



Improving all facets of sustainability – not just carbon!

26th June 2023



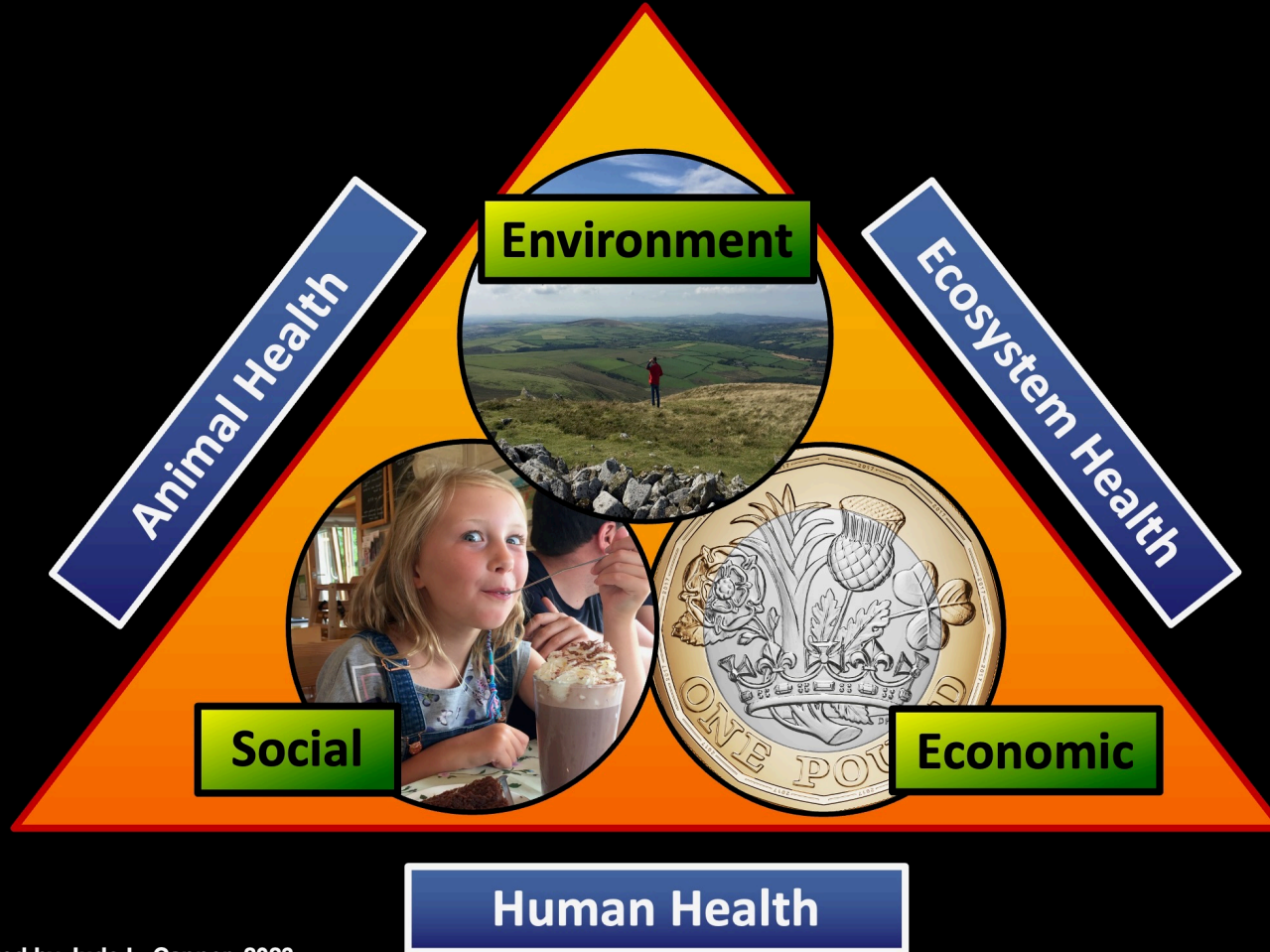
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Source: Jude L. Capper, 2023

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Sustainability comprises three pillars, all under the umbrella of One Health



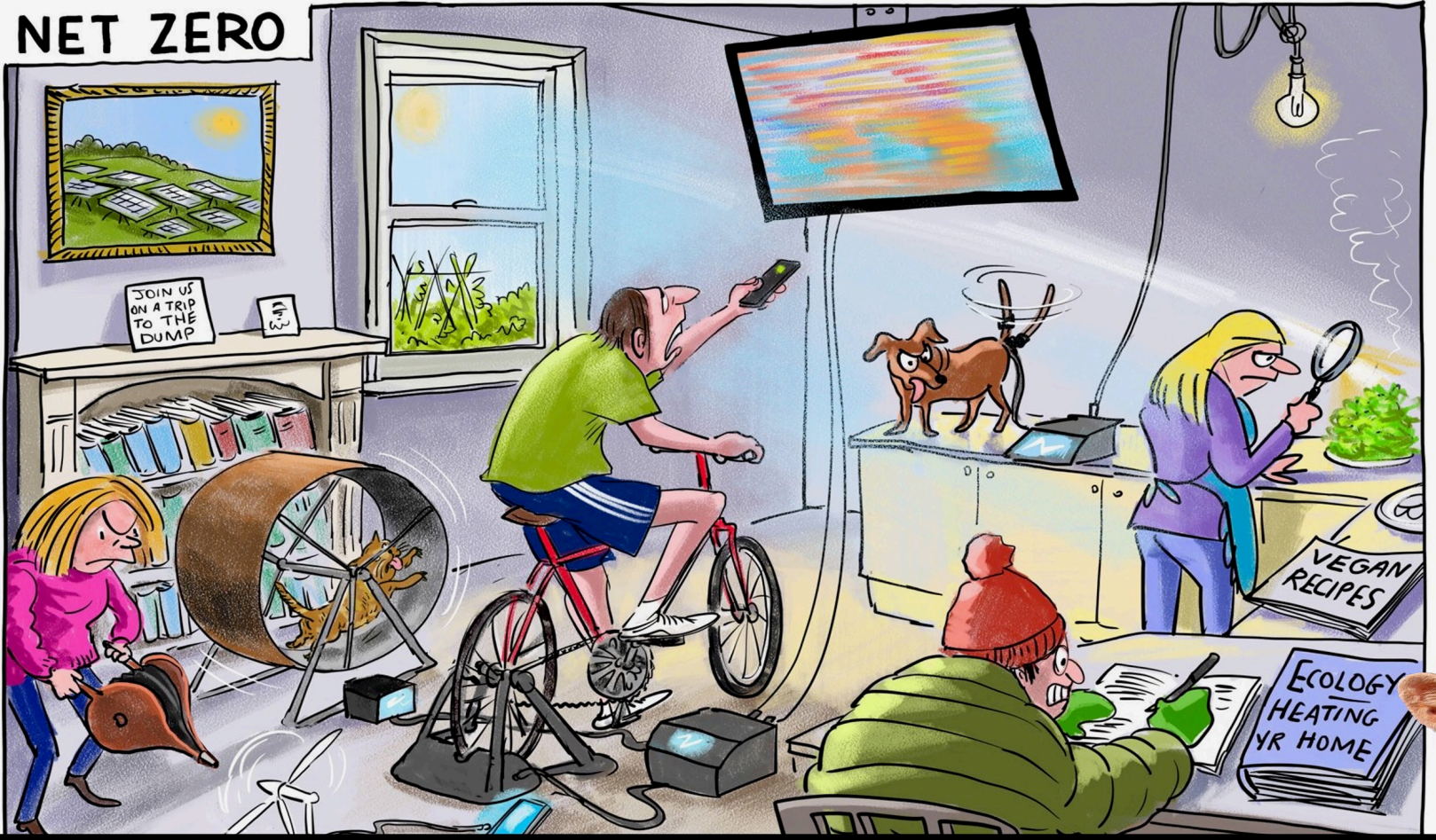
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Source: Created by Jude L. Capper, 2023.

S

Net Zero is a clear priority



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



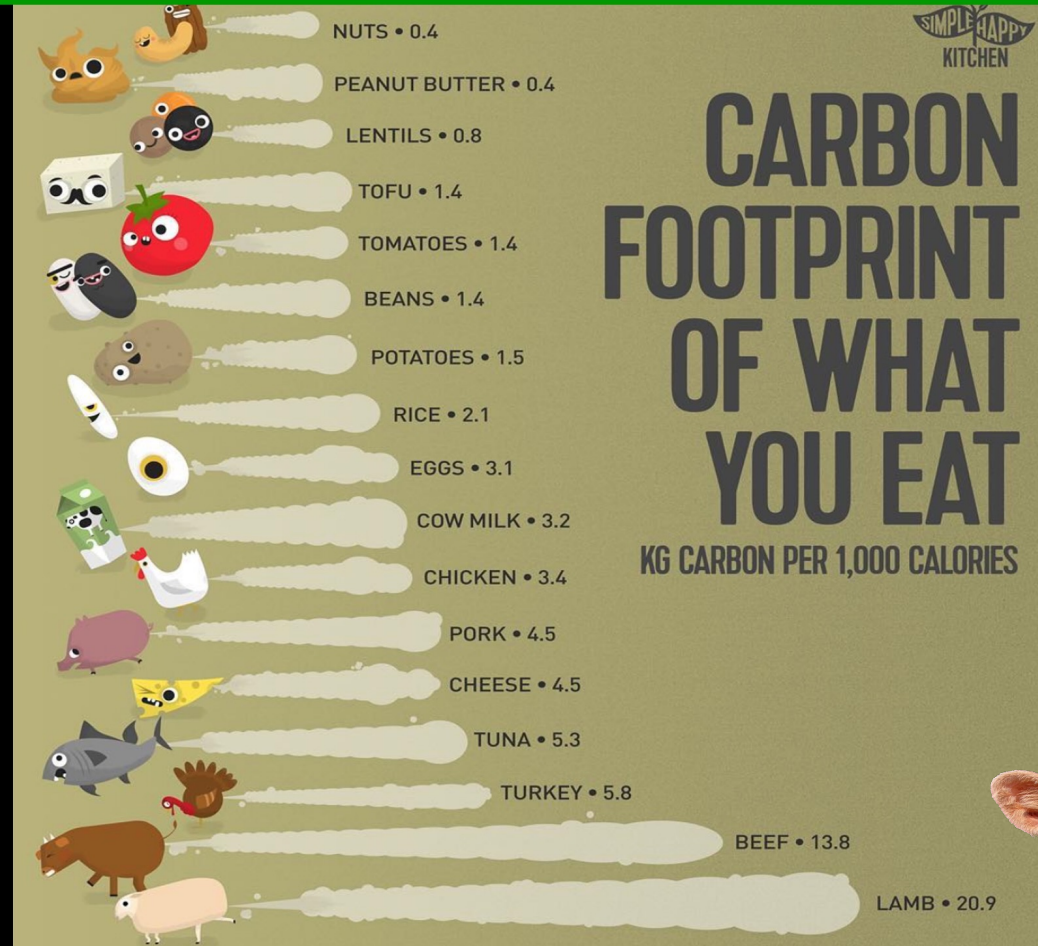
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B

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/

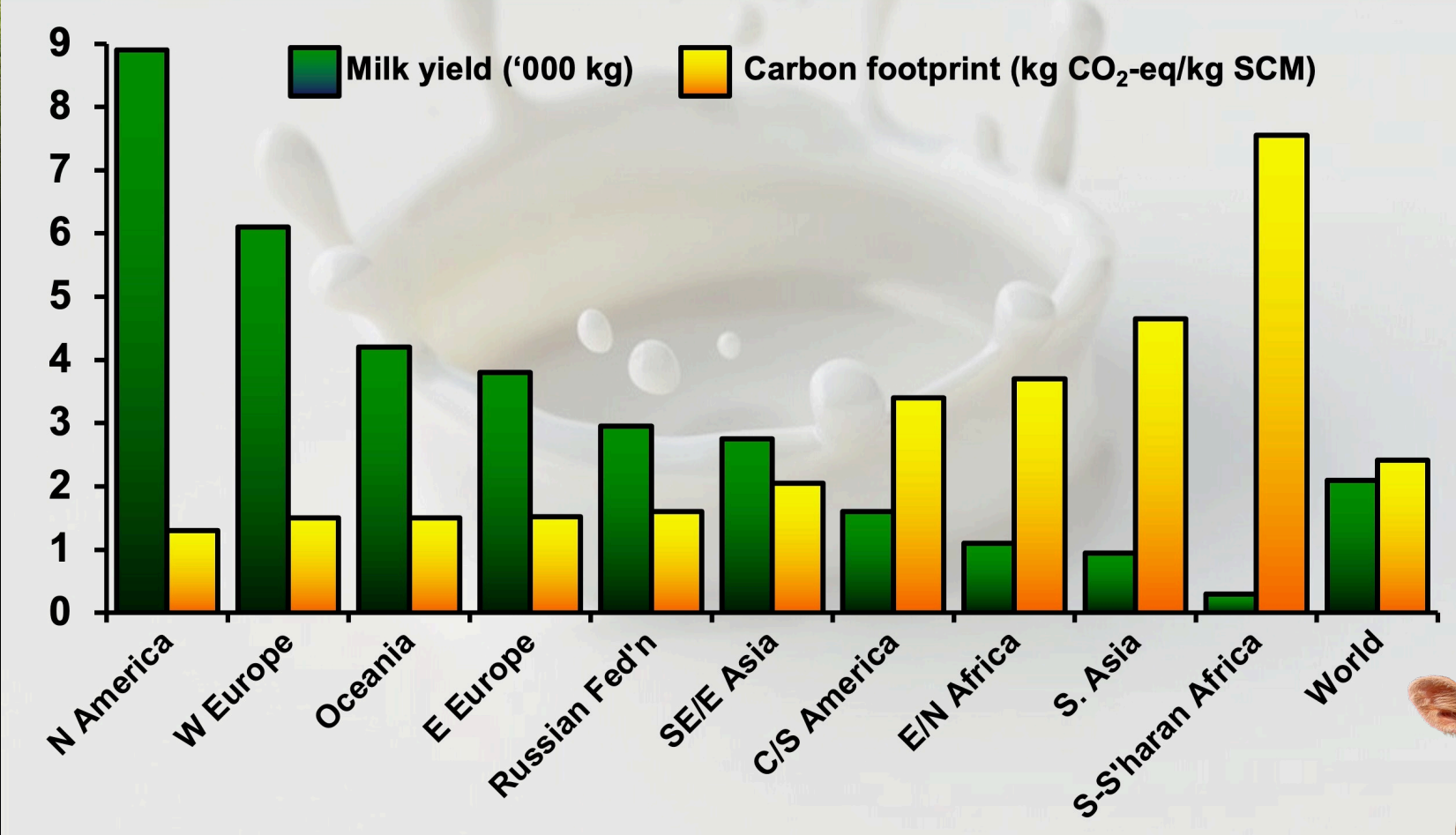


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A negative correlation exists between milk yield and carbon emissions

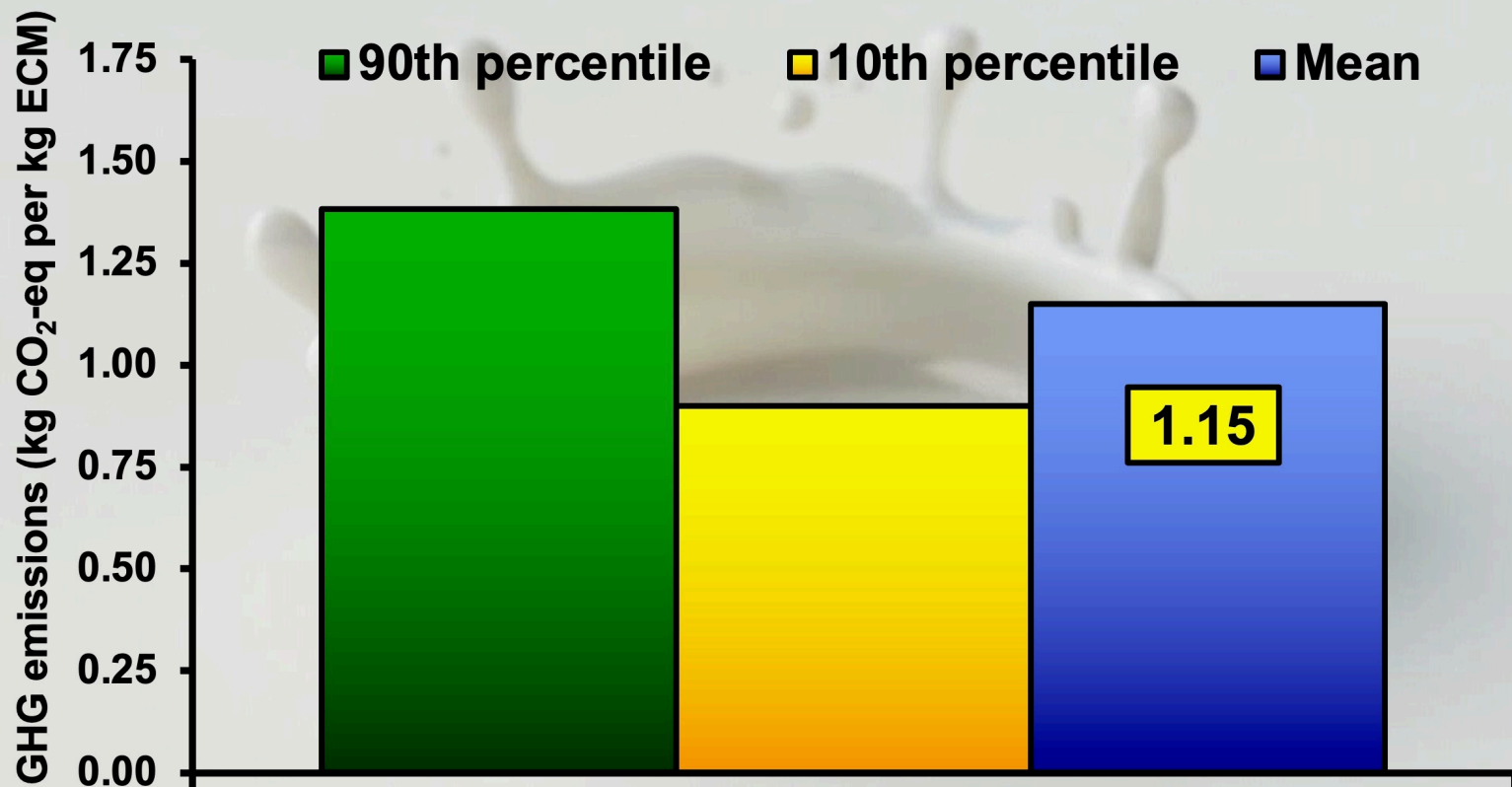


Source: Created by Jude L. Capper, 2023. Data from FAO (2010) Greenhouse Gas Emissions from the Dairy Sector. FAO, Rome, Italy.

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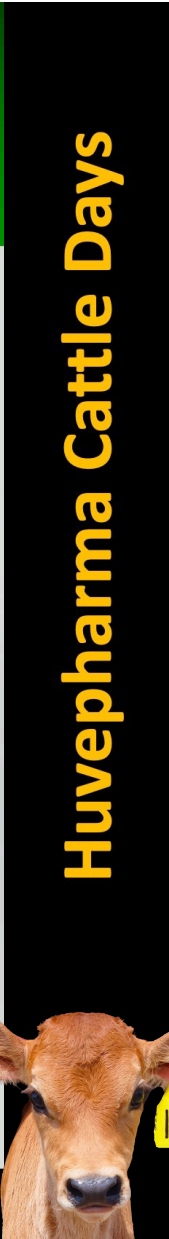


D GHG emissions from UK dairy production vary, offering mitigation opportunities



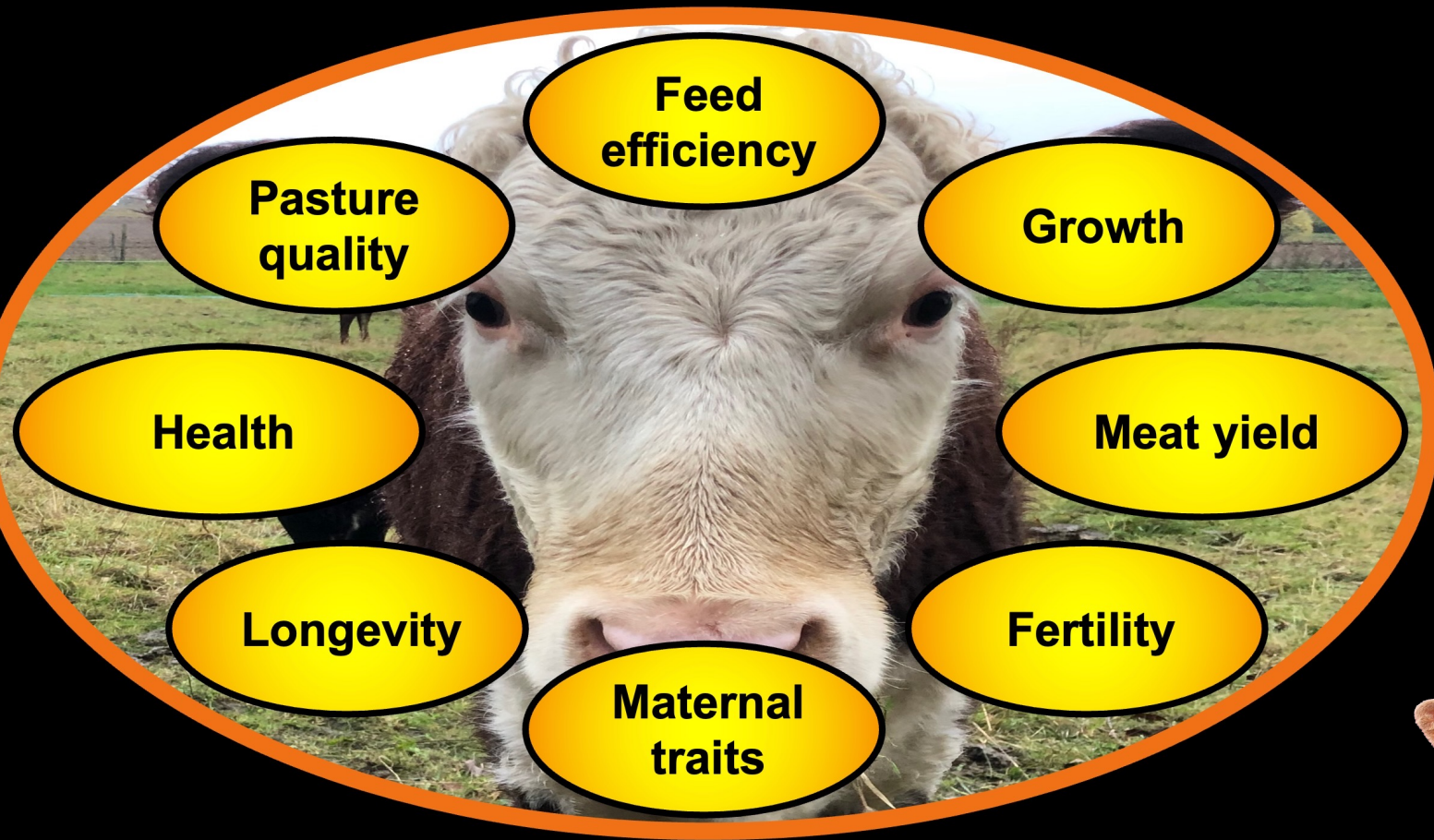
On-farm dairy carbon footprint

Source: Created by Jude L. Capper, 2023. Data from: Arla Climate Check Report (2021). A Sustainable Future for British Dairy. <https://news.arlafoods.co.uk/resources/arla-climate-check-report-2021-a-sustainable-future-for-british-dairy>



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Improving key performance indicators reduces environmental impacts



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Reducing age at slaughter has both economic and environmental benefits

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

23 mo

26 mo

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

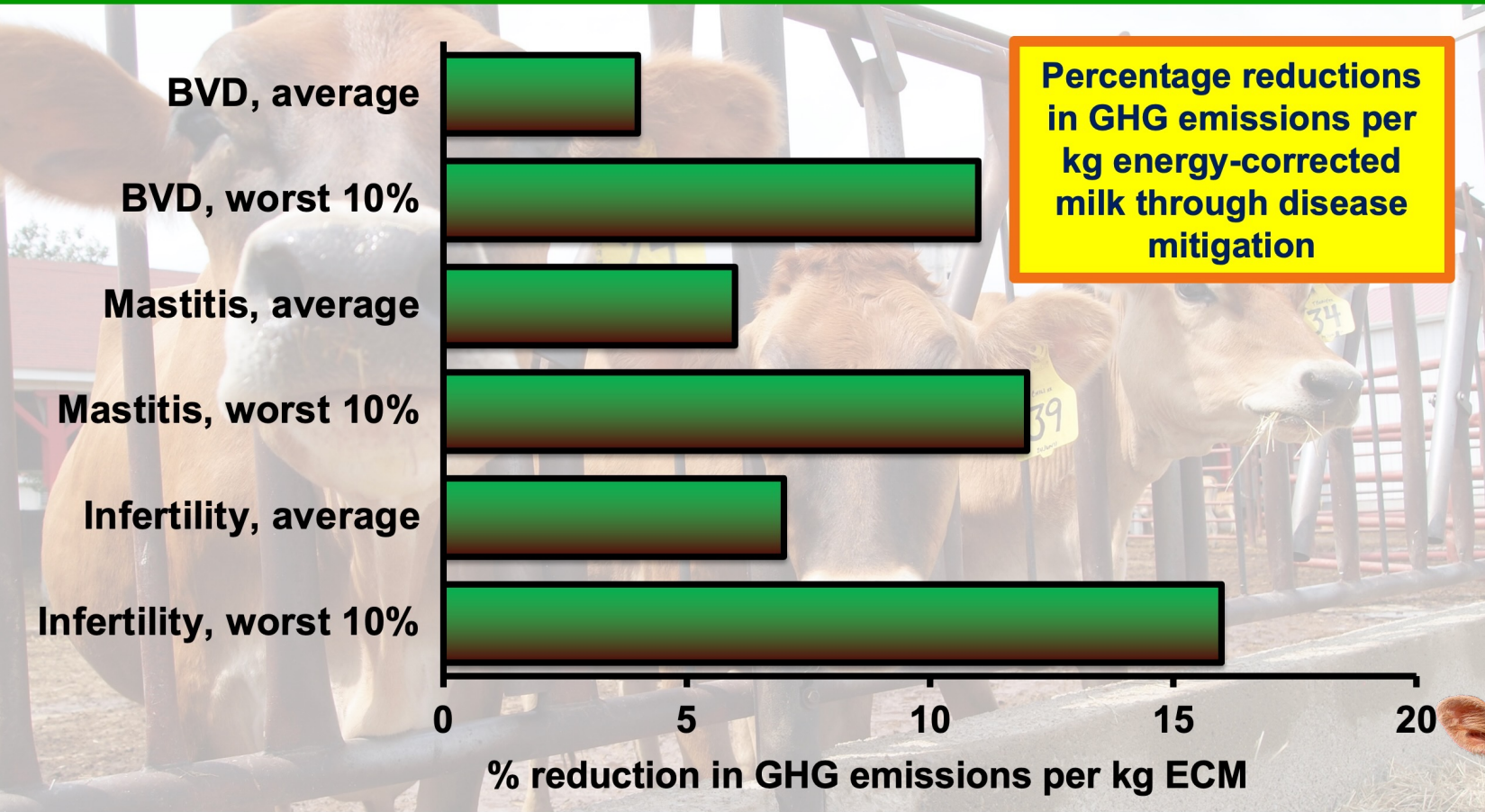
40 kg
 670 kg
 630 kg
 23 months
 0.90 kg/d
 702 days

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






D GHG emissions could be cut significantly by mitigating dairy diseases - UK



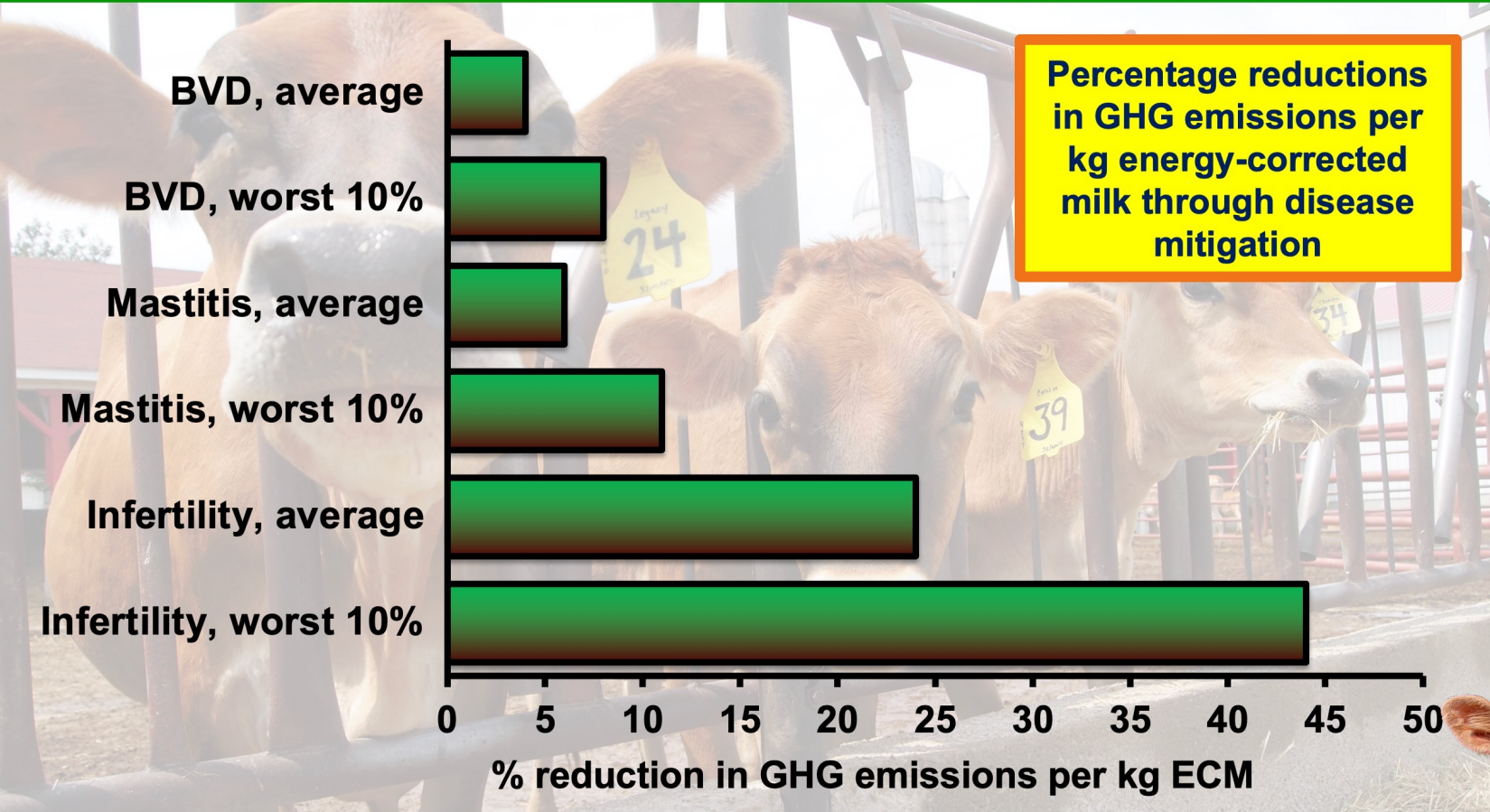
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Source: Created by Jude L. Capper, 2023. Data from: Statham et al. 2021. Dairy Cattle Health and Greenhouse Gas Emissions Pilot Study: Chile, Kenya and the UK.
Available from: <https://dairysustainabilityframework.org/wp-content/uploads/2020/10/Dairy-Cattle-Health-and-GHG-Emissions-Pilot-Study-Report.pdf>



D GHG emissions could be cut significantly by mitigating dairy diseases - Kenya



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Source: Created by Jude L. Capper, 2023. Data from: Statham et al. 2021. Dairy Cattle Health and Greenhouse Gas Emissions Pilot Study: Chile, Kenya and the UK.
Available from: <https://dairysustainabilityframework.org/wp-content/uploads/2020/10/Dairy-Cattle-Health-and-GHG-Emissions-Pilot-Study-Report.pdf>

“Real life” application – African swine fever

The recent African swine fever outbreak, in which 100-150 million pigs died, led to:

17-38% increase
in global pork
prices

Pigmeat losses
would have fed
550-824 million
people

Greenhouse
gases invested in
animals that died
or were culled
were equal to
annual emissions
of 16.7-25.1
million cars



D

What could global dairying look like if we improved health, nutrition and genetics?

Global average yield

2,577
kg

UK average yield

8,140
kg

Dairy cows

-181
million

If all dairy cattle had UK yields, global milk supply could be maintained using 181 million fewer cows (69%).

At US average yields, 200 million fewer cows (75%)



D

What about smallholders?



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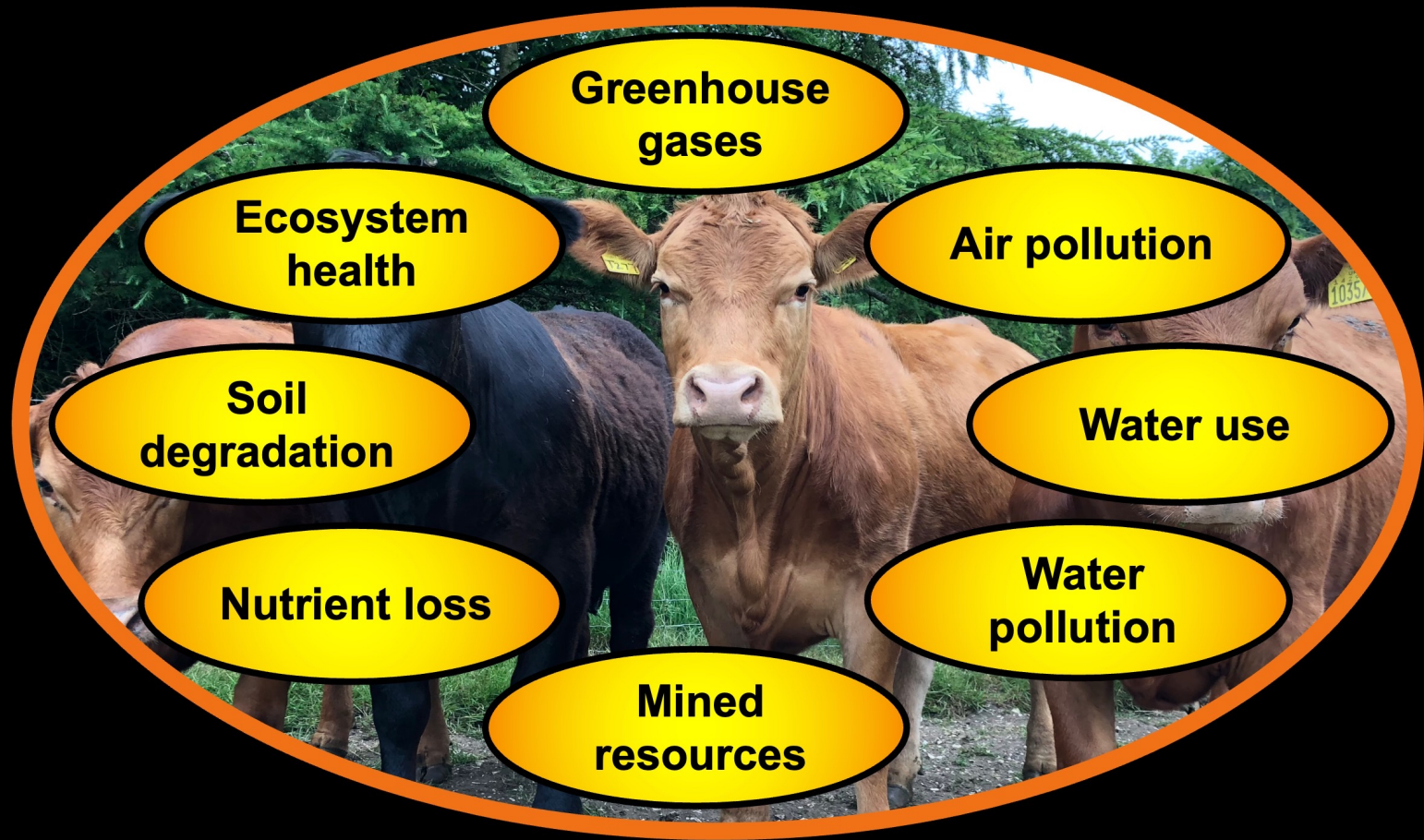


Source: Created by Jude L. Capper, 2023. Photo attribution: Mullookkaan, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons



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Environmental impacts are not limited to greenhouse gas emissions



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Grazing livestock are criticised by vocal activists



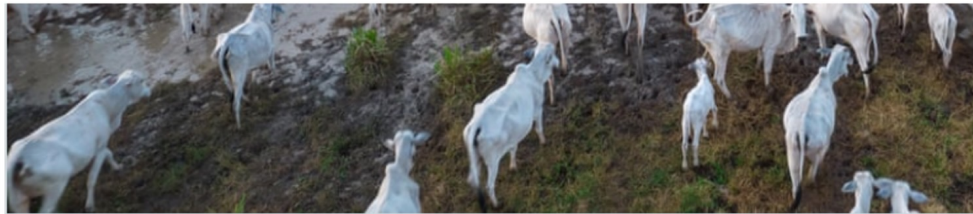
George Monbiot

@GeorgeMonbiot



When foodies, celebrity chefs and even some environmentalists say we should eat "pasture-fed" or "grass-fed" meat, this is what it means in practice.

The most damaging of all food products, it cannot feed more than a tiny number without causing ecocide.



The Guardian

More than 800m Amazon trees felled in six years to meet beef demand
Investigation involving Guardian shows systematic and vast forest loss linked to cattle farming in Brazil



Source: Created by Jude L. Capper, 2023. Screenshot from Twitter

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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.



Source: Created Dr. 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.

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Can we grow human food crops everywhere?



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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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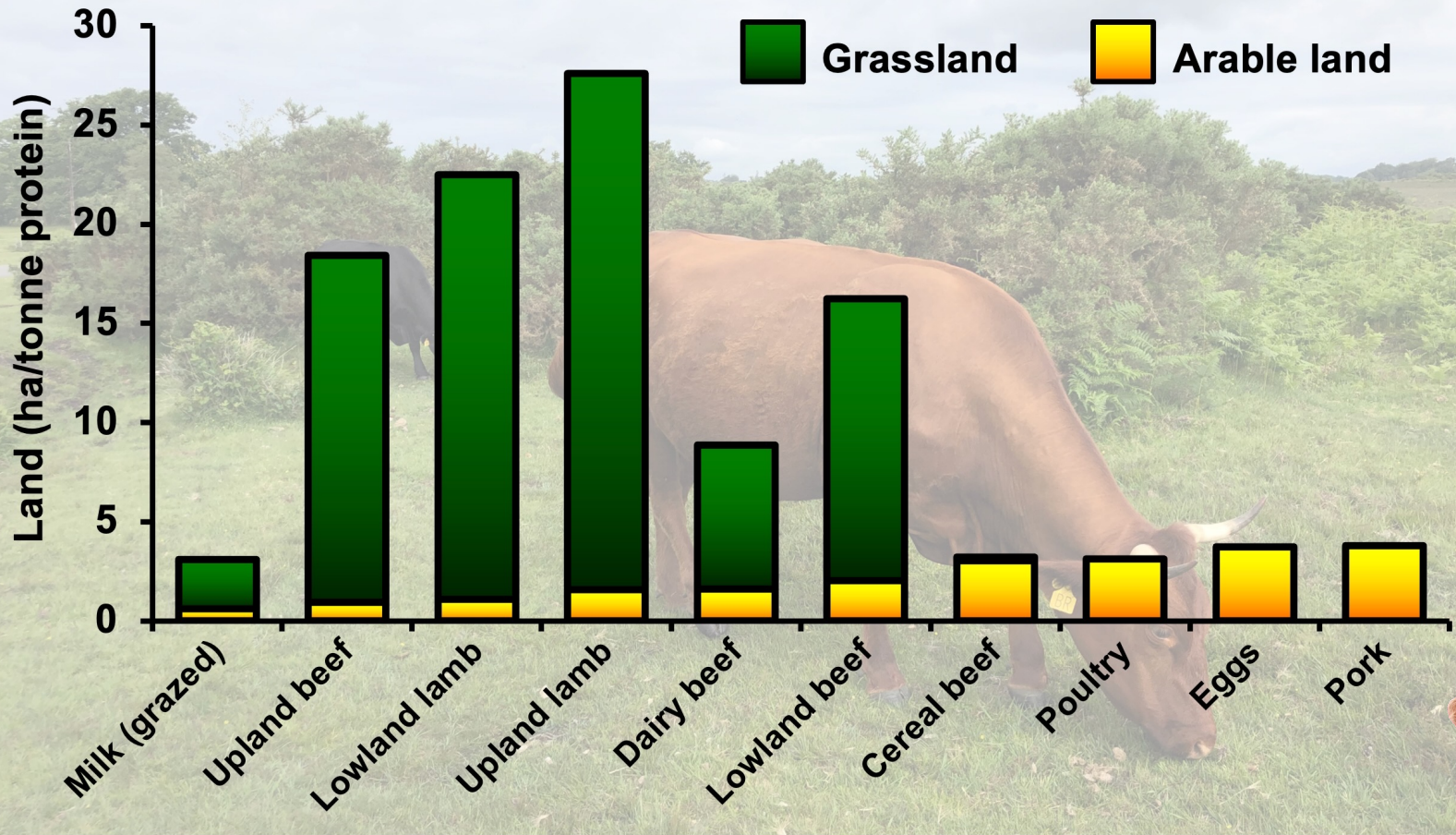


Source: Created by Jude L. Capper, 2023. Grazing land includes temporary grass on arable land (5% of total). Data from DEFRA. 2020. Farming statistics - provisional crop areas, yields and livestock populations at 1 June 2020 – United Kingdom.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/946161/structure-jun2020f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



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Livestock systems vary widely in arable and grassland use



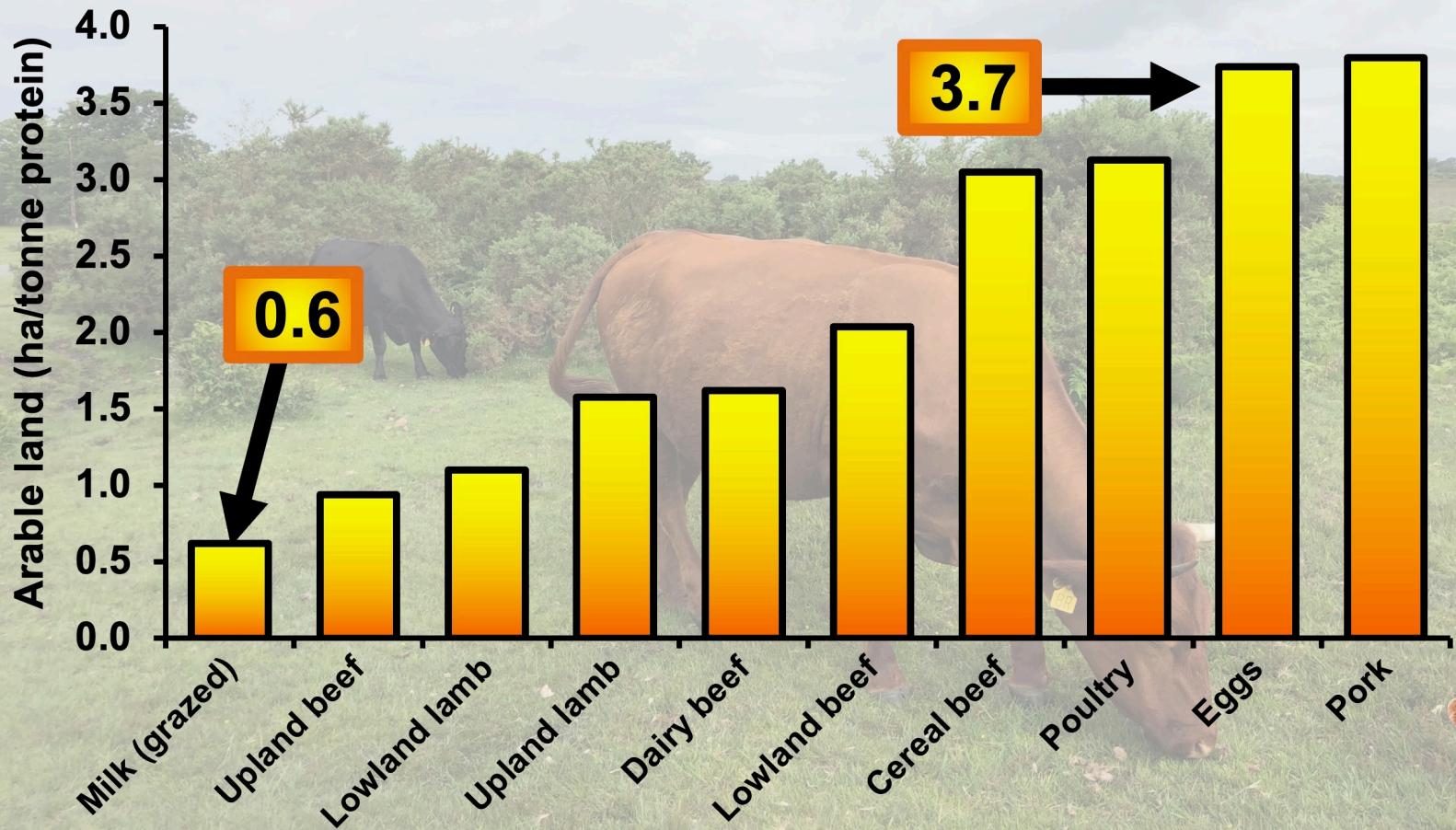
Source: Created by Jude L. Capper, 2023; data from Wilkinson and Lee (2018) Review: Use of human-edible animal feeds by ruminant livestock. *Animal*.



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Livestock systems vary widely in arable land use

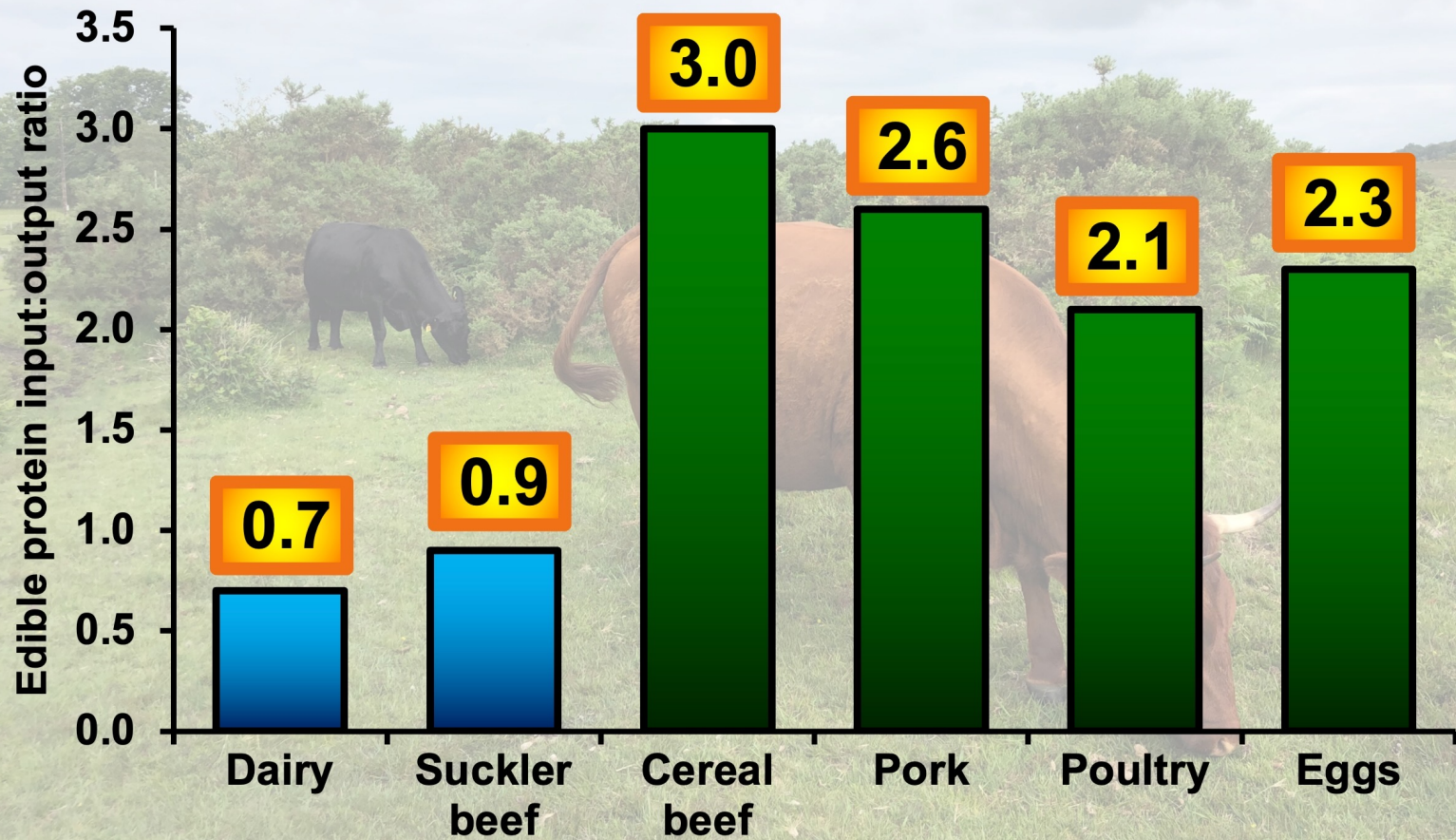


Source: Created by Jude L. Capper, 2023; data from Wilkinson and Lee (2018) Review: Use of human-edible animal feeds by ruminant livestock. *Animal*.



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



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



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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



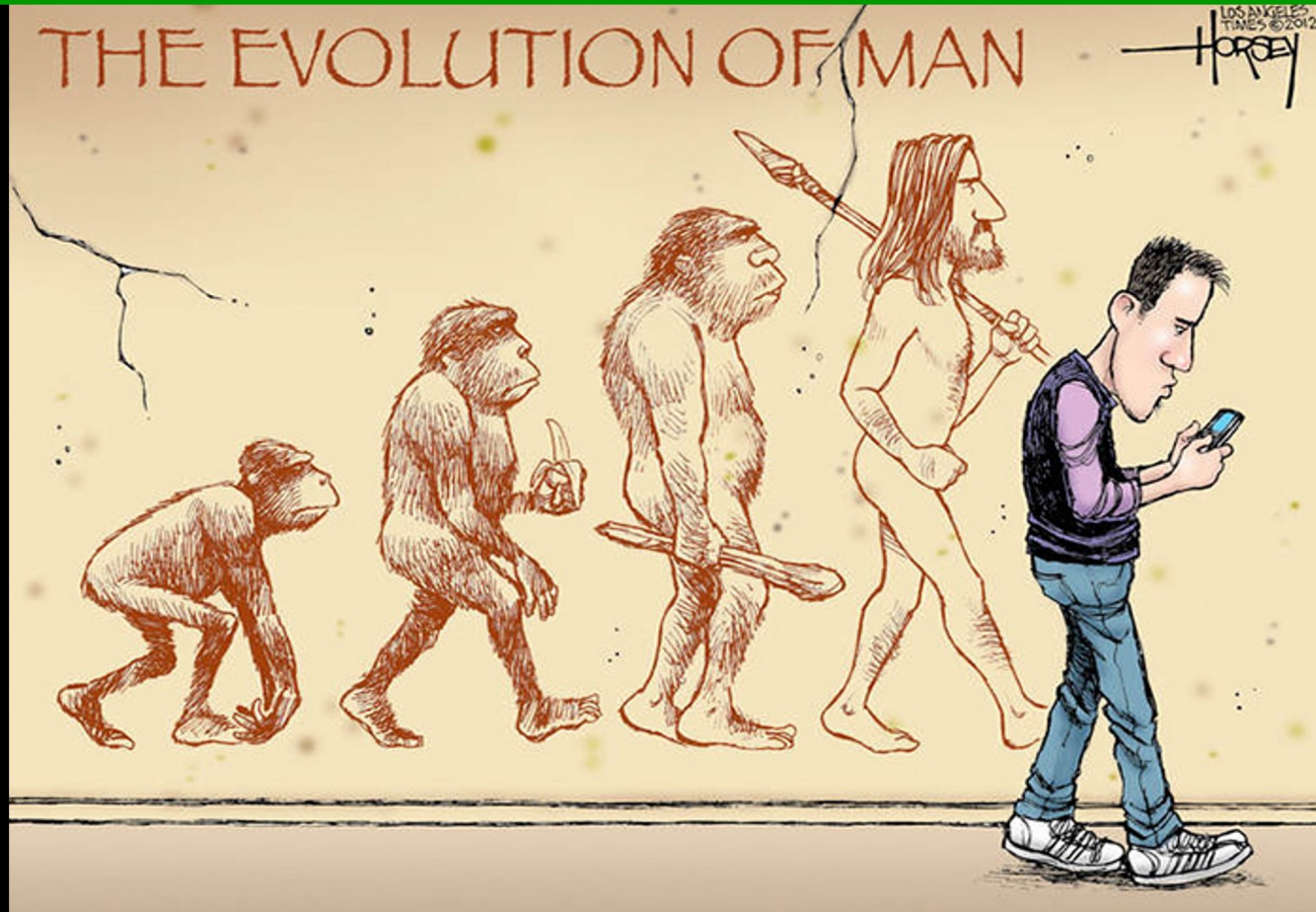
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Source: Created by Jude L. Capper, 2023.

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



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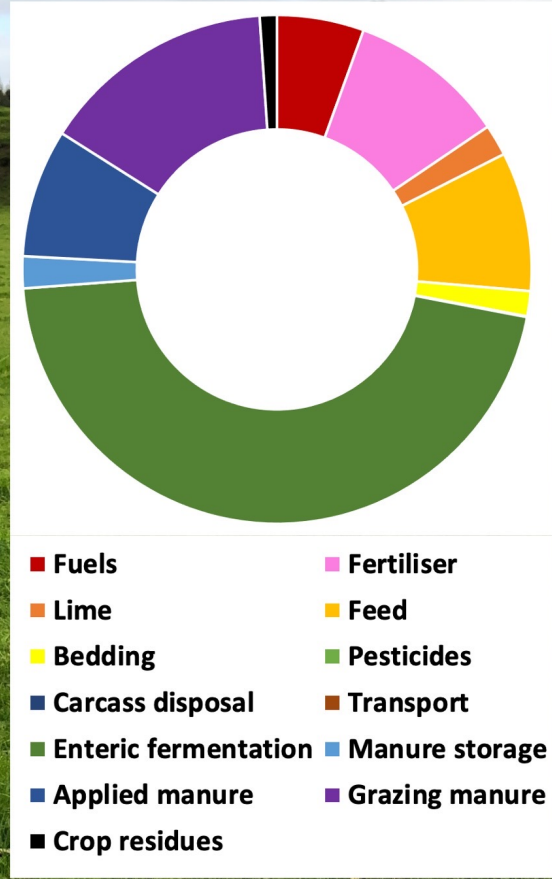


Source: Created by Jude L. Capper, 2023. Cartoon from: https://static.boredpanda.com/blog/wp-content/uploads/2016/02/funny-satirical-evolution-charles-darwin-day-251_700.jpg



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Standard footprinting tool urgently needed across the industry



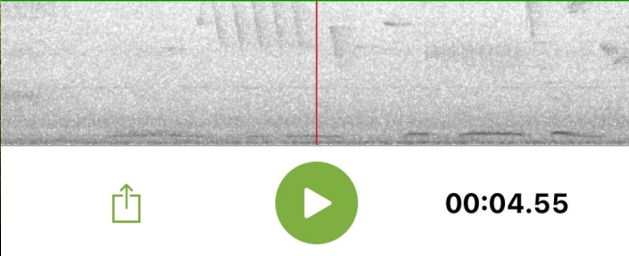
Source: Created by Jude L. Capper, 2023. Example carbon footprint results based on a beef finishing farm.

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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 😂

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		Eurasian Oystercatcher 29 May 2023 - Isle of Man, Isle of Man
	House Sparrow 7 May 2023 - Scotland, United Kingdom		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		Mistle Thrush 31 May 2023 - Magher Breck
	European Starling 29 May 2023 - Isle of Man, Isle of Man		

Manx Wildlife Trust



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

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Our biggest challenge is to keep meat and dairy in the diets of future food purchasers



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Source: Created by and photo from Jude L. Capper, 2023.



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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 55% the population of Sofia
- If all participants were based in Bulgaria they would comprise 10.3% 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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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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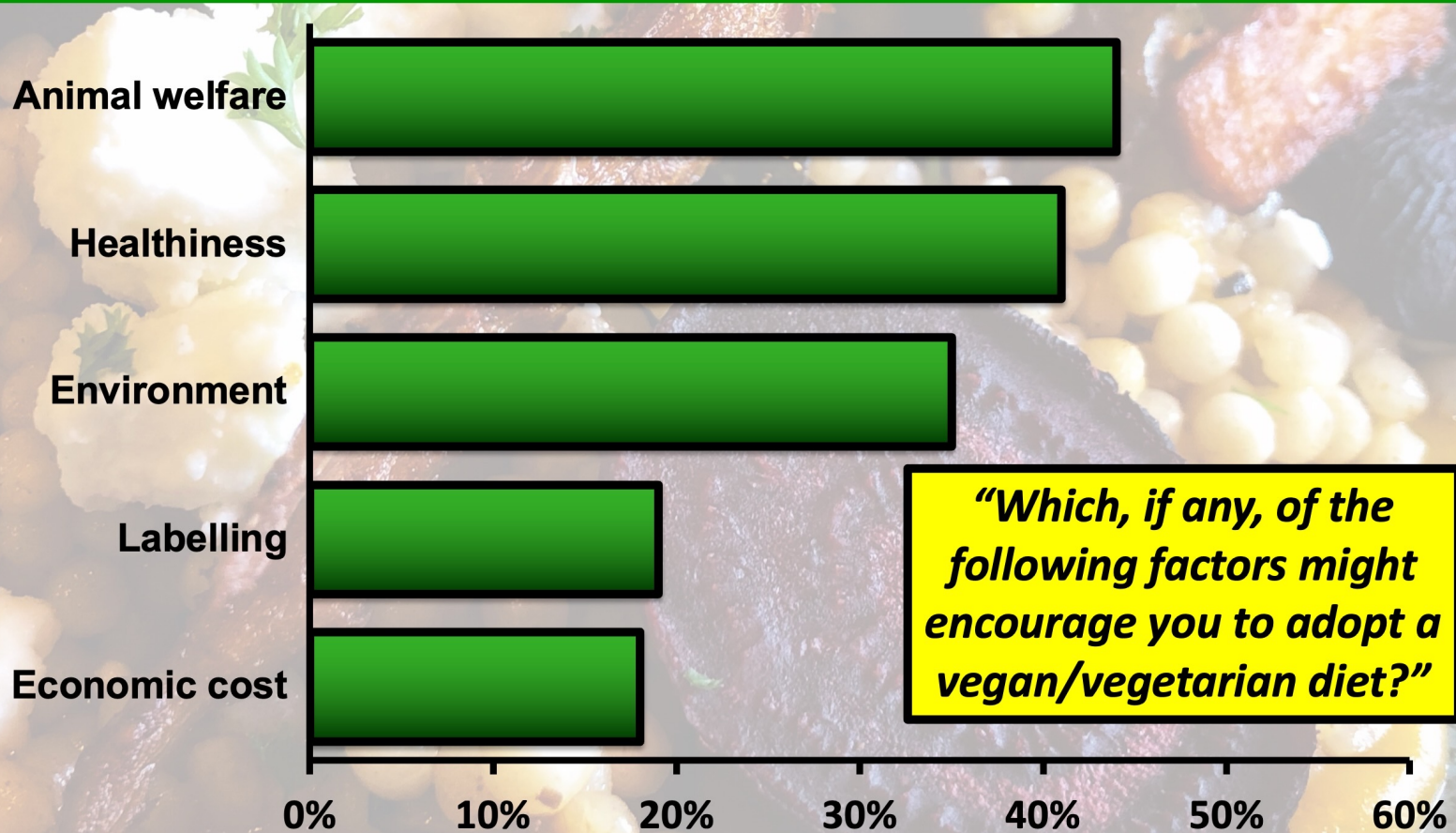


Source: Created by Jude L. Capper, 2023. Information from YouGov (2019) Is the future of food flexitarian?
<https://yougov.co.uk/topics/resources/articles-reports/2019/03/18/future-food-flexitarian>



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Animal welfare, health and the environment are primary consumer concerns

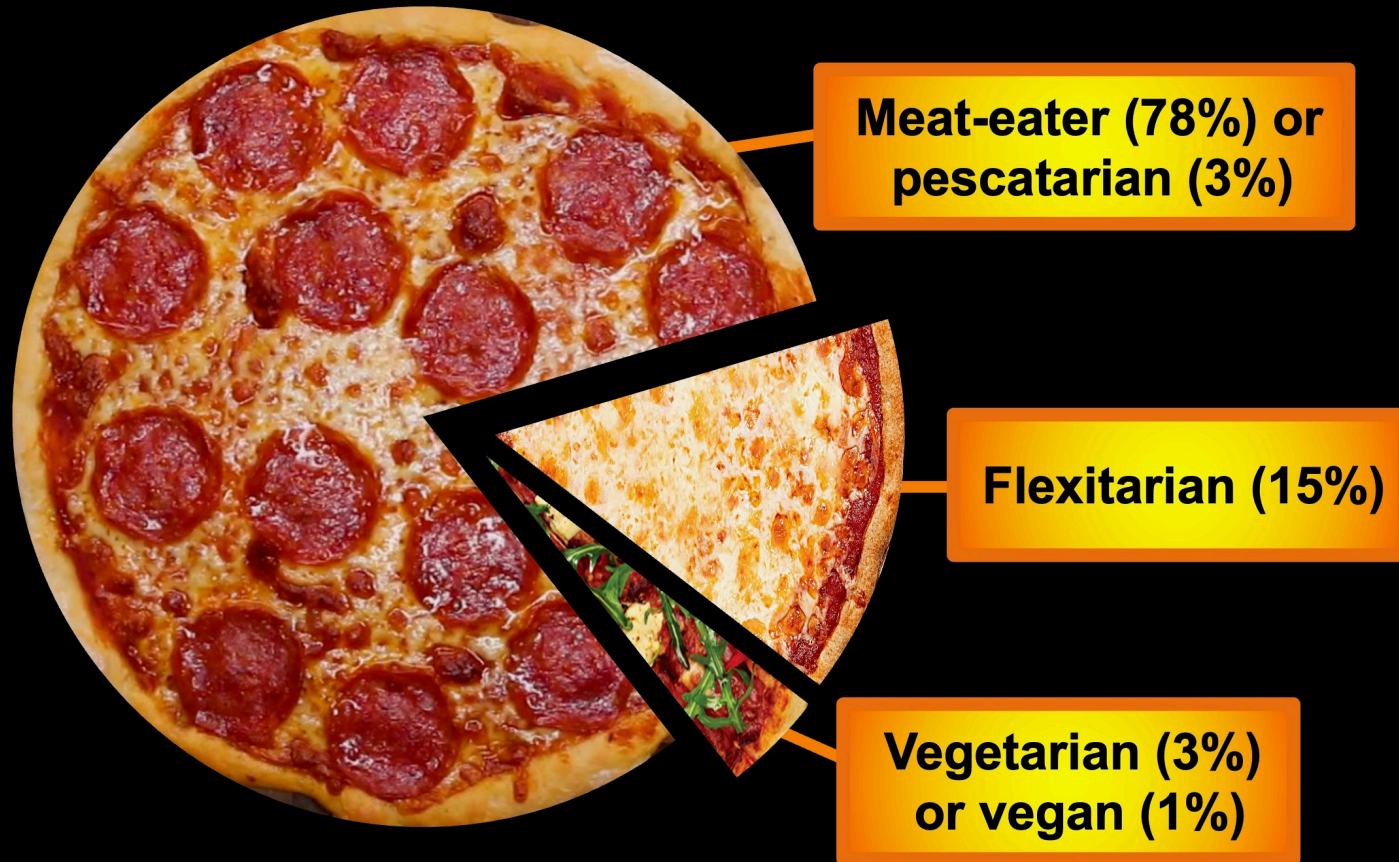


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The future probably isn't vegan, but it may be flexitarian?



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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%).



D

Plant-based dairy alternatives make environmental claims per unit of volume



White Cartons (Mighty M.LK):

- If... 1,000,000 people switched to **MIGHTY M.LK** for 1 year we could...
 - save enough water to fill over **38 Stadiums**
 - as well as saving **19,000 Acres** OF LAND
 - & offset enough CO₂ emissions to fill **63,000 hot air balloons**

Blue Cartons (M.LKology):

- If... 1,000,000 people switched to **M.LKology** for 1 year we could...
 - offset enough CO₂ emissions to fill **54,000 hot air balloons**
 - as well as saving **8,000 Acres** OF LAND
 - & save enough water to fill over **27 Stadiums**

OUR ECO IMPACT

IMPACT	Per 100ml*	Per Serving**	Grade
Carbon (CO ₂ eq.)	47g	120g	A+
Water Usage (L eq.)	180L	440L	D
Water Pollution (PO ₄ ³⁻ eq.)	0.90g	0.74g	A
Biodiversity (Species Loss Index)	0.010	0.025	A

*Calculated for supermarket sale in the UK. Online record: mondra.com/NPDS
**This pack contains four 250ml servings

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Source: Created and photo by Jude L. Capper, 2023.

D

Drinks vary in nutrient density and greenhouse gas emissions

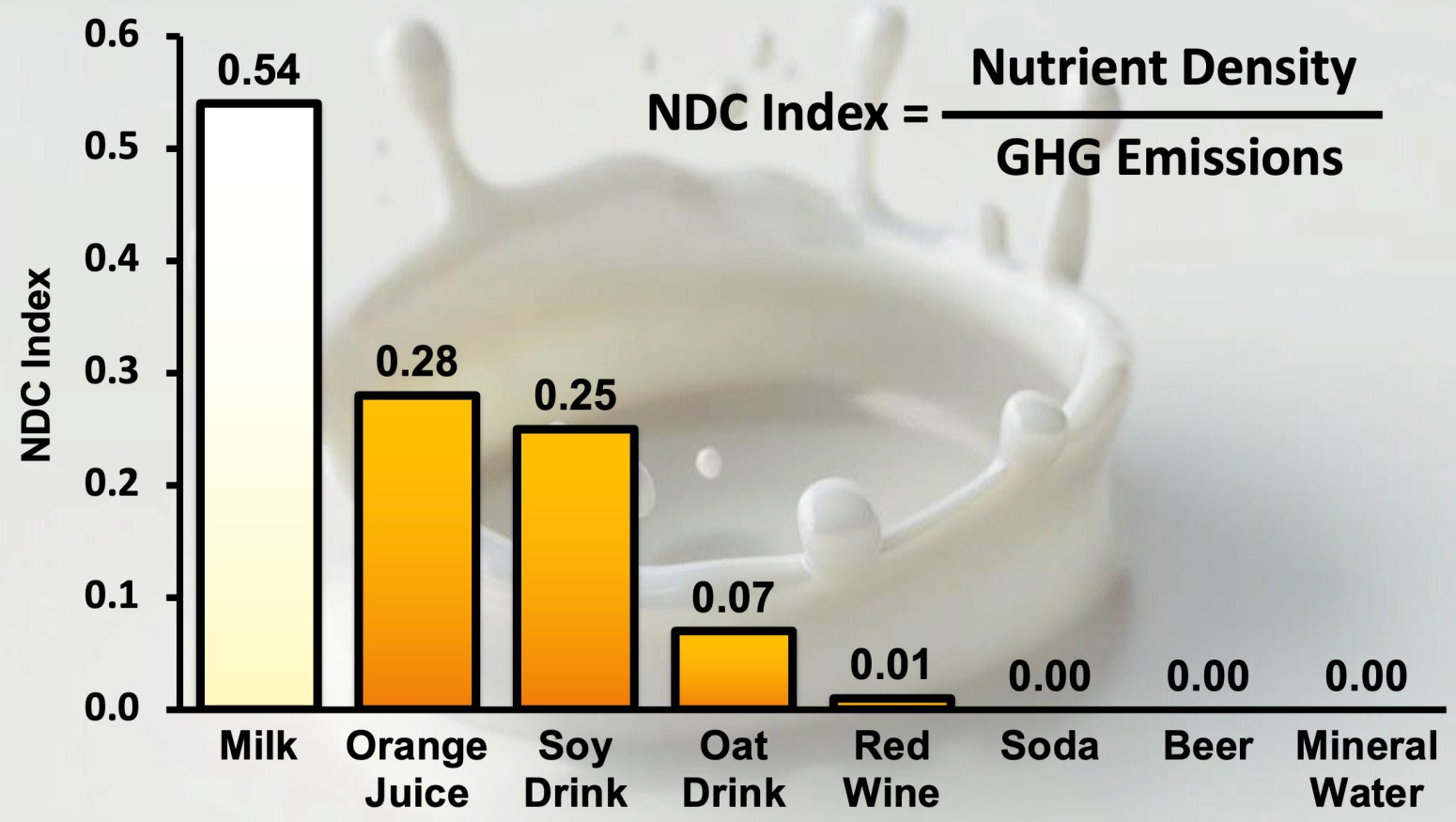
	Nutrient density	Carbon footprint g CO₂/100 g drink
Whole milk	53.8	99
Orange juice	17.2	61
Soya juice	7.6	30
Oat juice	1.5	21
Red wine	1.2	204
Soda	0.0	109
Beer	0.0	101
Water	0.0	10

Source: Created by Jude L. Capper, 2023. Data from: Smedman et al. (2010). Nutrient density to climate impact (NDCI) index of beverages. <https://doi.org/10.3402/fnr.v54i0.5170>






Nutrient density should be included when assessing carbon footprint



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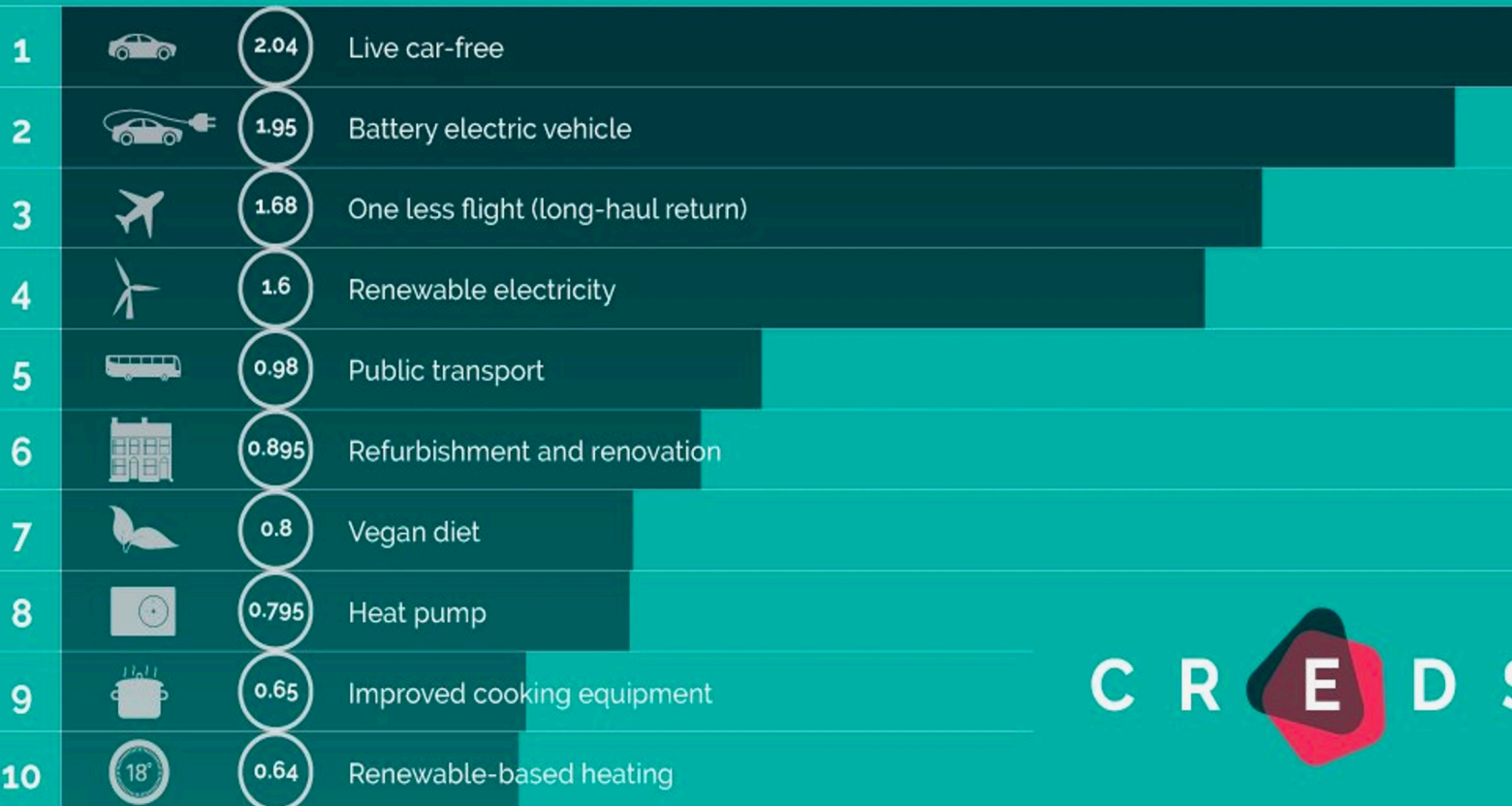


Source: Created by Jude L. Capper, 2023. Data from: Smedman et al. (2010). Nutrient density to climate impact (NDCI) index of beverages. <https://doi.org/10.3402/fnr.v54i0.5170>

CV

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

Top 10 options for reducing your carbon footprint



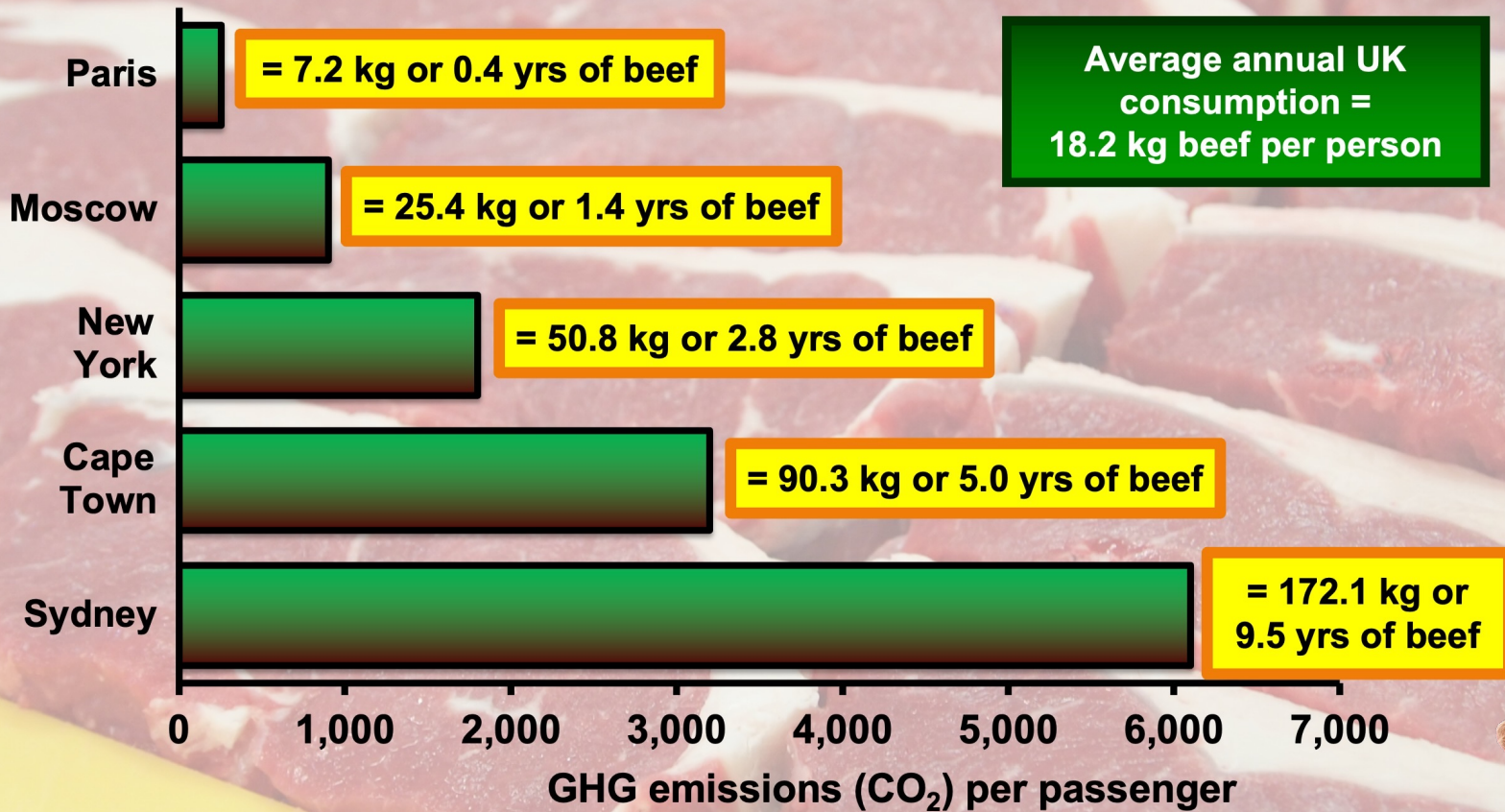
Source: Created by Jude L. Capper, 2023. Infographic adapted from Centre for Research into Energy Demand Solutions (2020). Available at: https://twitter.com/CREDS_UK/status/1262984570175176704?s=20

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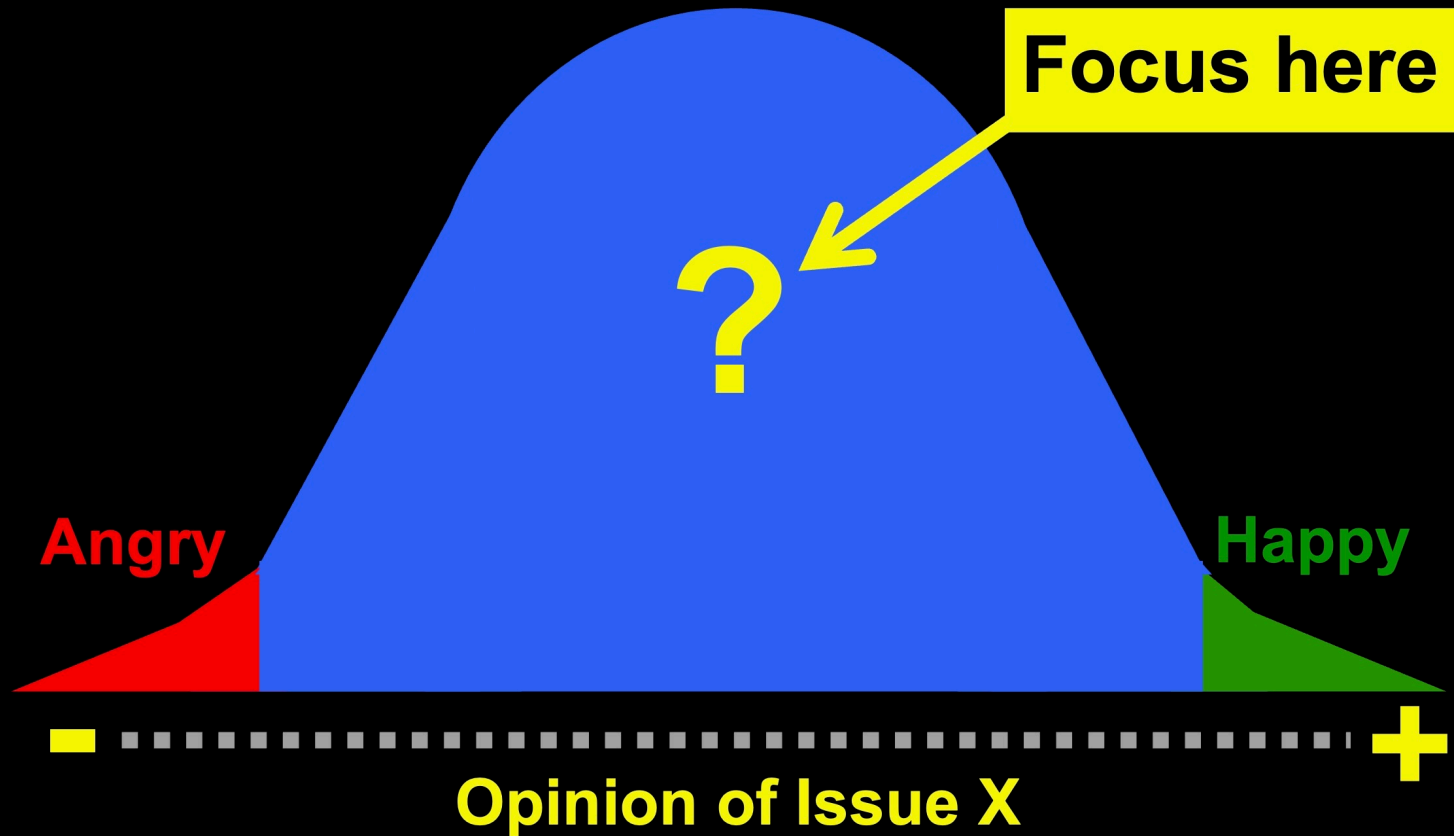
International flights emit considerable quantities of carbon compared to beef production



COM

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

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Source: Created by Jude L. Capper, 2023



COM

5 tips for positive communication

Share your values

Stay positive, polite and personal

Keep it short, simple and see-through

Focus on the important

Know when to walk away

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Source: Created by Jude L. Capper, 2023. Adapted from: Capper and Yancey (2015). Communicating Animal Science to the General Public. <https://doi.org/10.2527/af.2015-0028>



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You don't have to be the biggest,
you do need to do your best

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Source: Created by and photos from Jude L. Capper, 2023.

B

Thank you!



@Bovidiva

<http://bovidiva.com/presentationlinks>

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Questions?



Source: Created by and photo from Jude L. Capper, 2023. Cartoon from: <http://RubesCartoons.com>