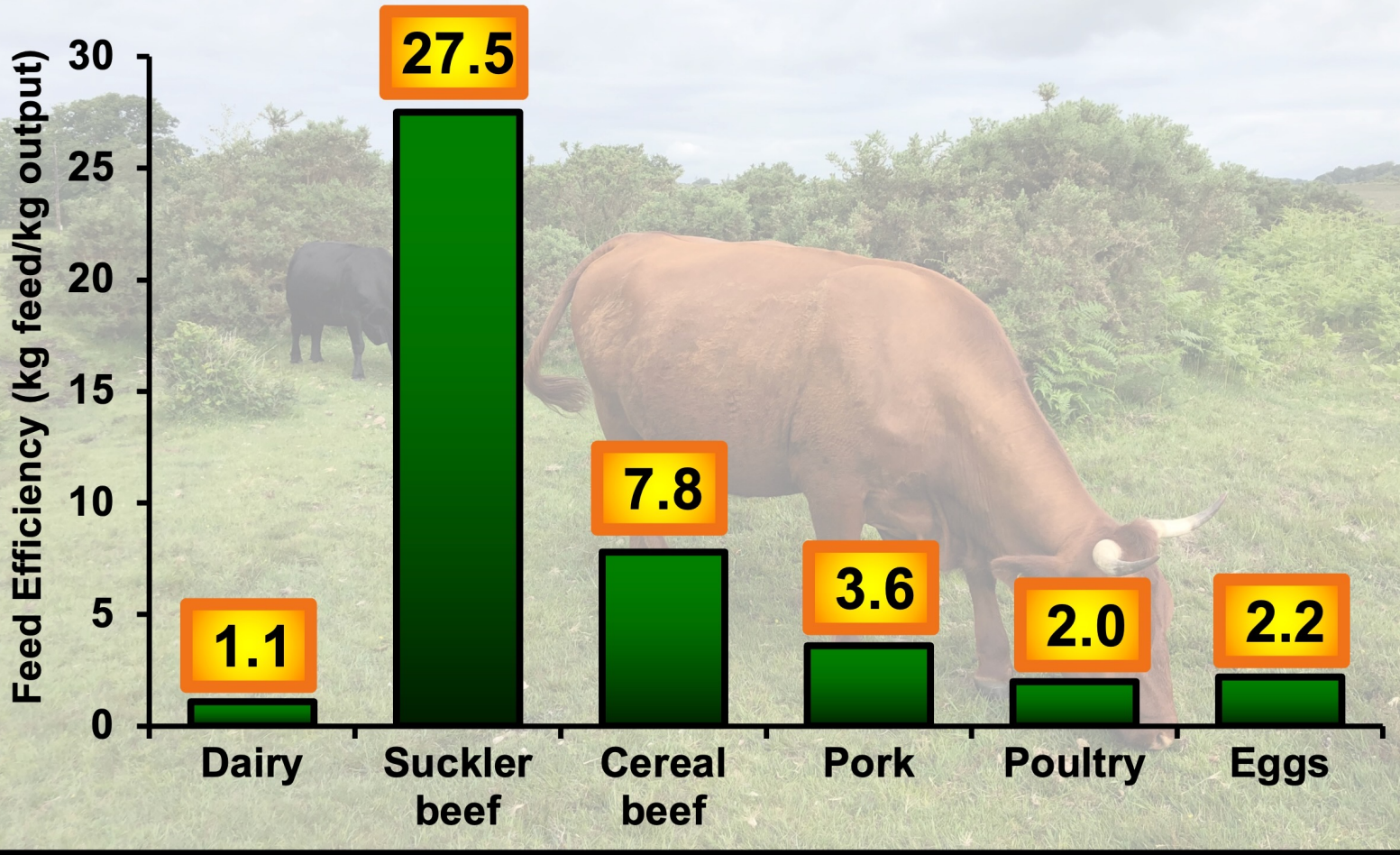
Source: Created by Jude L. Capper, 2023. Grazing land includes temporary grass on arable land (5% of total). Data from DEFRA. 2020. Farming statistics - provisional crop areas, yields and livestock populations at 1 June 2020 – United Kingdom.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/946161/structure-jun2020final-uk-22dec20.pdf



Feed efficiency ratios vary between systems and species



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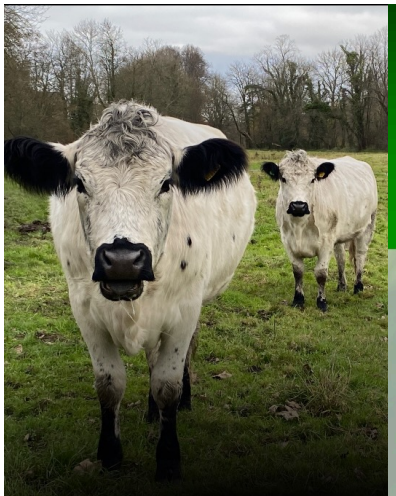
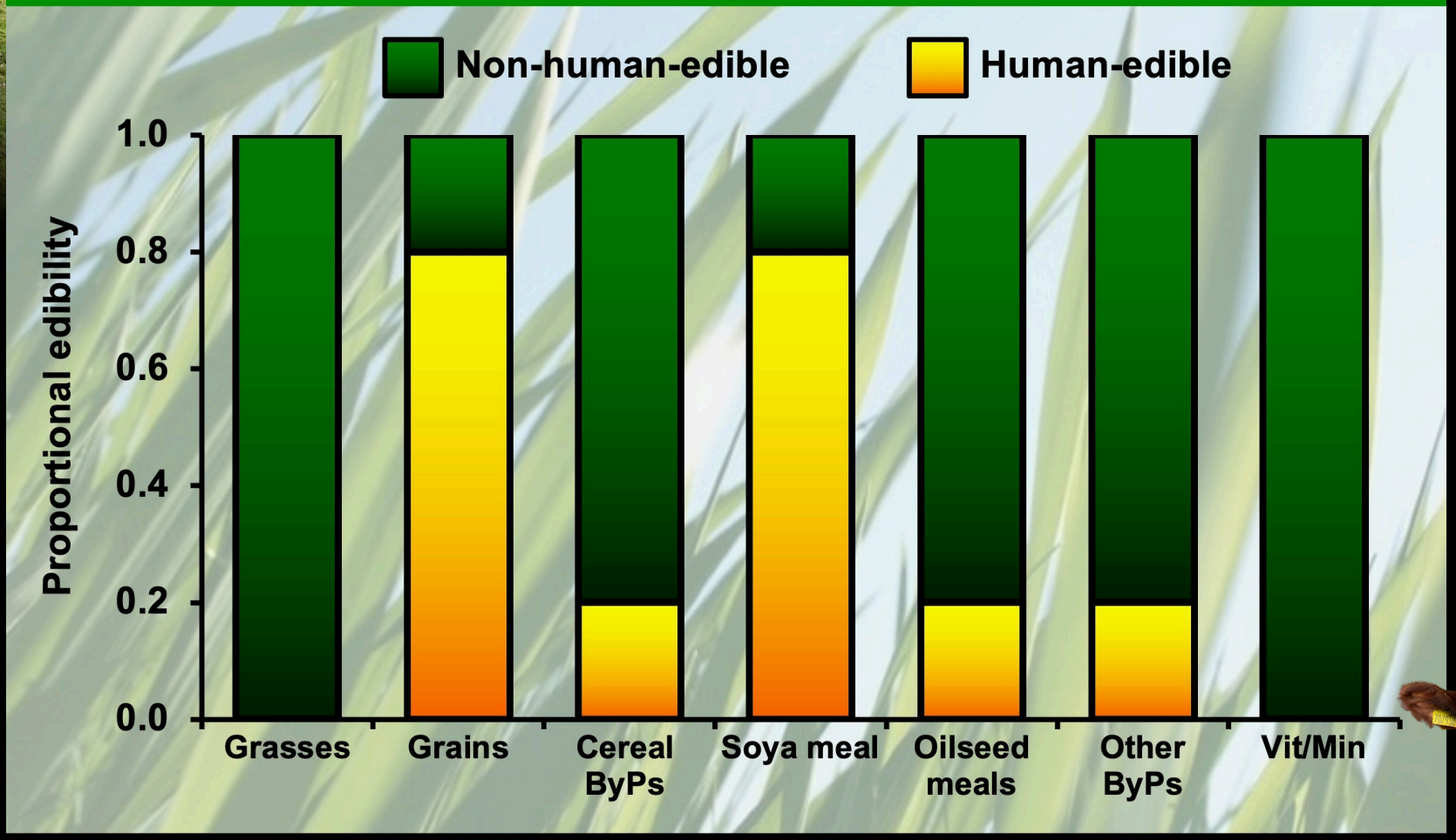
Source: Created by Jude L. Capper, 2023; data from Wilkinson (2011) https://doi.org/10.1017/S175173111100005X



S

Feed efficiency metrics must consider competition for human-edible foods



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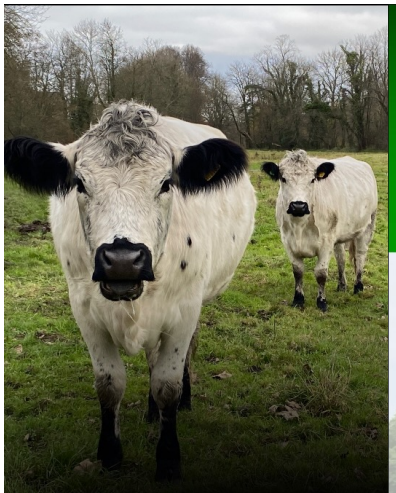
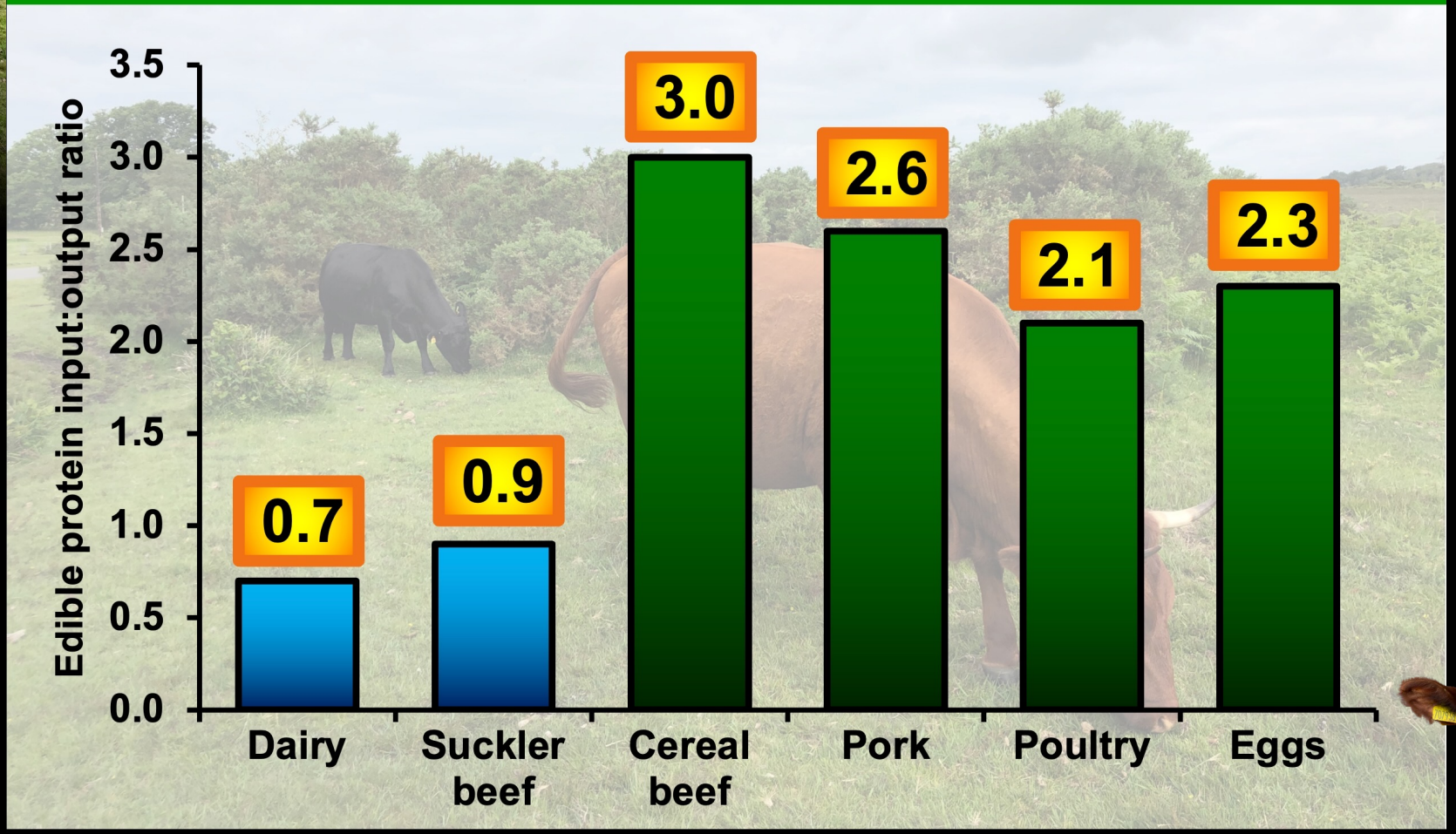


S

Grazing cattle systems produce more human-edible protein than they consume



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Source: Created by Jude L. Capper, 2023; data from Wilkinson (2011) Re-defining efficiency of feed use by livestock. *Animal.*

S

Removing cattle from pasture disadvantages ground-nesting birds

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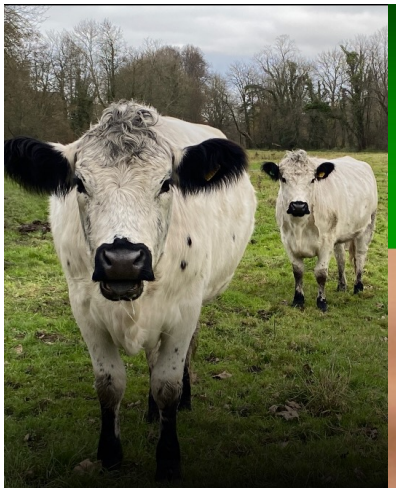
Source: Created by Jude L. Capper, 2023. Photo from Odd Falch https://www.pexels.com/photo/brown-bird-on-brown-grass-12084162/



S

Dung beetles have myriad ecosystem benefits

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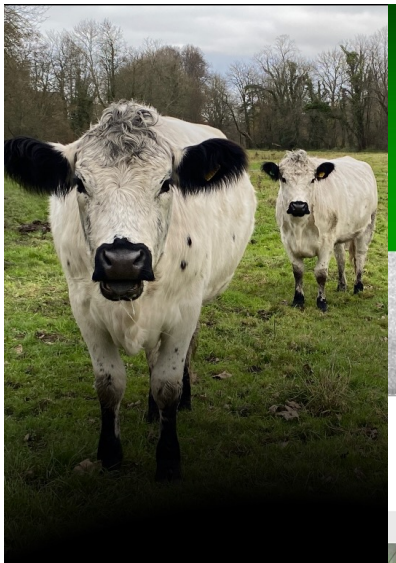
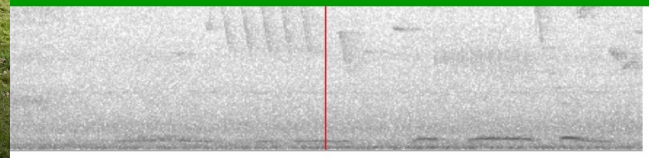


S

Merlin app is a great example of ecosystem data gathering



00:04.55

BEST MATCHES


Common Chaffinch


Common Wood-Pigeon


Eurasian Wren


European Goldfinch


Eurasian Blackbird

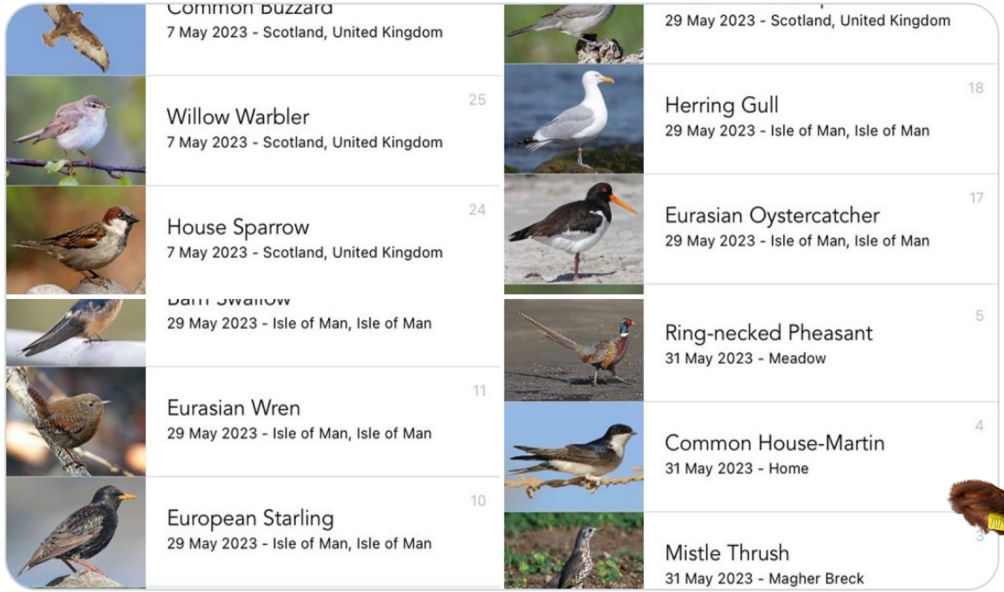

Eurasian Collared-Dove


European Robin

Anna Kerruish @ManxShepherdess · May 31

Slightly addicted to the **#merlin app**, to the point that there's an on farm competition. Whoever gets most **birds** by 14/6 gets a box of French Fancies 🧁

Now leaving my phone at the gate of each field while I drive the quad round checking sheep, because I'm that competitive 😂



Manx Wildlife Trust

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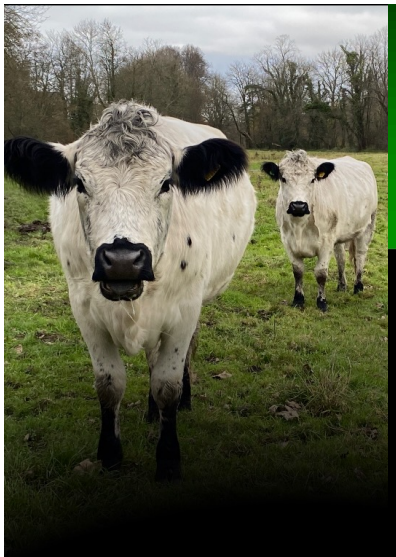
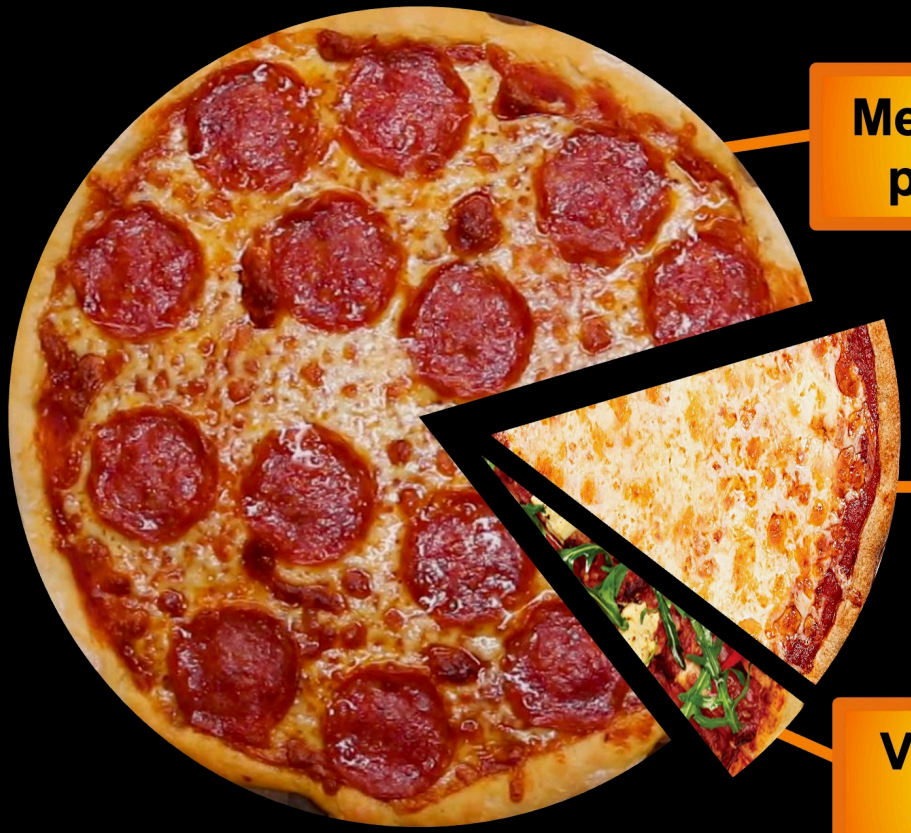
Source: Created by Jude L. Capper, 2023. Screenshots from Merlin app and Twitter.



B

The future probably isn't vegan, but it may be flexitarian?



Meat-eater (78%) or pescatarian (3%)

Flexitarian (15%)

Vegetarian (3%) or vegan (1%)

Net Zero for Red Meat Producers

Harper Adams University

Source: Created by Jude L. Capper, 2023. Data from YouGov (2019) Is the future of food flexitarian? https://yougov.co.uk/topics/resources/articles-reports/2019/03/18/future-food-flexitarian Question: *"Which, if any, of these best describes your usual eating habits?"* Results adjusted for people who answered "don't know" (3%) or "other" (3%).

COM

Guilt is a primary motivator for people considering going vegetarian or vegan

"I sometimes feel guilty when consuming meat and dairy products"

66% of meat-eaters and flexitarians thinking of giving up meat said "yes" compared to 25% of national population

Net Zero for Red Meat Producers

Harper Adams University

Source: Created by Jude L. Capper, 2023. Information from YouGov (2019) Is the future of food flexitarian? https://yougov.co.uk/topics/resources/articles-reports/2019/03/18/future-food-flexitarian

CV

New CREDS report puts transport, energy and food choices into context

Top 10 options for reducing your carbon footprint

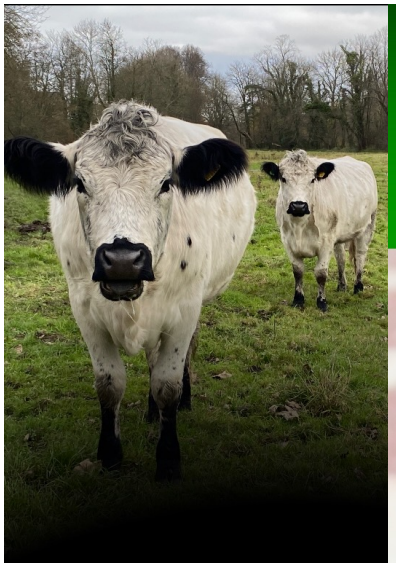
1	2.04	Live car-free
2	1.95	Battery electric vehicle
3	1.68	One less flight (long-haul return)
4	1.6	Renewable electricity
5	0.98	Public transport
6	0.895	Refurbishment and renovation
7	0.8	Vegan diet
8	0.795	Heat pump
9	0.65	Improved cooking equipment
10	0.64	Renewable-based heating

C R E D S

Net Zero for Red Meat Producers

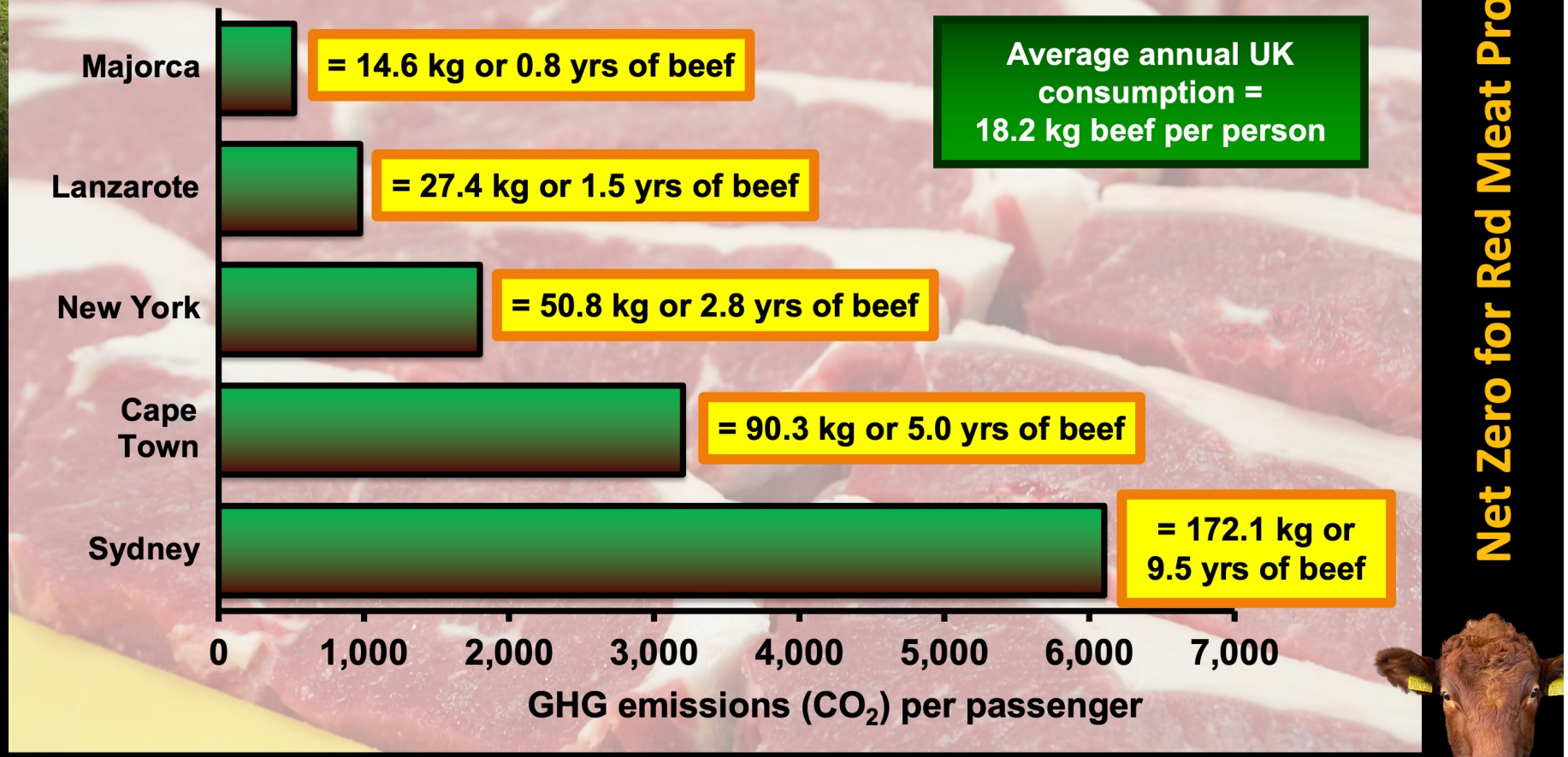
Harper Adams University

Source: Created by Jude L. Capper, 2023. Infographic adapted from Centre for Research into Energy Demand Solutions (2020). Available at: https://twitter.com/CREDS_UK/status/1262984570175176704?s=20



CV

International flights emit considerable quantities of carbon compared to beef production



Net Zero for Red Meat Producers

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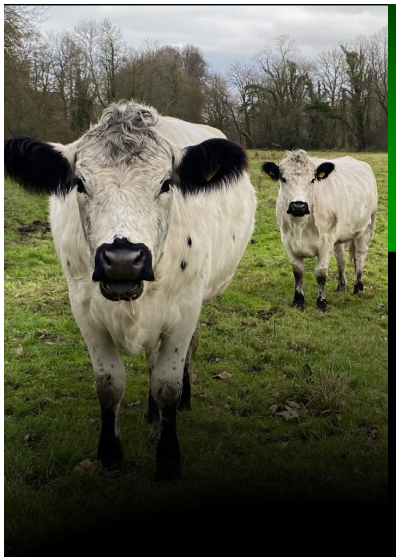
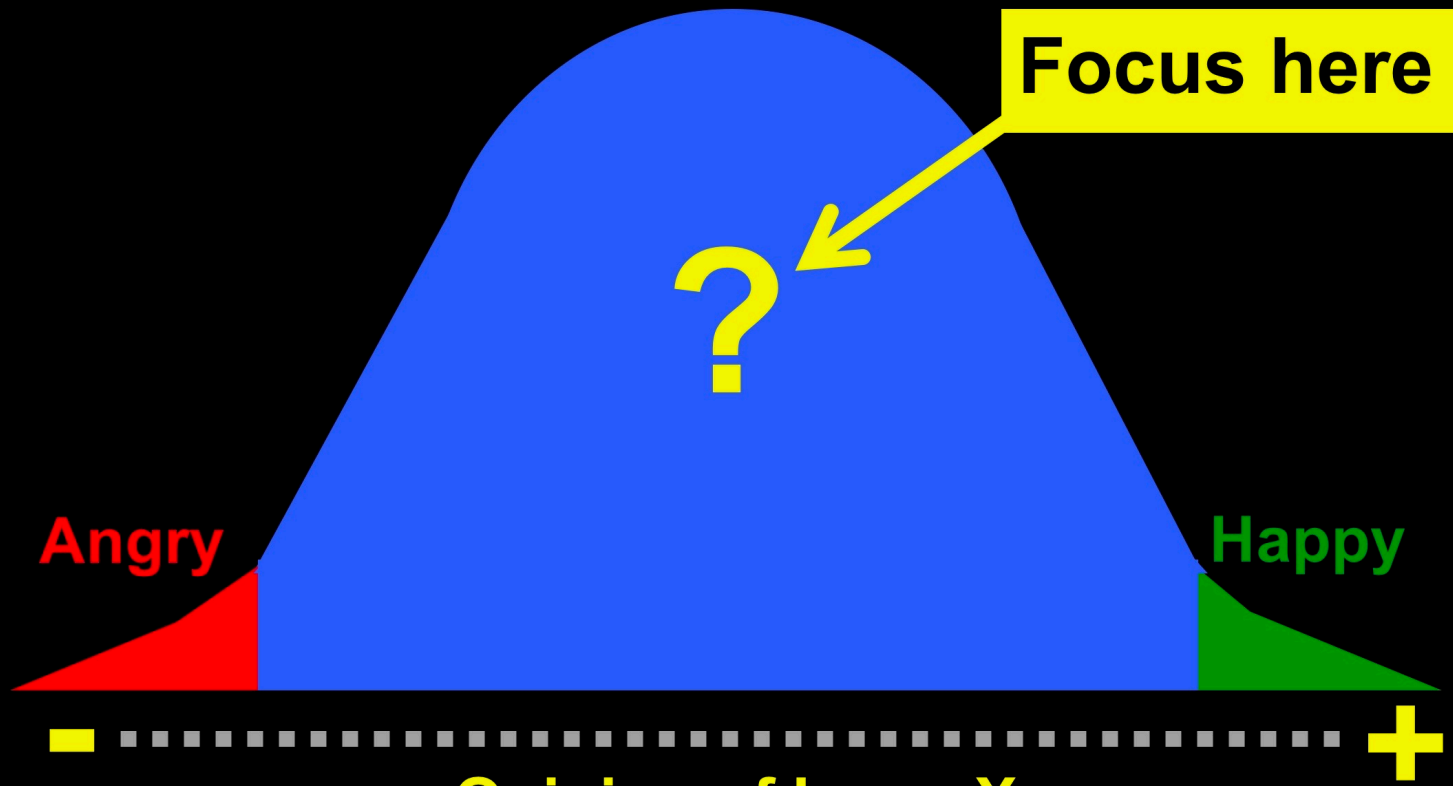
Source: Created by Jude L. Capper, 2023. Calculations based on GHG emissions flight data from: https://co2.myclimate.org/en/flight_calculators/new and on a carbon footprint per kg of boneless beef of 35.5 kg CO2-eq (under GWP100) from AHDB: http://beefandlamb.ahdb.org.uk/wp-content/uploads/2013/05/p_cp_down_to_earth300112.pdf



COM

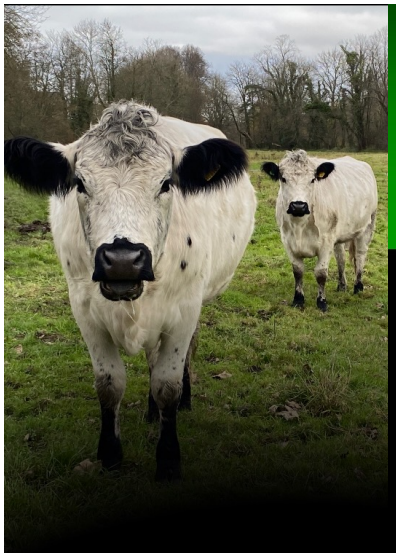
We need to communicate with consumers who don't yet have fixed opinions of agriculture



Net Zero for Red Meat Producers

Harper Adams University

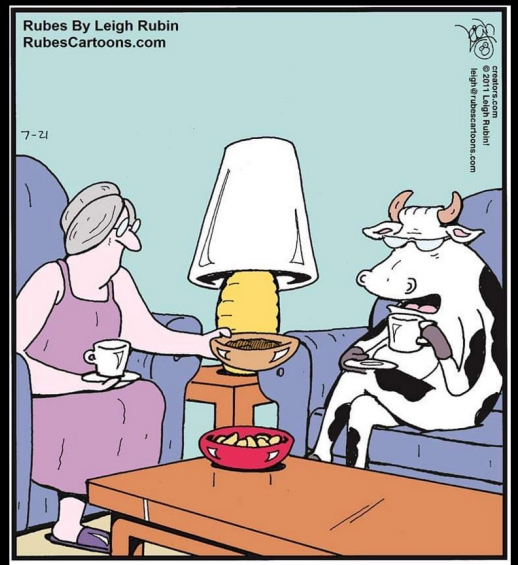
Source: Created by Dr. Jude L. Capper, 2017



B

Thank you!

JCapper@Harper-Adams.ac.uk



"No more bean dip for me, dear. I'm trying to reduce my carbon footprint."

Questions?

Net Zero for Red Meat Producers

Harper Adams University

Source: Created by Dr. Jude L. Capper, 2021. Cartoon from: http://RubesCartoons.com