



Net Zero for Red Meat Producers

5th October 2023

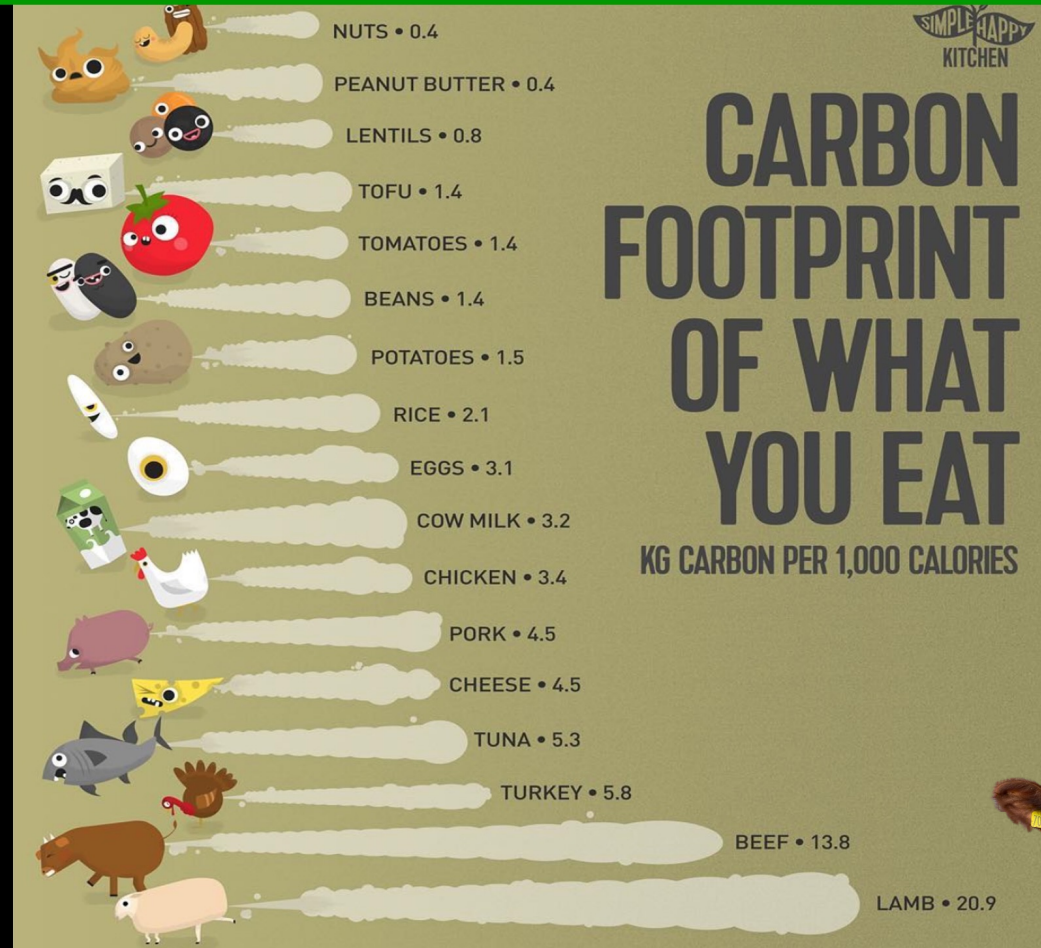
Source: Jude L. Capper, 2023



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



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



COM

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

**JOIN THE
NEW YEAR'S
REVOLUTION**



- 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



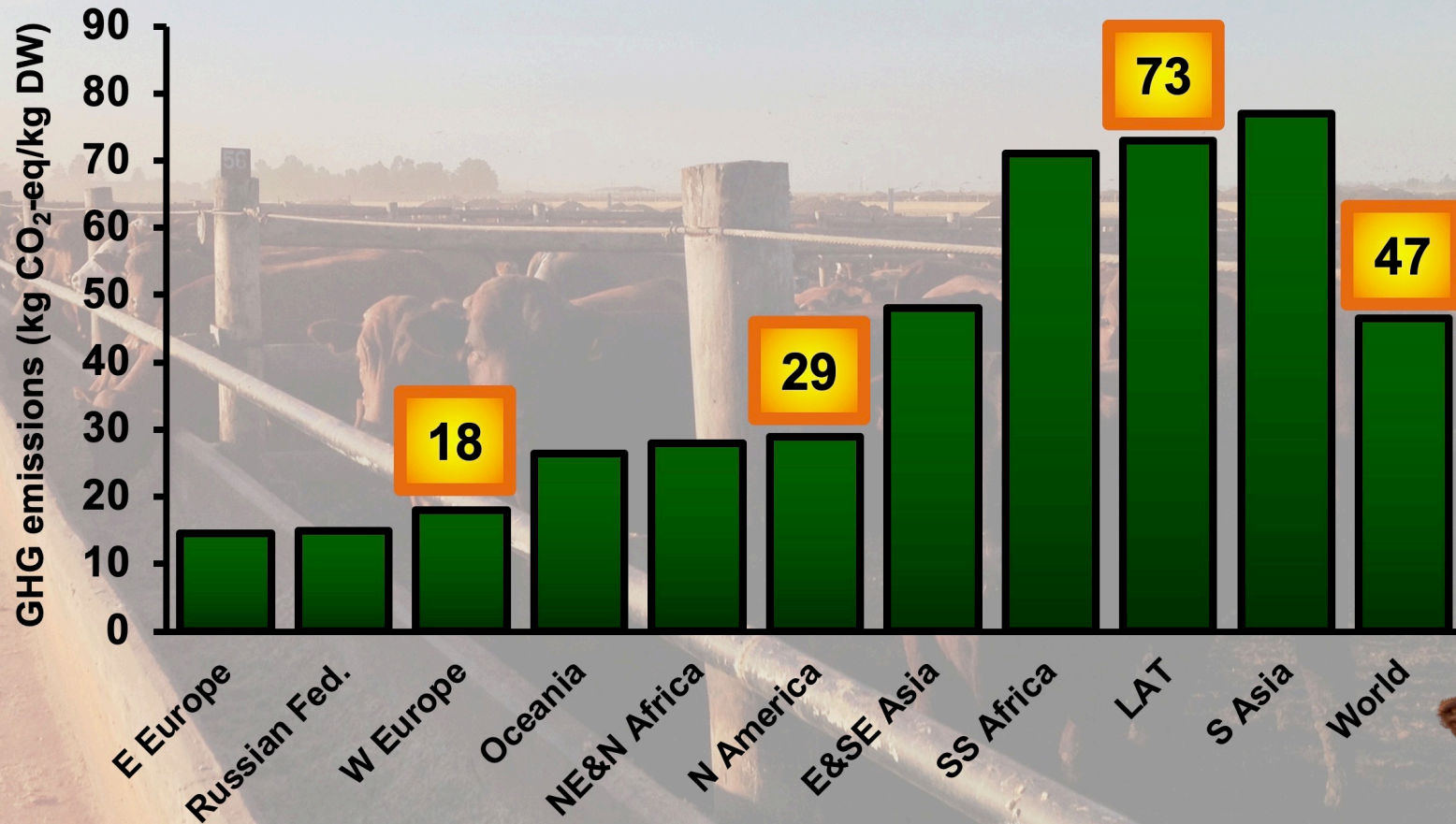
Source: Created by Jude L. Capper, 2023. Information from: <https://veganuary.com/blog/>

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The carbon footprint of beef production varies across the globe

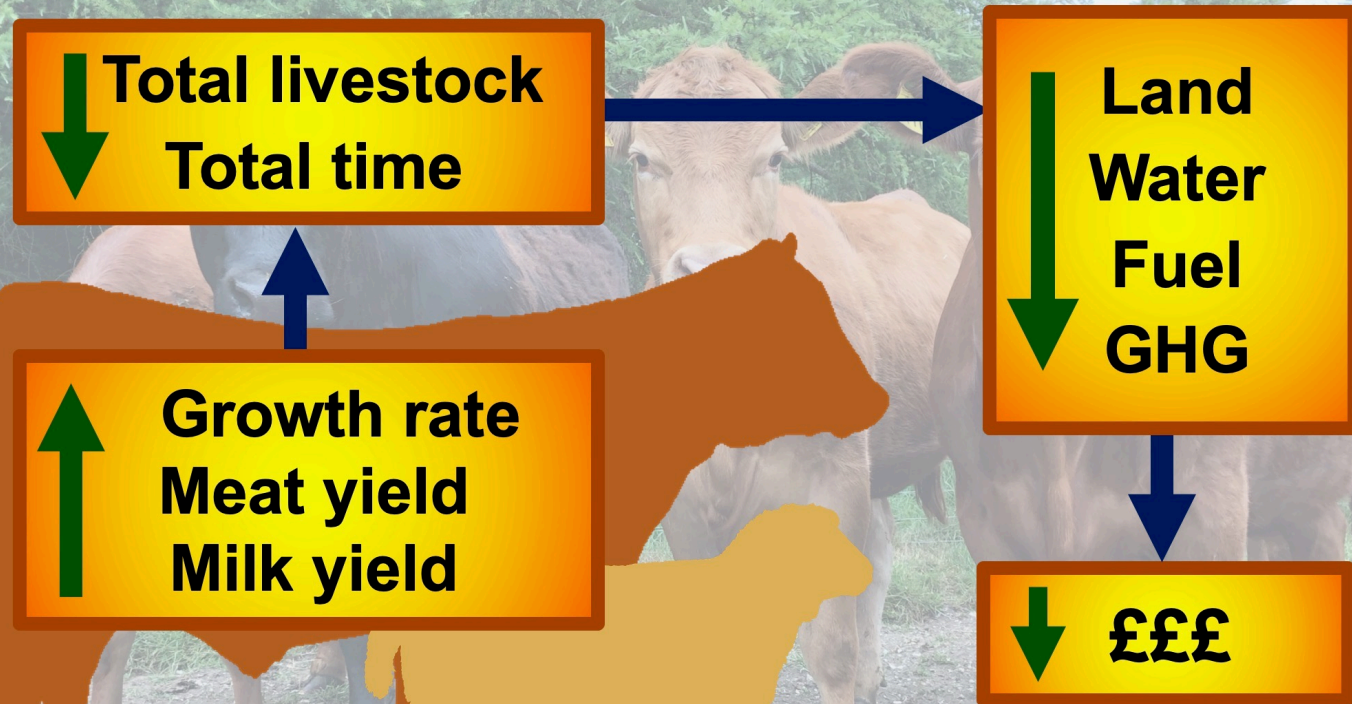


Source: Created by Dr. Jude L. Capper, 2020; data from Gerber et al. (2013) Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities. FAO, Rome, Italy.



B

Improving animal productivity reduces the environmental impact of milk and meat

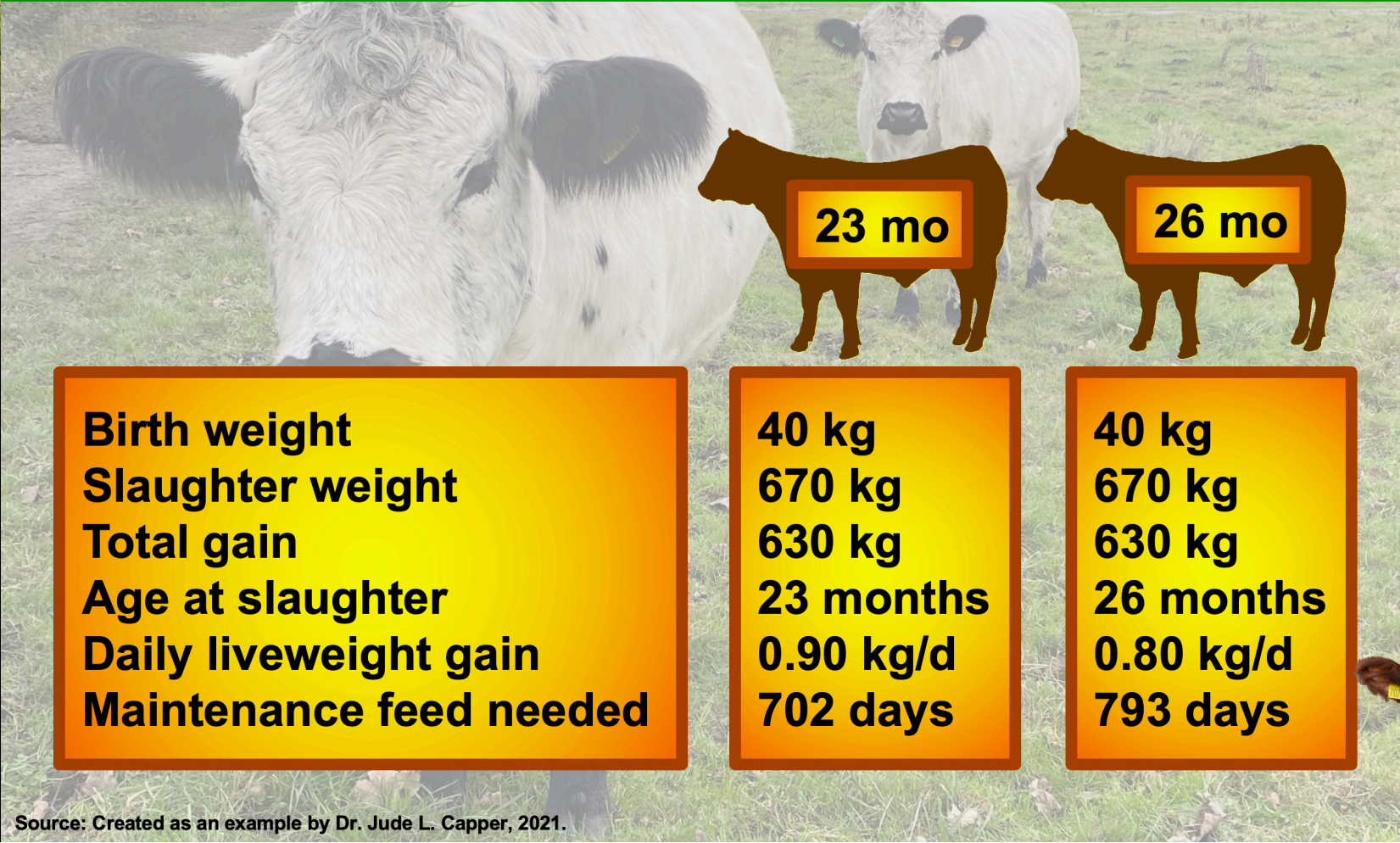


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Reducing age at slaughter has both economic and environmental benefits



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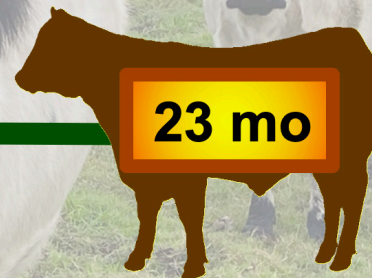


Source: Created as an example by Dr. Jude L. Capper, 2021.

B

Reducing age at slaughter has both economic and environmental benefits

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



| |
|-------------------------|
| Birth weight |
| Slaughter weight |
| Total gain |
| Age at slaughter |
| Daily liveweight gain |
| Maintenance feed needed |

| |
|-----------|
| 40 kg |
| 670 kg |
| 630 kg |
| 23 months |
| 0.90 kg/d |
| 702 days |

| |
|-----------|
| 40 kg |
| 670 kg |
| 630 kg |
| 26 months |
| 0.80 kg/d |
| 793 days |

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

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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%



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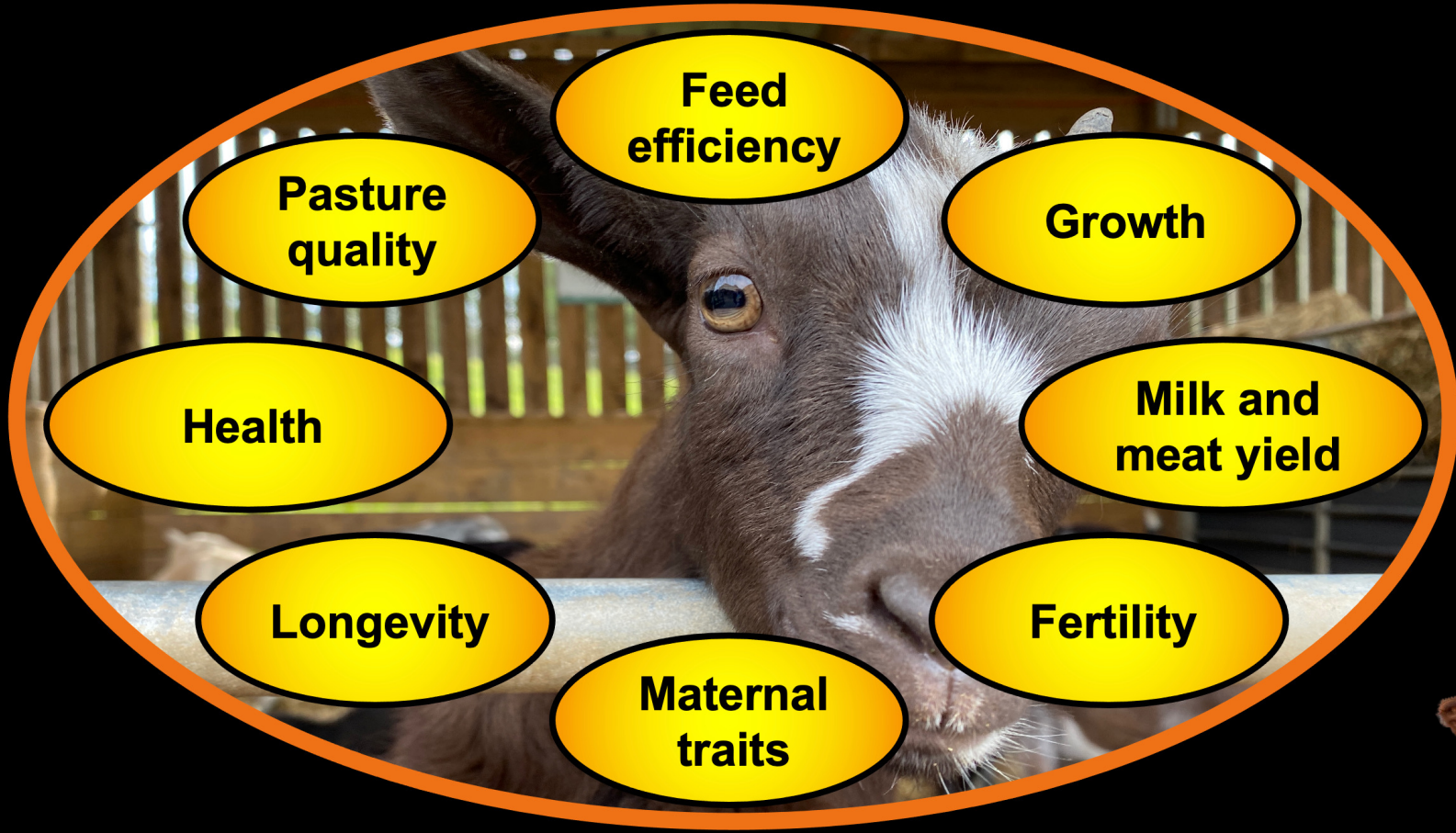


Source: Created by Jude L. Capper, 2023. Data from: Capper et al. 2023. Helping farmers navigate the green economy: A data-driven blueprint for net zero beef. British Society of Animal Science Annual Meeting. <https://doi.org/10.1016/j.anscip.2023.01.515>



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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



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Harper Adams University

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

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**



B

Example (ideal) key performance indicators for UK suckler beef and lamb production

| | <u>Beef</u> | <u>Lamb</u> |
|---|--------------------|-------------|
| Mature cow or ewe liveweight, kg | <650 | <80 |
| Age at first calving/lambing, months | 24 | 12 to 24 |
| Weaning rate, % | 100% | >160% |
| Sale weight, kg lwt | Depends on market | |
| Purchased feed use per cow or ewe, kg | As low as possible | |
| Homegrown fodder use per cow or ewe, kg | As low as possible | |
| Daily liveweight gain, kg | >1.60 | >0.45 |
| Age at slaughter, months | 16 to 20 | 4 to 6 |
| Mortality, % | <2.0 | <5.0 |
| Replacement rate, % | 14 to 16 | 15 to 25 |



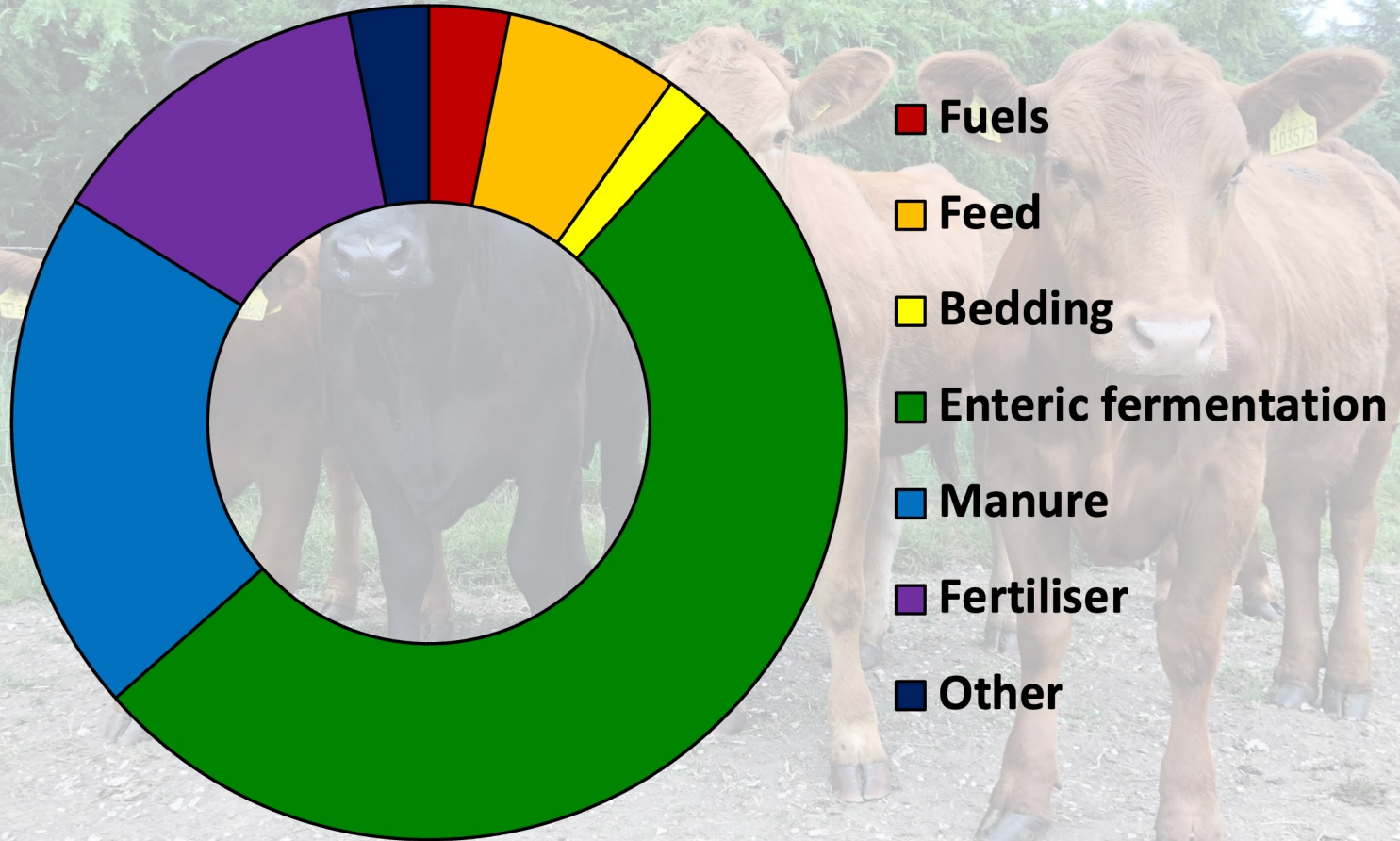
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Can livestock farms reach net zero?



B

Example carbon footprint - beef

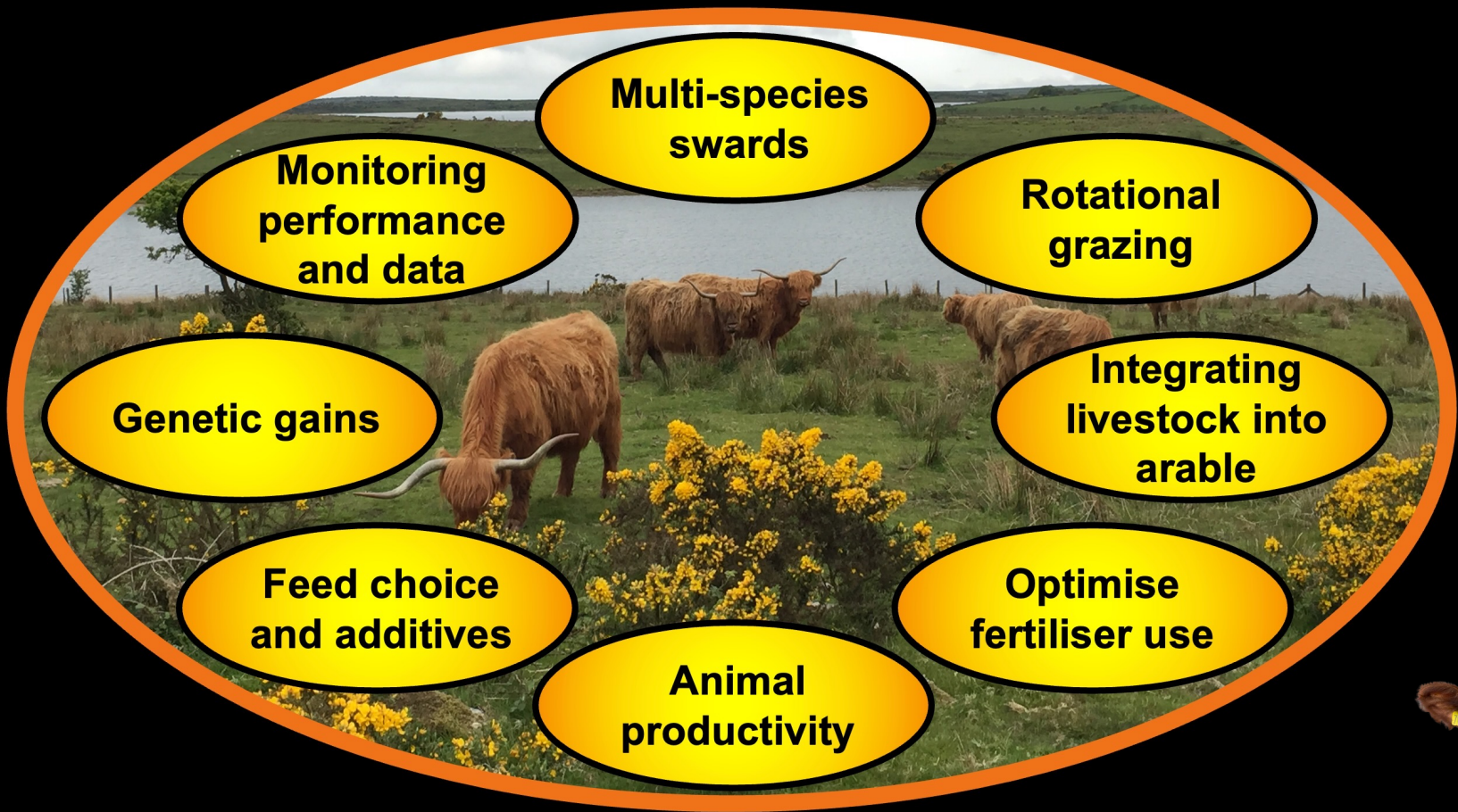


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Key actions that can be implemented on farm to reduce carbon footprints

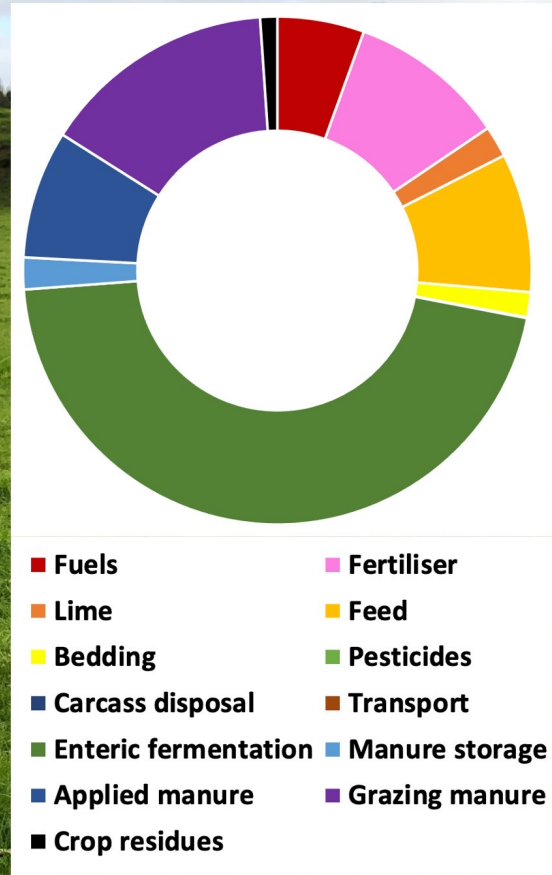


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Standard footprinting tool urgently needed across the industry



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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 CO₂

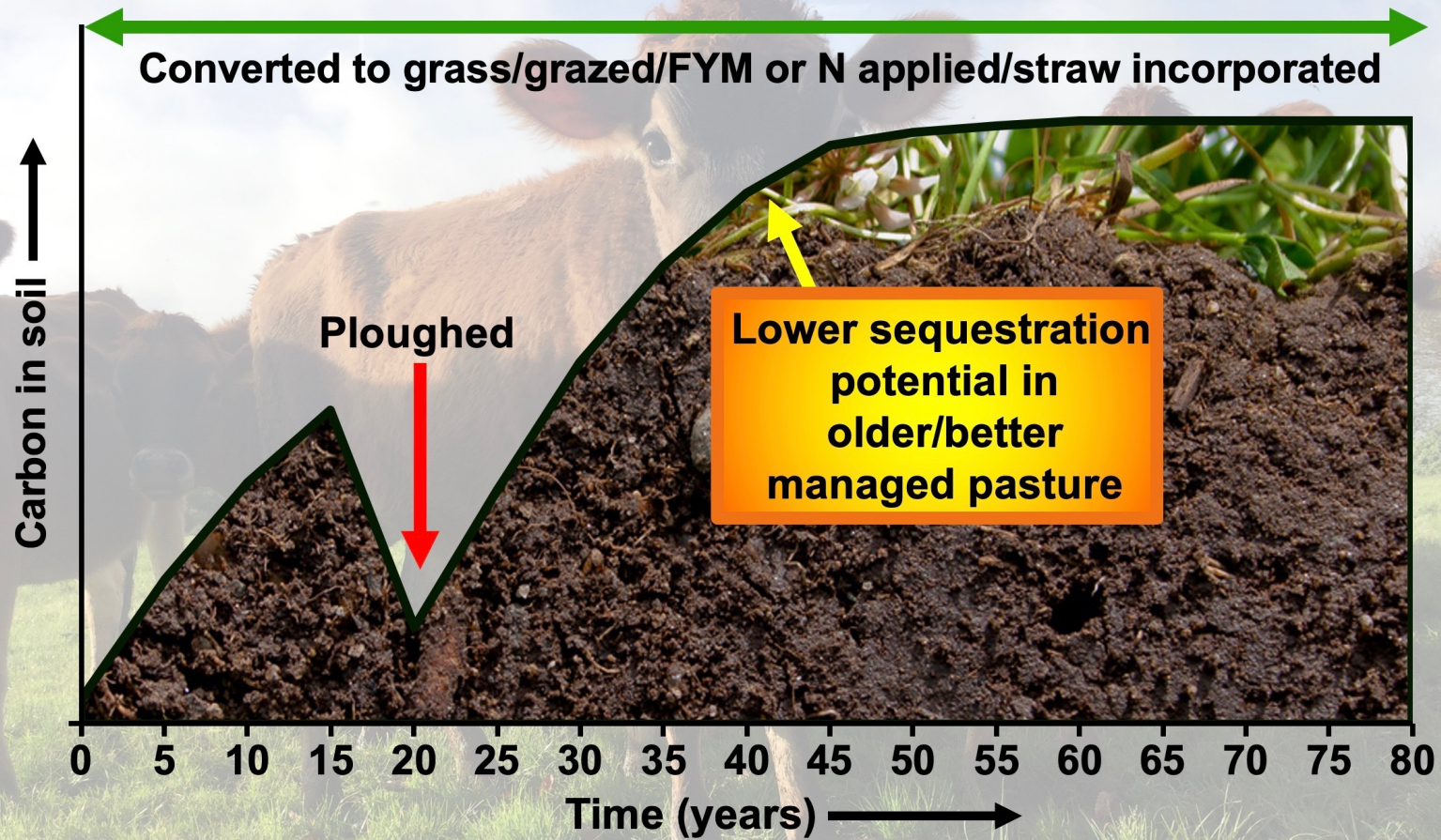
Need to justify these impacts vs. beef from dairy.



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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*.

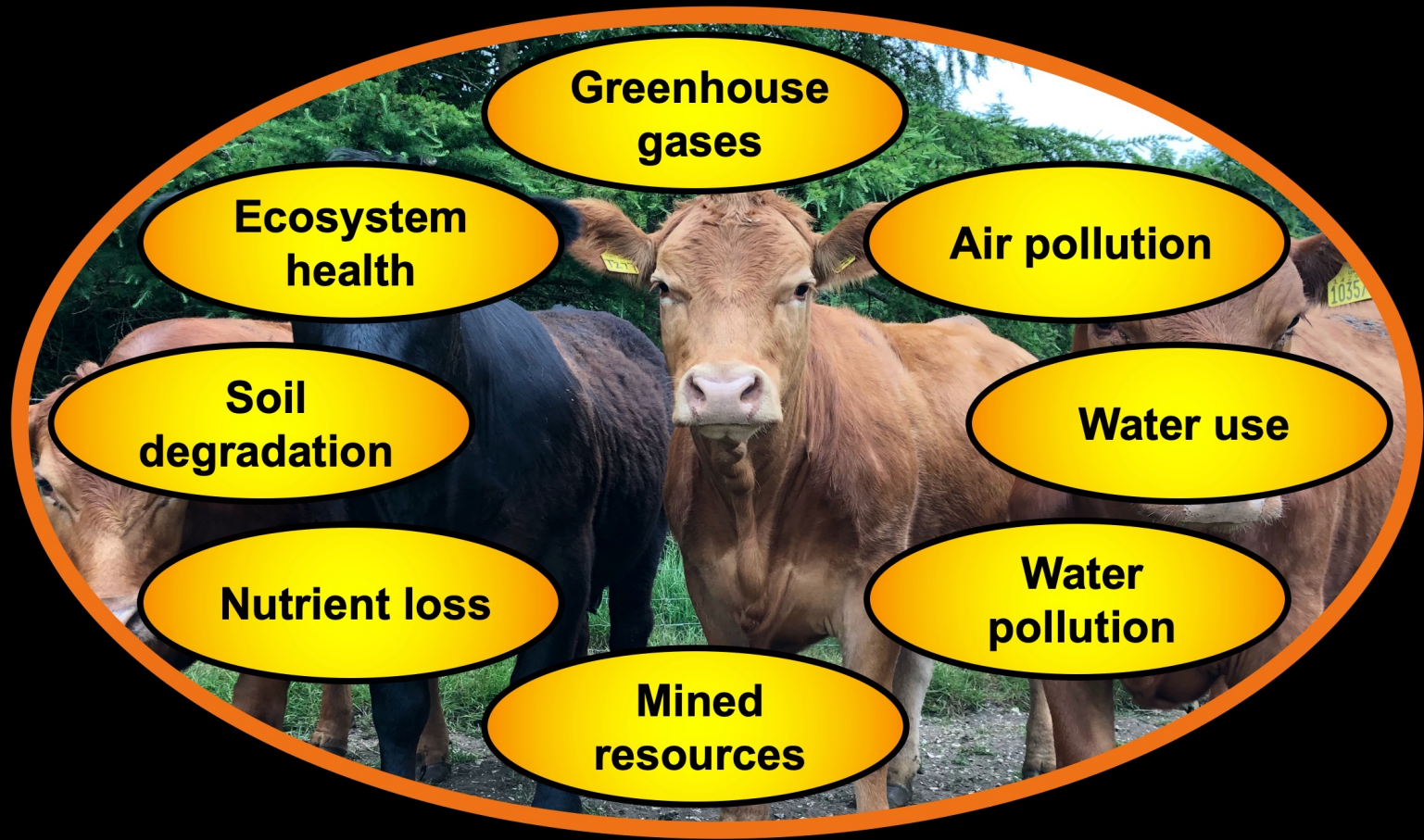


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Environmental impacts are not limited to greenhouse gas emissions



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Can we grow human food crops everywhere?



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Harper Adams
University

Source: Created by Jude L. Capper, 2023

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Can we grow human food crops everywhere?



Source: Created by Jude L. Capper, 2023

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

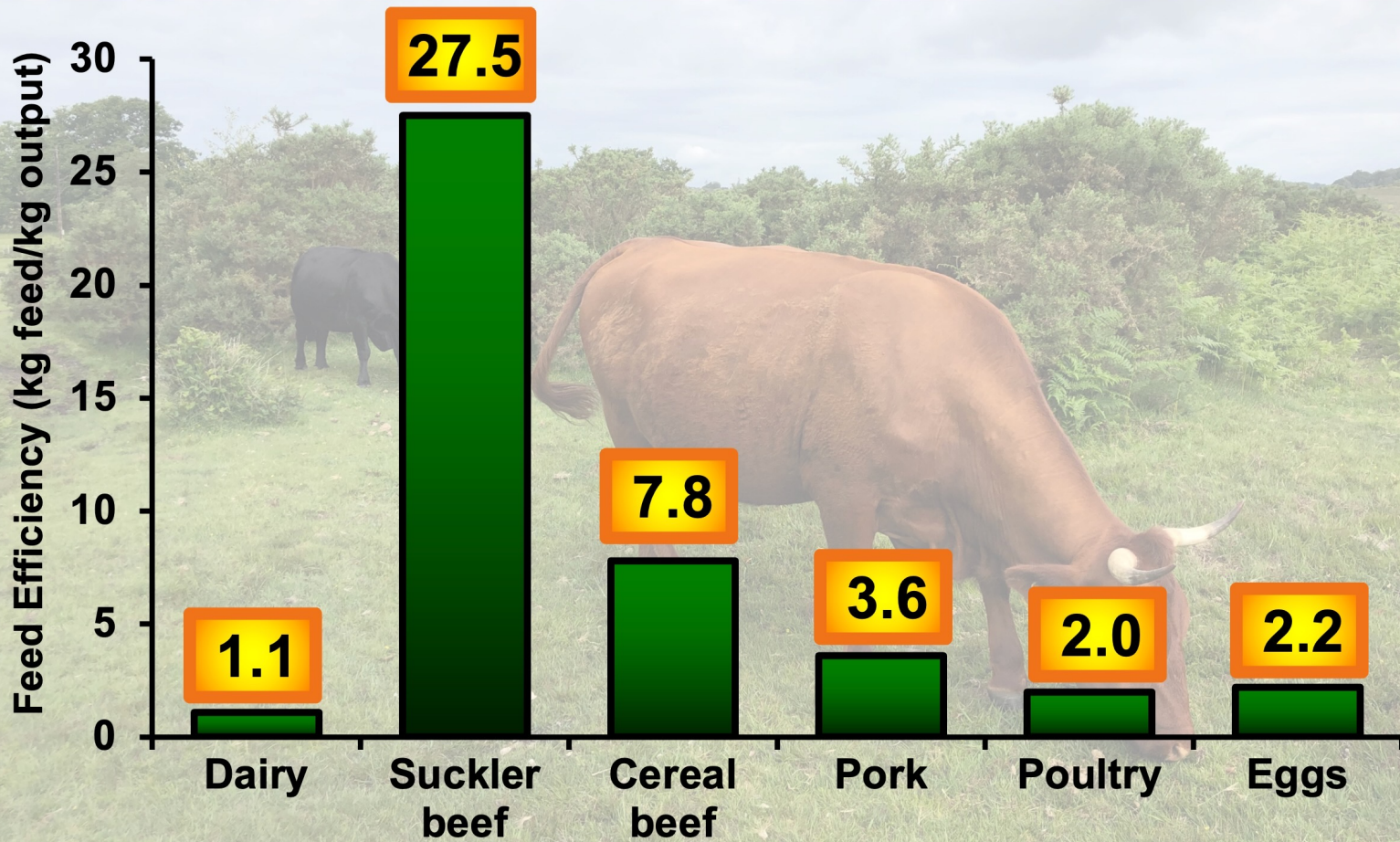


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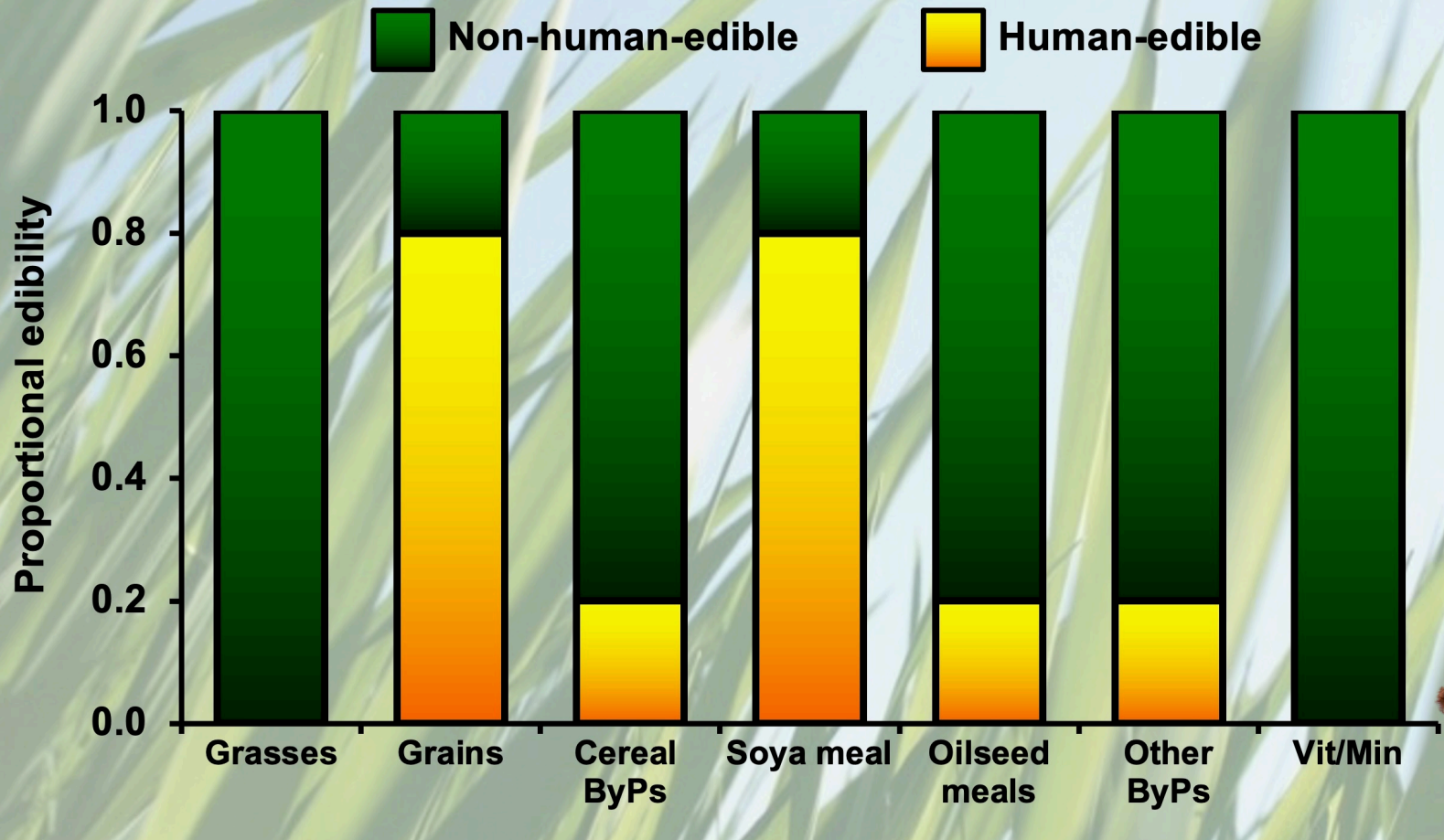
Feed efficiency ratios vary between systems and species



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Feed efficiency metrics must consider competition for human-edible foods

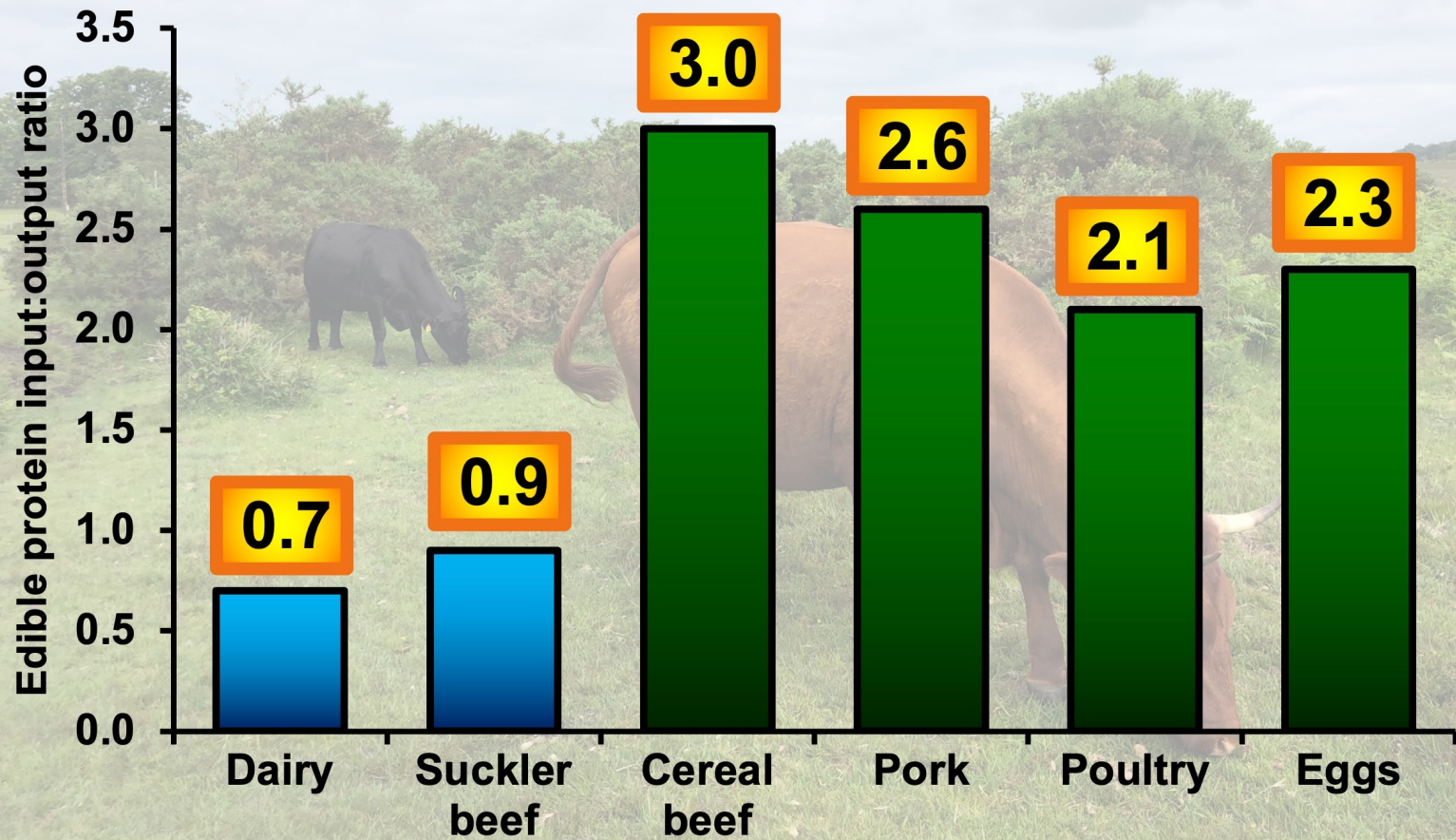


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Grazing cattle systems produce more human-edible protein than they consume



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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/>

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Dung beetles have myriad ecosystem benefits



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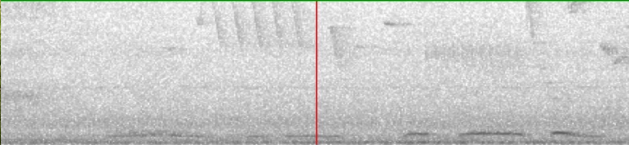


Source: Created by Jude L. Capper, 2023.



S

Merlin app is a great example of ecosystem data gathering



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 😂

📄 00:04.55

BEST MATCHES

| | | |
|--|------------------------|---|
| | Common Chaffinch | ✓ |
| | Common Wood-Pigeon | ✓ |
| | Eurasian Wren | ✓ |
| | European Goldfinch | ✓ |
| | Eurasian Blackbird | ✓ |
| | Eurasian Collared-Dove | ✓ |
| | European Robin | ✓ |

| | | | | |
|--|---|----|--|--|
| | Common Buzzard 7 May 2023 - Scotland, United Kingdom | | | Herring Gull 29 May 2023 - Scotland, United Kingdom |
| | Willow Warbler 7 May 2023 - Scotland, United Kingdom | 25 | | Eurasian Oystercatcher 29 May 2023 - Isle of Man, Isle of Man |
| | House Sparrow 7 May 2023 - Scotland, United Kingdom | 24 | | Ring-necked Pheasant 31 May 2023 - Meadow |
| | Bank Swallow 29 May 2023 - Isle of Man, Isle of Man | | | Common House-Martin 31 May 2023 - Home |
| | Eurasian Wren 29 May 2023 - Isle of Man, Isle of Man | 11 | | Mistle Thrush 31 May 2023 - Magher Breck |
| | European Starling 29 May 2023 - Isle of Man, Isle of Man | 10 | | |

Manx Wildlife Trust



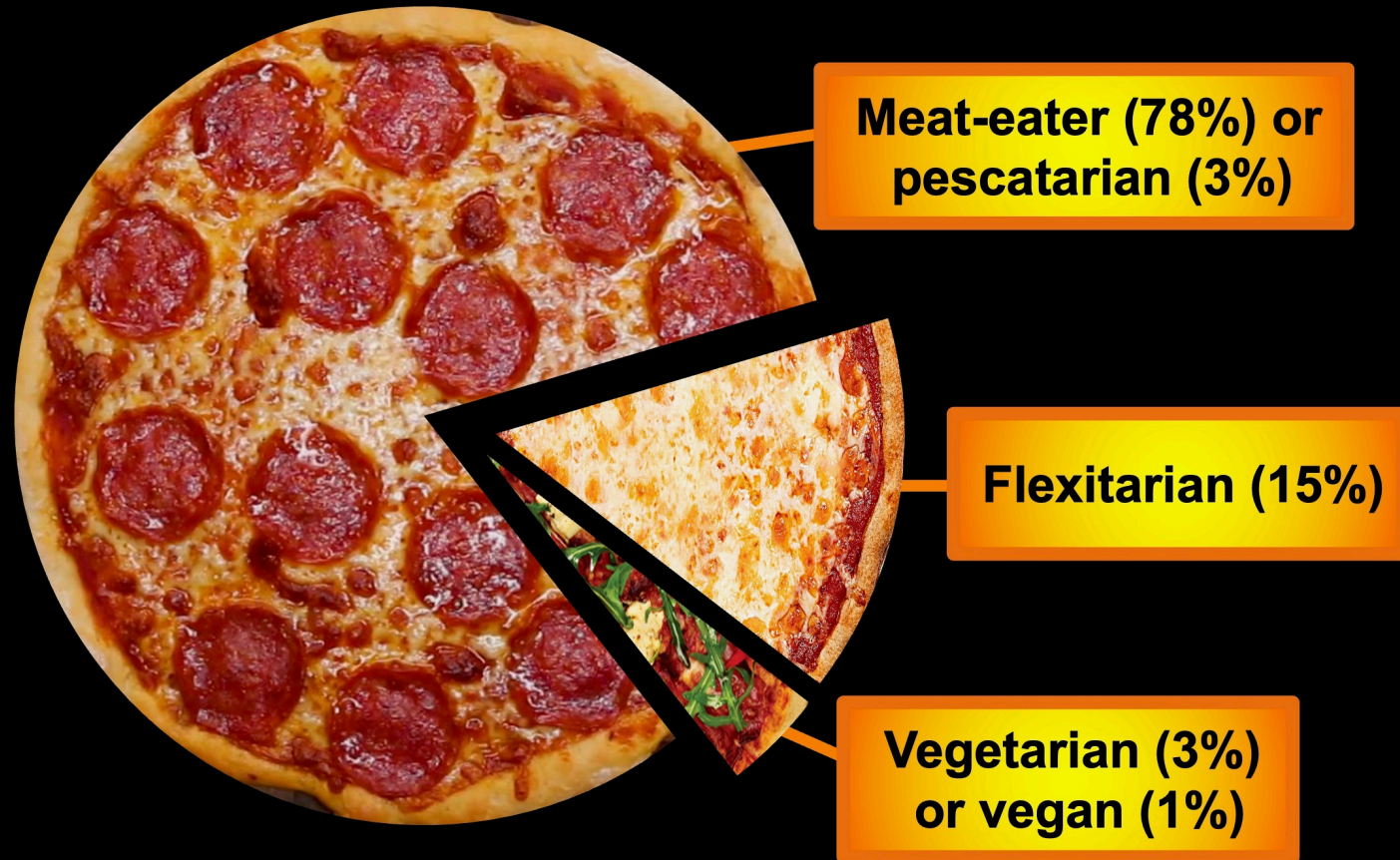
Source: Created by Jude L. Capper, 2023. Screenshots from Merlin app and Twitter.

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



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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

**No guilt
34%**

**Feel guilty
66%**



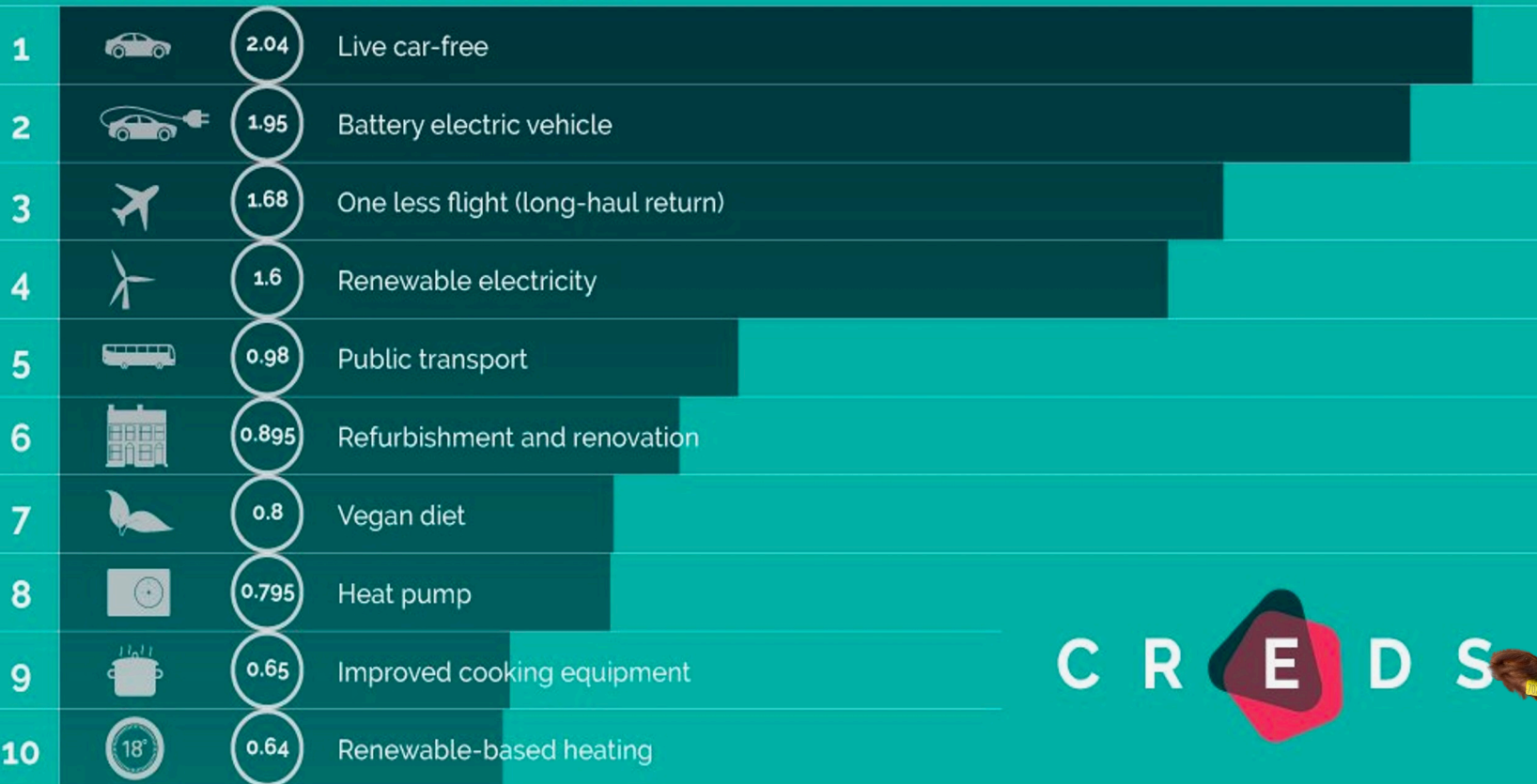
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CV

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

Top 10 options for reducing your carbon footprint



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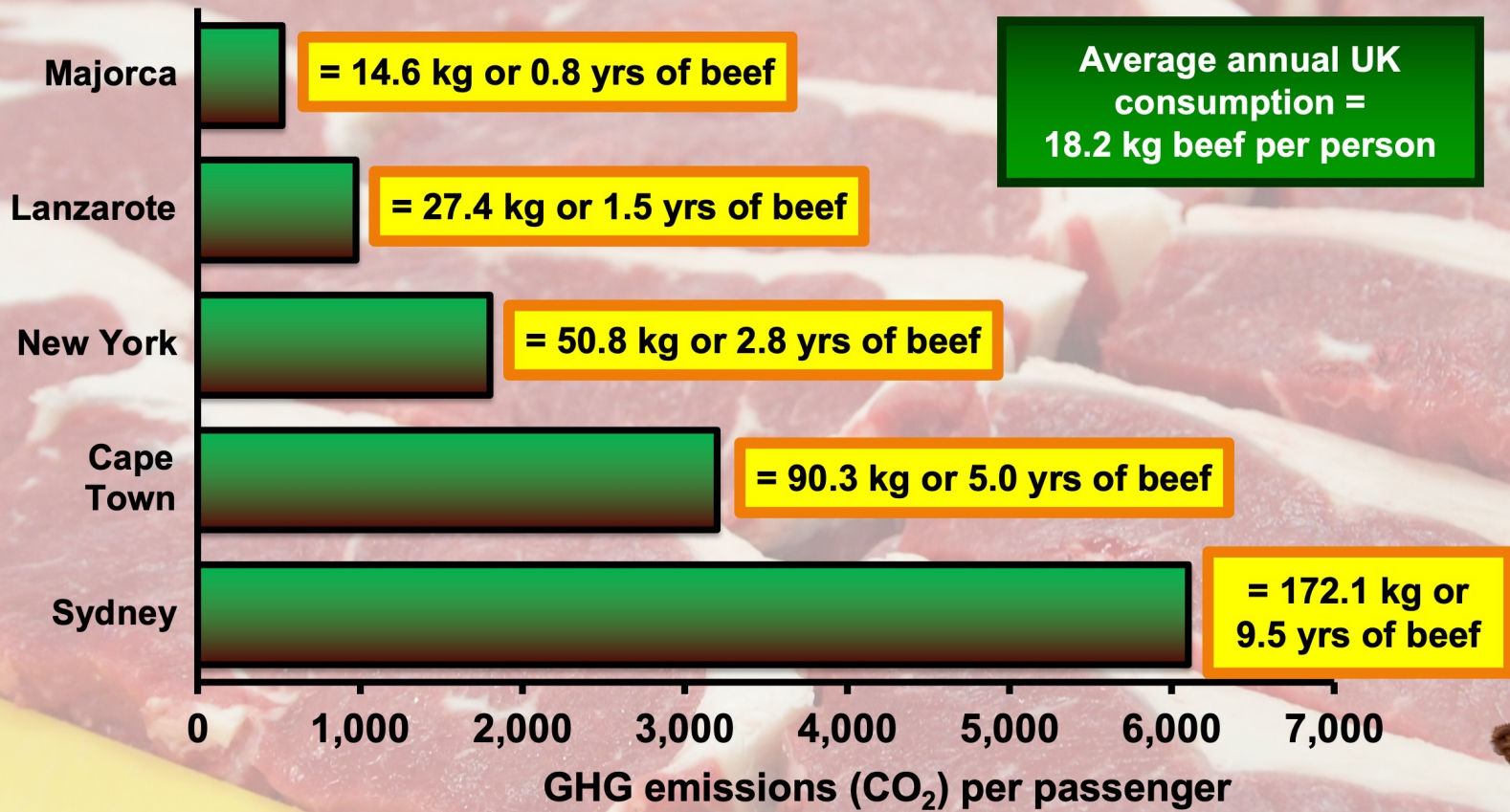


Source: Created by Jude L. Capper, 2023. Infographic adapted from Centre for Research into Energy Demand Solutions (2020). Available at: https://twitter.com/CREDS_UK/status/1262984570175176704?s=20



cv

International flights emit considerable quantities of carbon compared to beef production

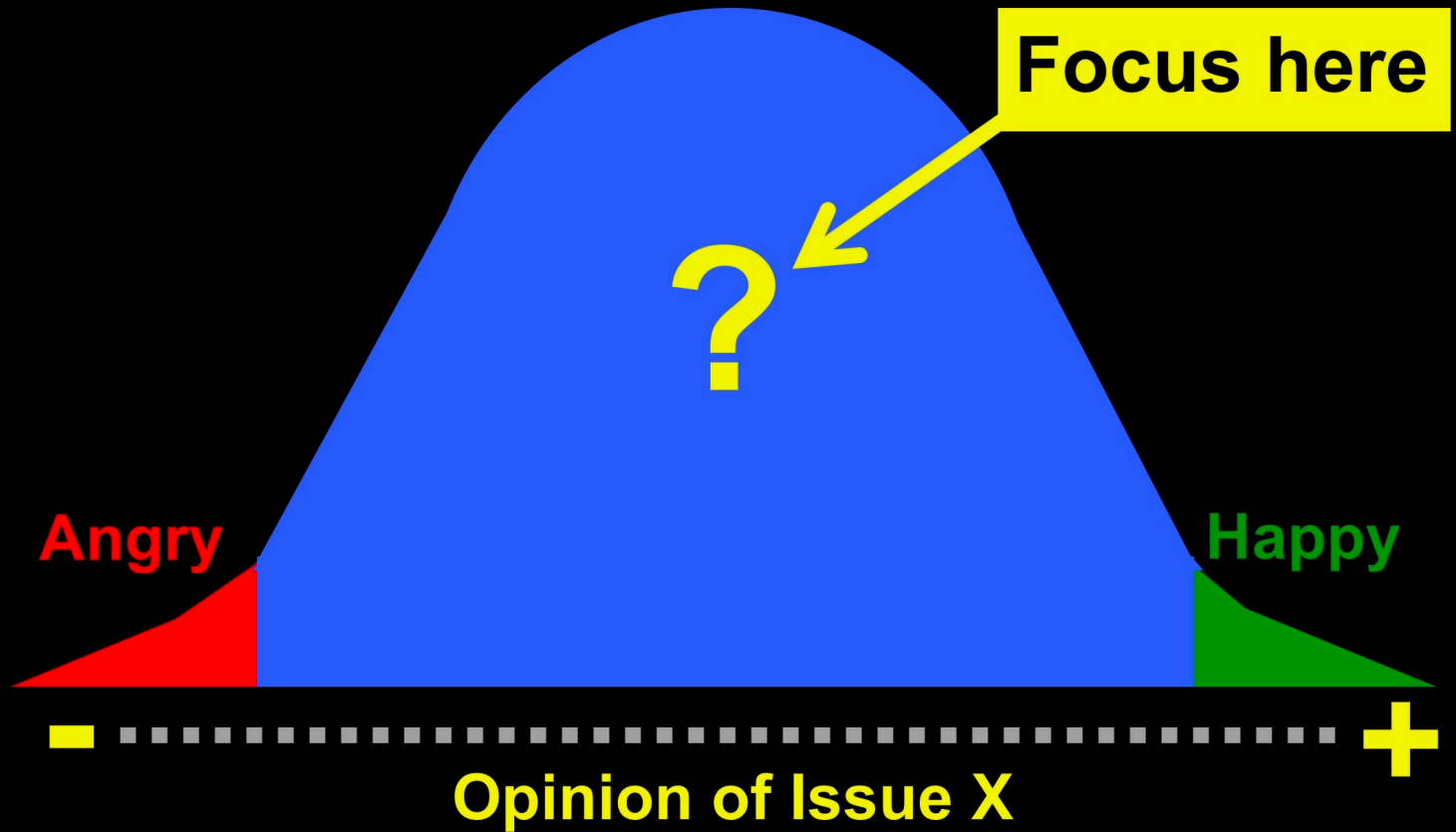


Source: Created by Jude L. Capper, 2023. Calculations based on GHG emissions flight data from: https://co2.myclimate.org/en/flight_calculators/new and on a carbon footprint per kg of boneless beef of 35.5 kg CO₂-eq (under GWP100) from AHDB: http://beefandlamb.ahdb.org.uk/wp-content/uploads/2013/05/p_cp_down_to_earth300112.pdf



COM

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



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

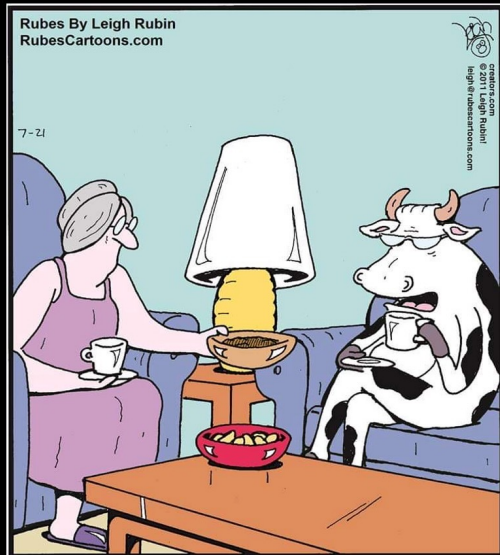


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Thank you!

JCapper@Harper-Adams.ac.uk

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



Questions?



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