



**Improving
sustainability –
from cattle, crops
and carbon to
consumer
communications**

**Prof. Jude Capper
PhD DSc (h.c.) ARAgS FRASE**

17th January 2024

Vintermøde 2024



Source: Jude L. Capper, 20

s

There is no definitive sustainable protein system – but every system can be sustainable



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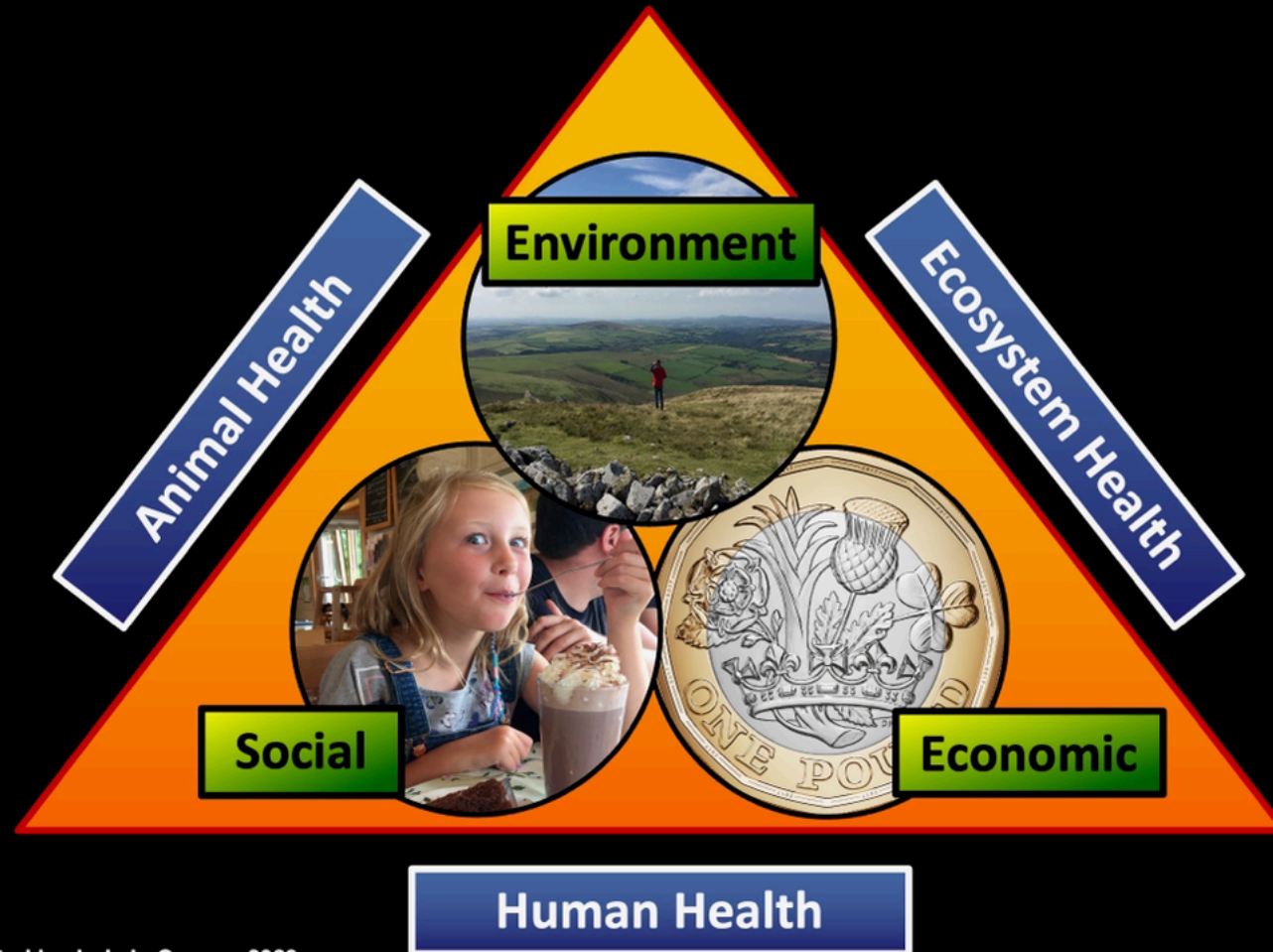
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Source: Created and photos by Jude L. Capper, 2023.

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



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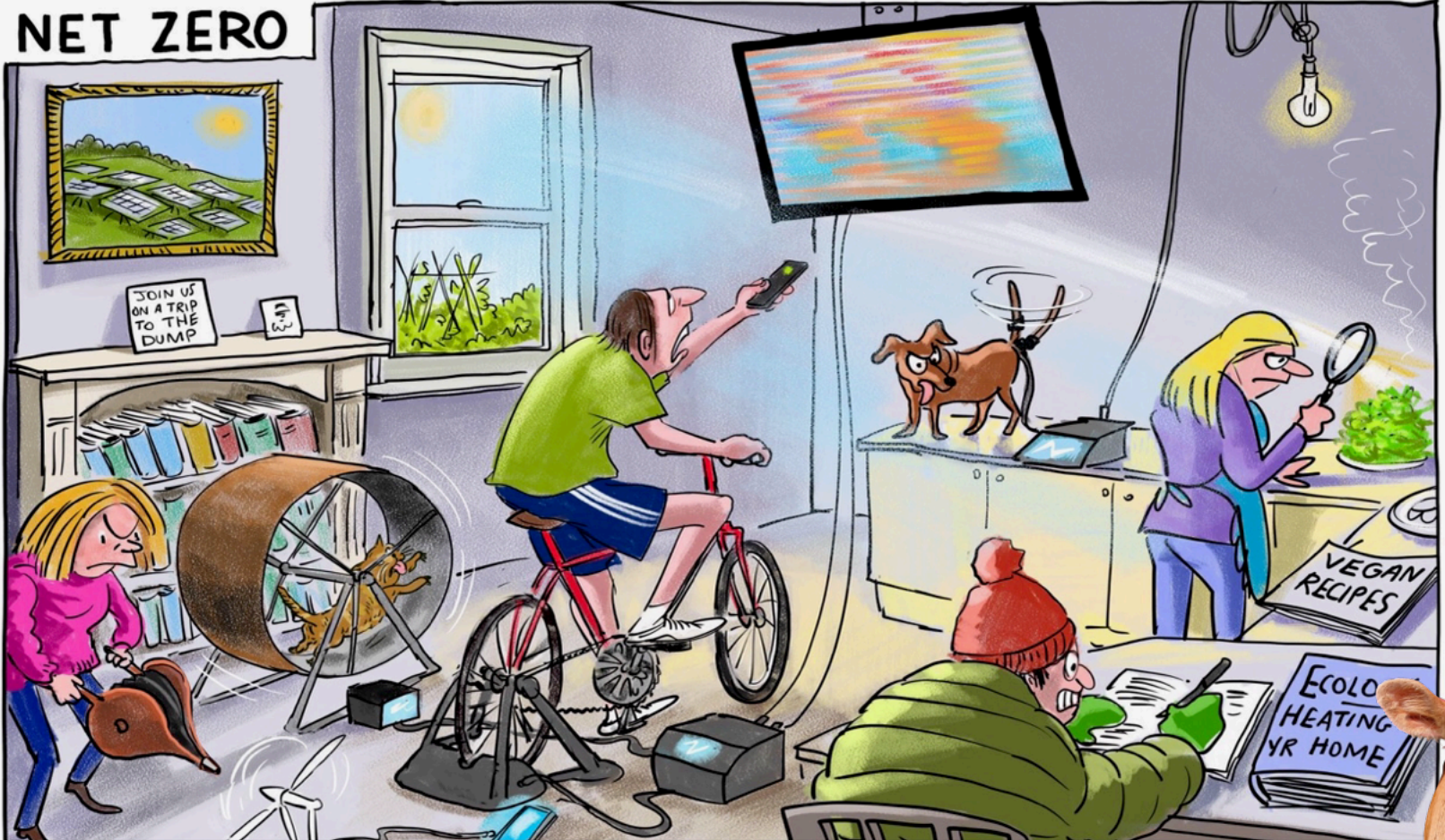


Source: Created by Jude L. Capper, 2023.



S

Net Zero is a clear priority



Source: Created by Jude L. Capper, 2023. Cartoon from: <https://twitter.com/Caroon4sale/status/1384537729460056067?s=20>

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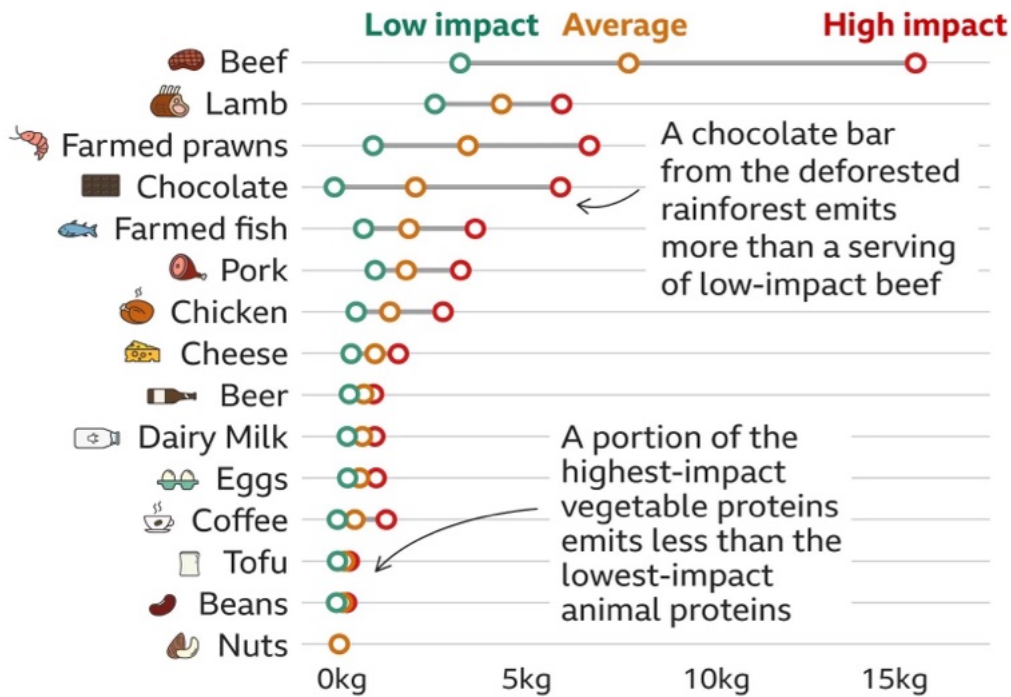




B

Media articles tend to focus on beef

Beef has the biggest carbon footprint – but the same food can have a range of impacts
 Kilograms of greenhouse gas emissions per serving



Note: The figures for each food are based on calculations from 119 countries. Serving sizes are from the British Dietetic Association (BDA) and Bupa.

Poore and Nemecek's paper is often-quoted, reporting beef GHG emissions of 4-15 kg CO₂e per serving. But is this the whole picture?

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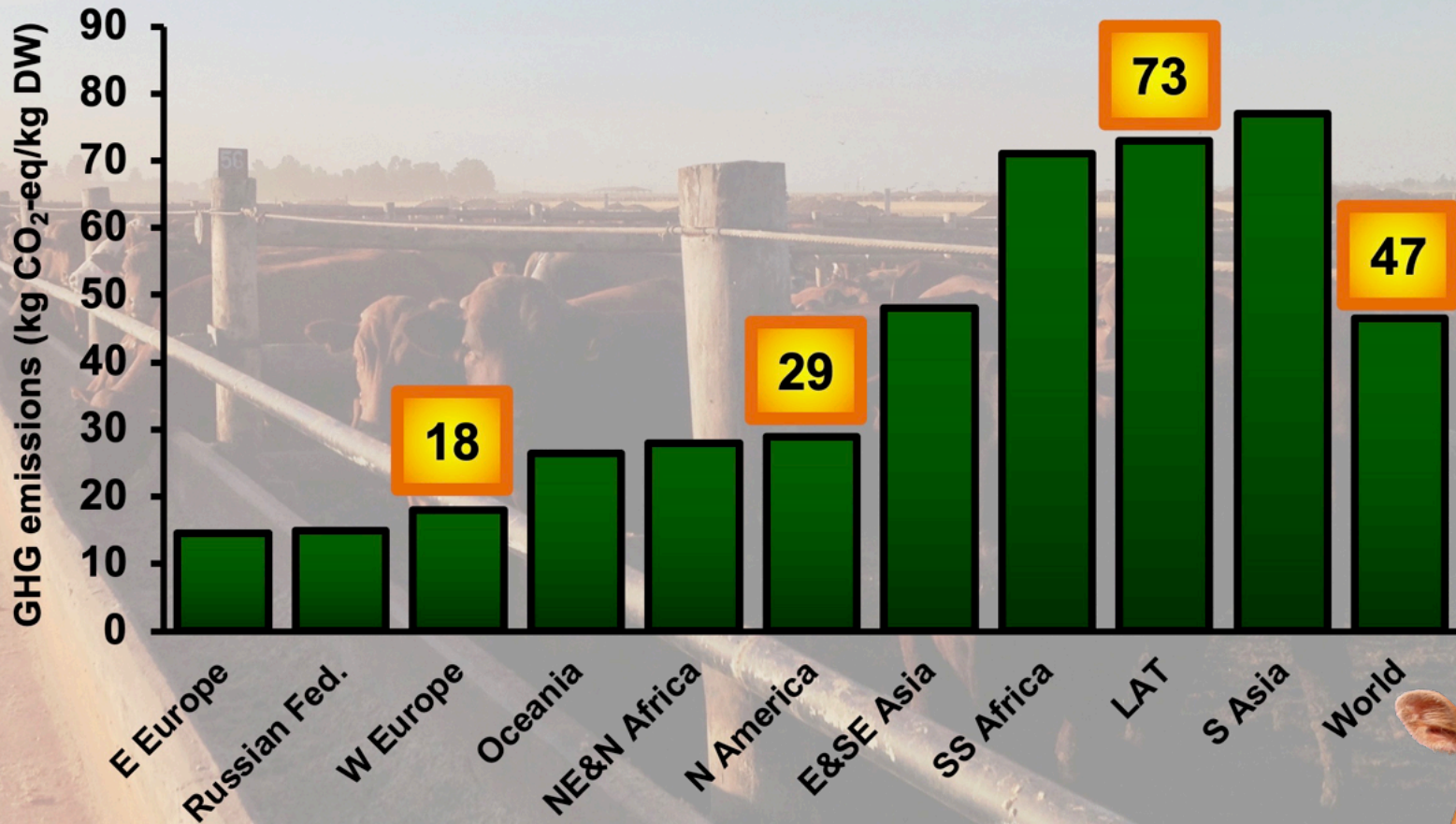


Source: Created by Jude L. Capper, 2024. Infographic from the BBC (<https://www.bbc.co.uk/news/science-environment-46459714>) citing Poore and Nemecek (2018) <https://doi.org/10.1126/science.aag0216>



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.

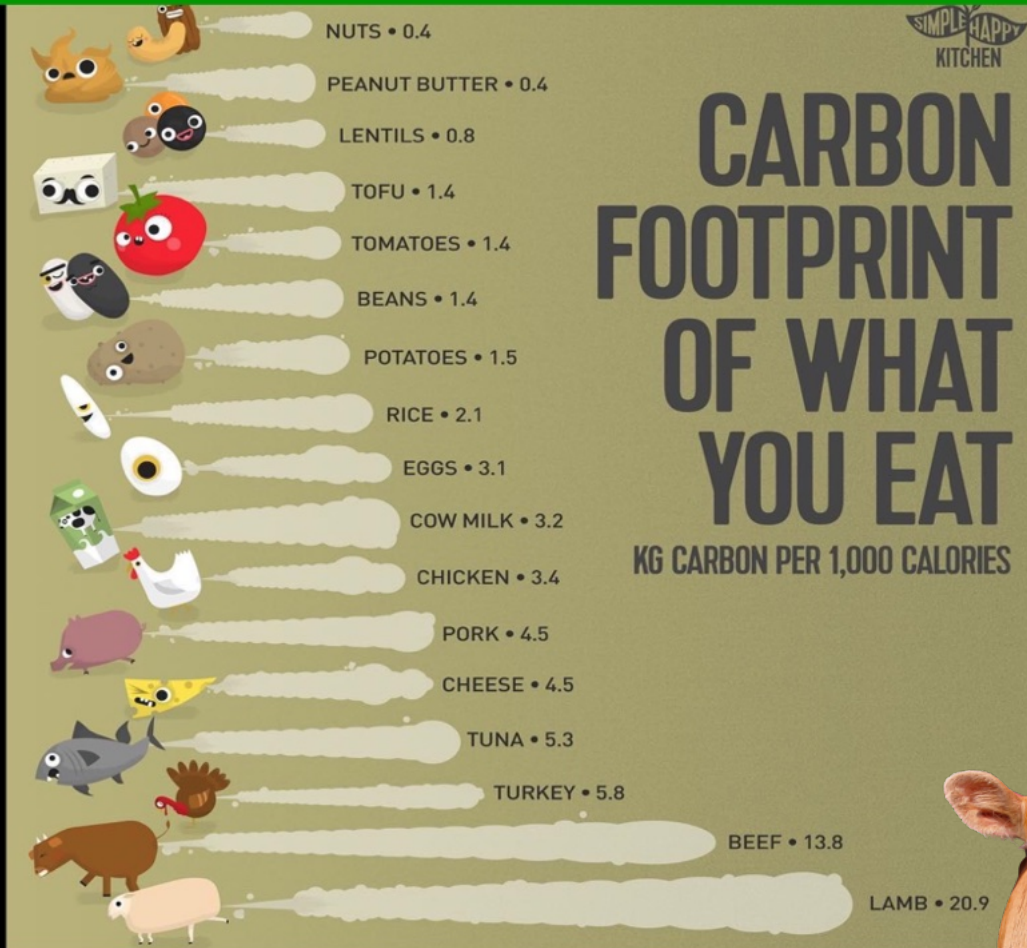




B

Global averages are meaningless

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



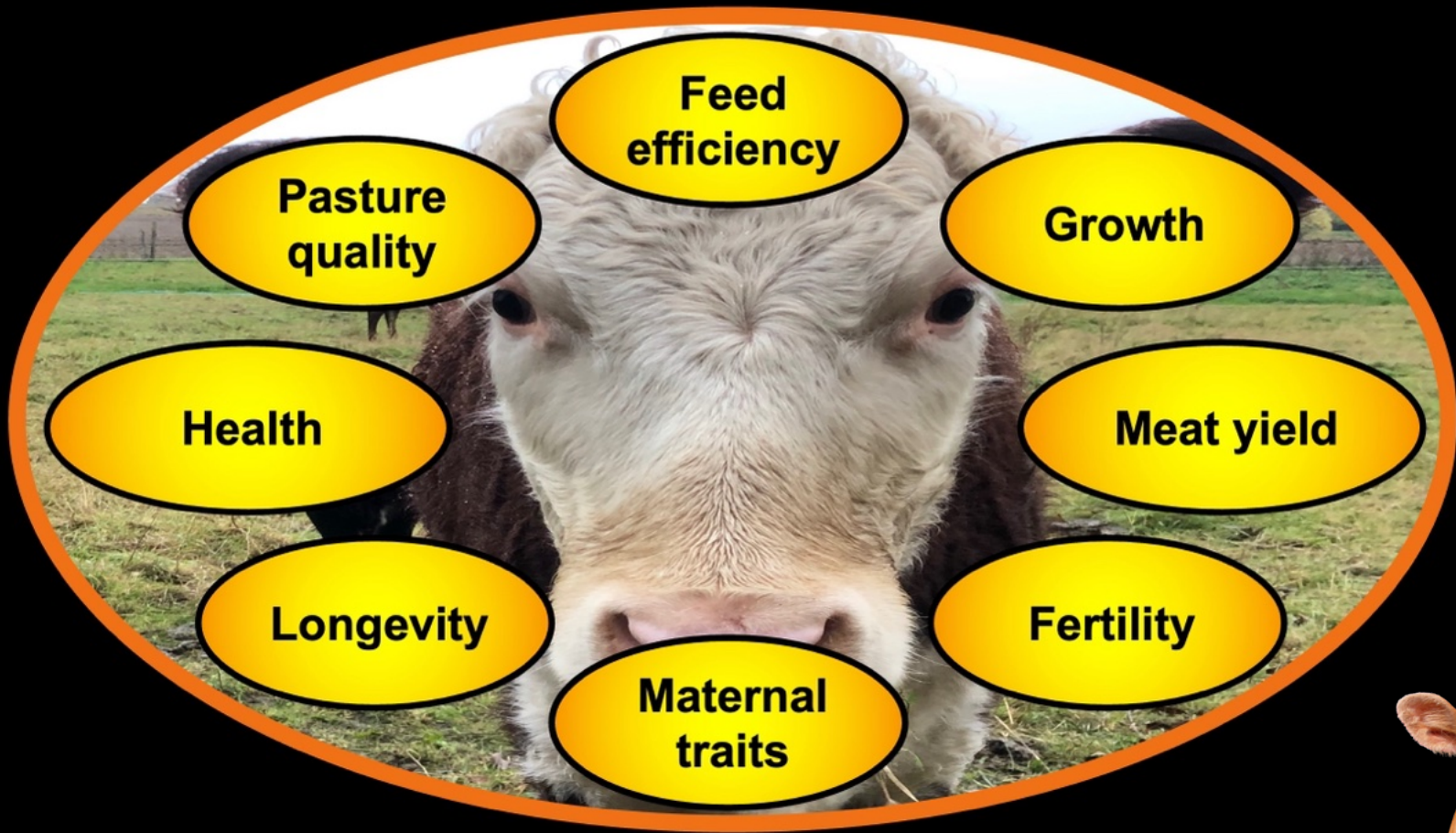
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Source: Created by Jude L. Capper, 2023. Infographic from https://www.instagram.com/simple_happy_kitchen/

B

Improving key performance indicators reduces environmental impacts



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Source: Created by Jude L. Capper, 2023

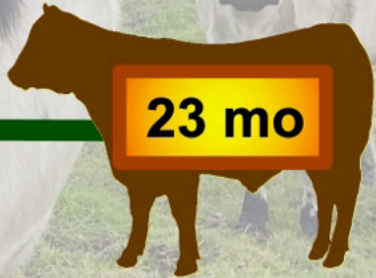




B

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 Jude L. Capper, 2023.

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%



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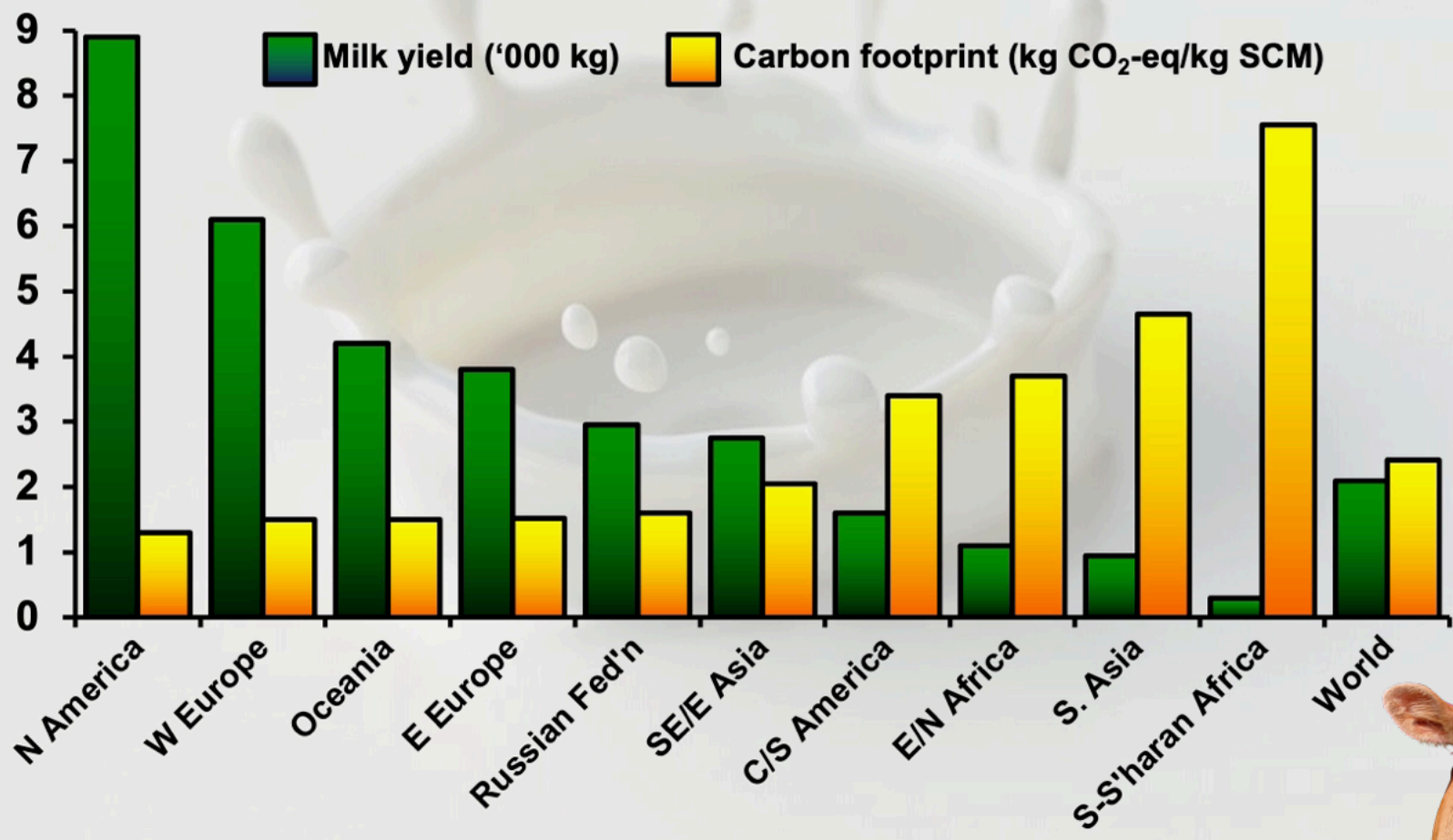
Source: Created by Jude L. Capper, 2023. Data from: Capper et al. 2023. Helping farmers navigate the green economy: A data-driven blueprint for net zero beef. British Society of Animal Science Annual Meeting. <https://doi.org/10.1016/j.anscip.2023.01.515>





D

A negative correlation exists between milk yield and carbon emissions

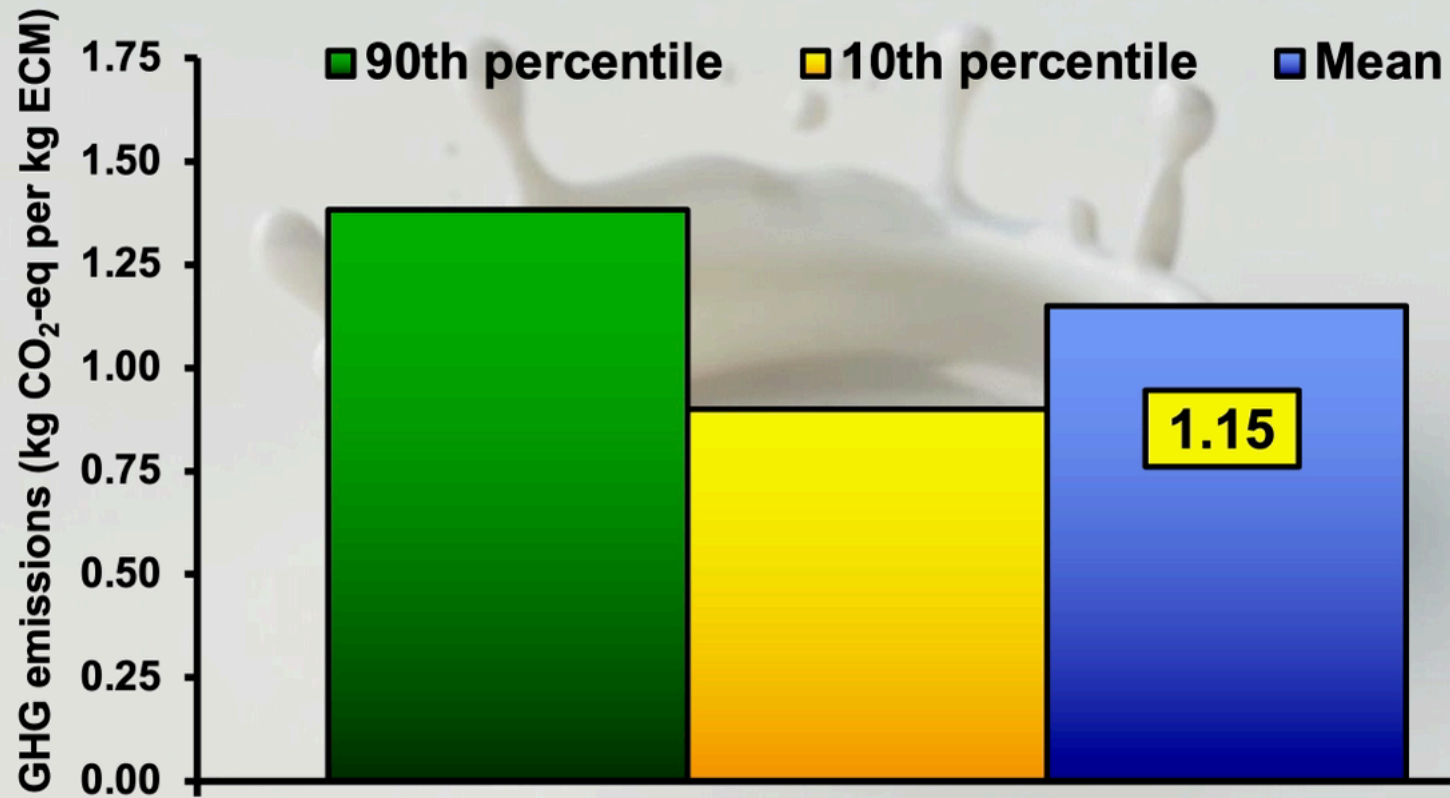


Source: Created by Jude L. Capper, 2023. Data from FAO (2010) Greenhouse Gas Emissions from the Dairy Sector. FAO, Rome, Italy.

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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>

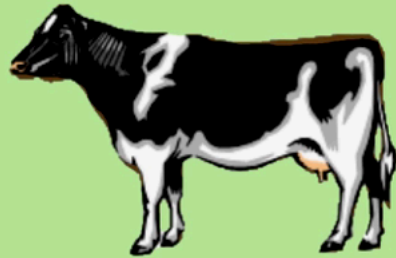
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DS

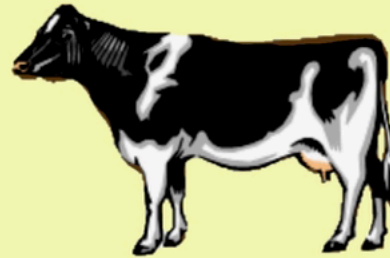
Dairy heifer losses are significant in UK herds

Birth



**100 heifers
are born**

Calving



**81 heifers
enter herd**

100 d lactation



**77 survive
past 100 days**

**Each heifer requires 6,118 kg feed DM to rear it
from birth to calving**

Source: Created by Jude L. Capper, 2023. Data from Wathes et al. (2008) <https://doi.org/10.1017/S1751731108002322> and Hanks and Kossaibati (2016) Key performance indicators for the UK national dairy herd. University of Reading, Reading, UK.

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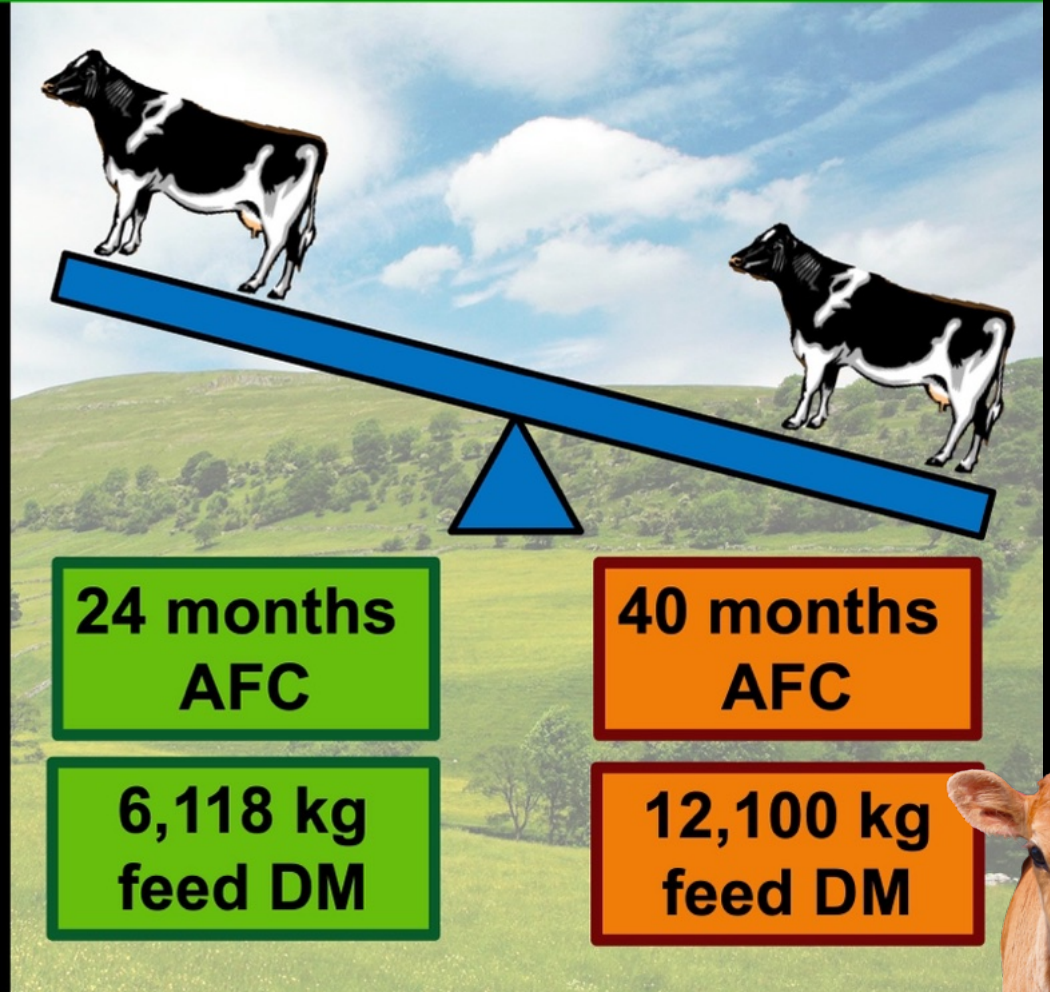


DS

Age doesn't matter – unless you're a heifer

Calving a heifer at 40 months of age requires an extra 5,982 kg feed DM. Inefficiency increases resource use and GHG emissions.

Source: Created by Jude L. Capper, 2023. Based on analysis of feed use to 24 months or 40 months at DMI = 3% of bodyweight from 24-40 months.



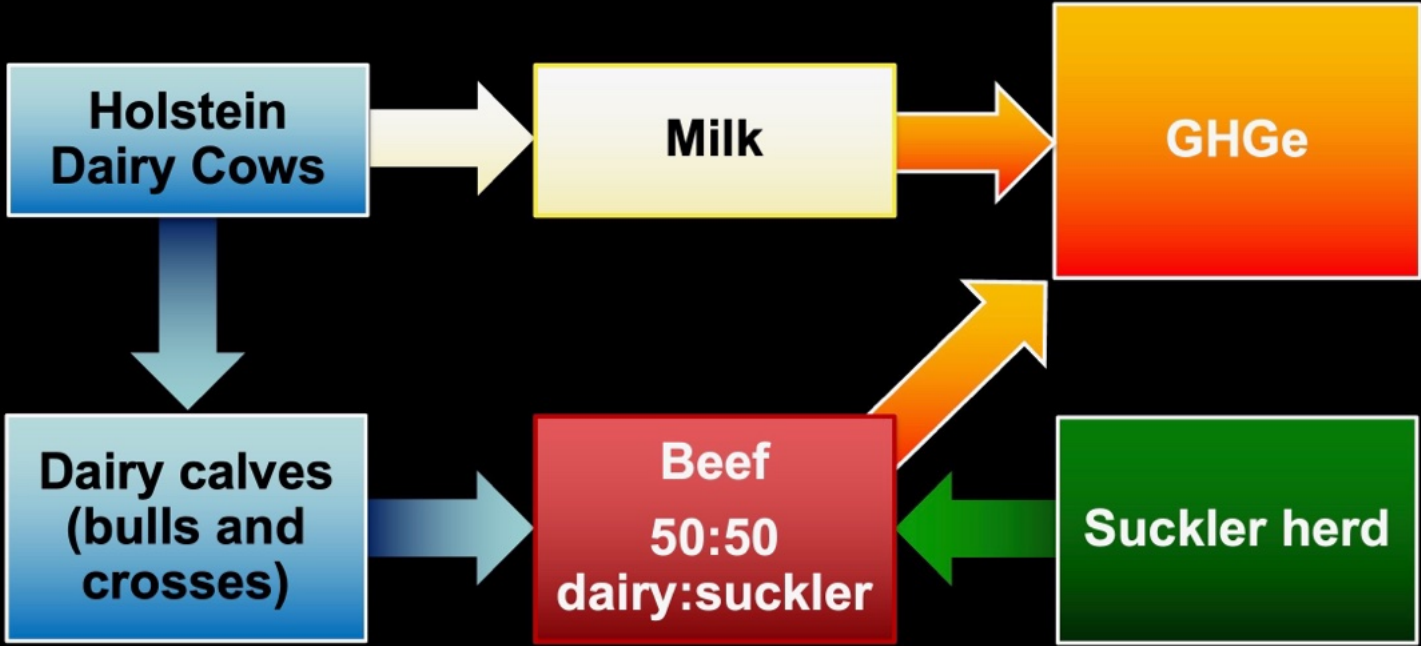
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B

High level impacts of changing to dual-purpose breeds



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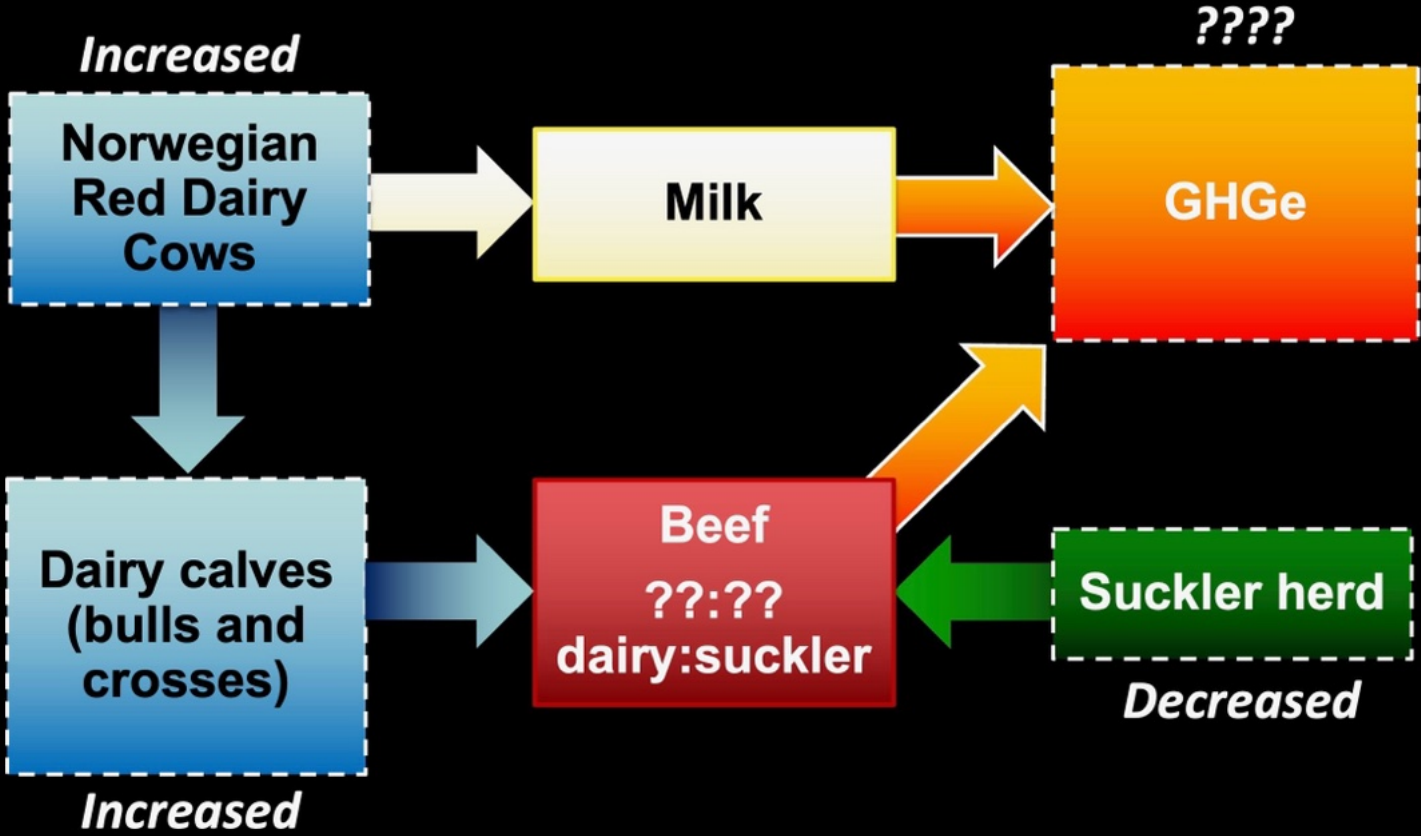


Source: Created by Jude L. Capper, 2023. Project #SCF0134 funded by DEFRA, Co-authors Sinclair and Wilkinson, HAU, 2023.



B

High level impacts of changing to dual-purpose breeds



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Source: Created by Jude L. Capper, 2023. Project #SCF0134 funded by DEFRA, Co-authors Sinclair and Wilkinson, HAU, 2023.



Dual-purpose cows: dairy model data inputs

	Holstein	N. Red
Energy-corrected milk yield, kg/d	27.5	24.7
Lactation length, d	331	323
Mature bodyweight, kg	570	537
Calving interval, d	391	383
# of lactations before culling	3.6	4.2
Cow mortality, %	6.3	3.5
Heifer replacement rate, %	27.8	23.8
Age at first calving, mo	26.6	26.9
Cows producing a live calf/yr, %	86.6	91.5
Calf birthweight, kg	42.2	39.7
Pre-weaning calf mortality, %	7.2	4.0

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Source: Created by Jude L. Capper, 2023. Project #SCF0134 funded by DEFRA, Co-authors Sinclair and Wilkinson, HAU, 2023.





B

Dual-purpose cows: cattle numbers and production

	Holstein	N. Red	Diff.	%
Dairy cows, '000 head	118.8	132.7	13.9	11.7
Dairy heifers, '000 head	75.3	72.4	-2.4	-3.16
Total dairy cattle, '000 head	194.3	205.6	11.5	5.94
Prime beef from dairy, tonnes CW	21,057	29,258	8,201	39.0
Cull beef from dairy, tonnes CW	7,124	7,303	179	2.51
Suckler cows, '000 head	96.4	64.8	-31.6	-32.8
Prime beef from sucklers, tonnes CW	21,057	14,157	-6,900	-32.8
Cull beef from sucklers, tonnes CW	4,516	3,036	-1,480	-32.8

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Source: Created by Jude L. Capper, 2023. Project #SCF0134 funded by DEFRA, Co-authors Sinclair and Wilkinson, HAU, 2023.



B

Dual-purpose cows: GHGe from beef and dairy

	Holstein	N. Red	Diff.	%
<u>Emissions intensity, kg CO₂e/kg</u>				
Dairy GHGe/kg ECM	1.478	1.512	0.034	2.29
Dairy beef GHGe/kg CW	17.2	17.7	0.48	2.81
Suckler beef GHGe/kg CW	32.4	32.4	-	-
<u>Total GHGe, tonnes CO₂e</u>				
Dairy GHGe	1,477,819	1,511,690	33,871	2.29
Dairy beef GHGe	361,446	516,304	154,858	42.8
Suckler beef GHGe	783,477	526,746	-256,731	-32.77
Total beef GHGe	1,144,923	1,043,050	-101,873	-8.90
Total cattle industry GHGe	2,622,742	2,554,740	-68,002	-2.59

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Source: Created by Jude L. Capper, 2023. Project #SCF0134 funded by DEFRA, Co-authors Sinclair and Wilkinson, HAU, 2023.

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%)

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Source: Created by Jude L. Capper, 2023. Data from FAOSTAT (2020) <http://www.fao.org/faostat/en/>

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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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Livestock are a vital resource in developing regions



"For me, Send a Cow is everything"

Source: Created by Jude L. Capper, 2023. Photo from Send a Cow (2018) <https://www.sendacow.org/blog/for-me-send-a-cow-is-everything>

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s

Livestock are a vital resource in developing regions

“I started secondary school without a petticoat; that cow bought me my first petticoat. I cannot forget that.”

"For me, Send a Cow is everything"

Source: Created by Jude L. Capper, 2023. Photo from Send a Cow (2018) <https://www.sendacow.org/blog/for-me-send-a-cow-is-everything>



S

How do we account for myriad livestock benefits in sustainability metrics?



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Source: Created by Jude L. Capper, 2023.

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Can livestock farms reach net zero?



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Source: Created by Jude L. Capper, 2023.



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Honesty is the best policy



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Source: Created by Jude L. Capper, 2024.

B

We need to be realistic about opportunities and limitations for reducing emissions



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Source: Created by Jude L. Capper, 2024.



B

We need to be realistic about opportunities and limitations for reducing emissions



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Source: Created by Jude L. Capper, 2024.



B

We need to be realistic about opportunities and limitations for reducing emissions



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Source: Created by Jude L. Capper, 2024.



B

Huge variation in farm footprints – need to exemplify and learn from the best



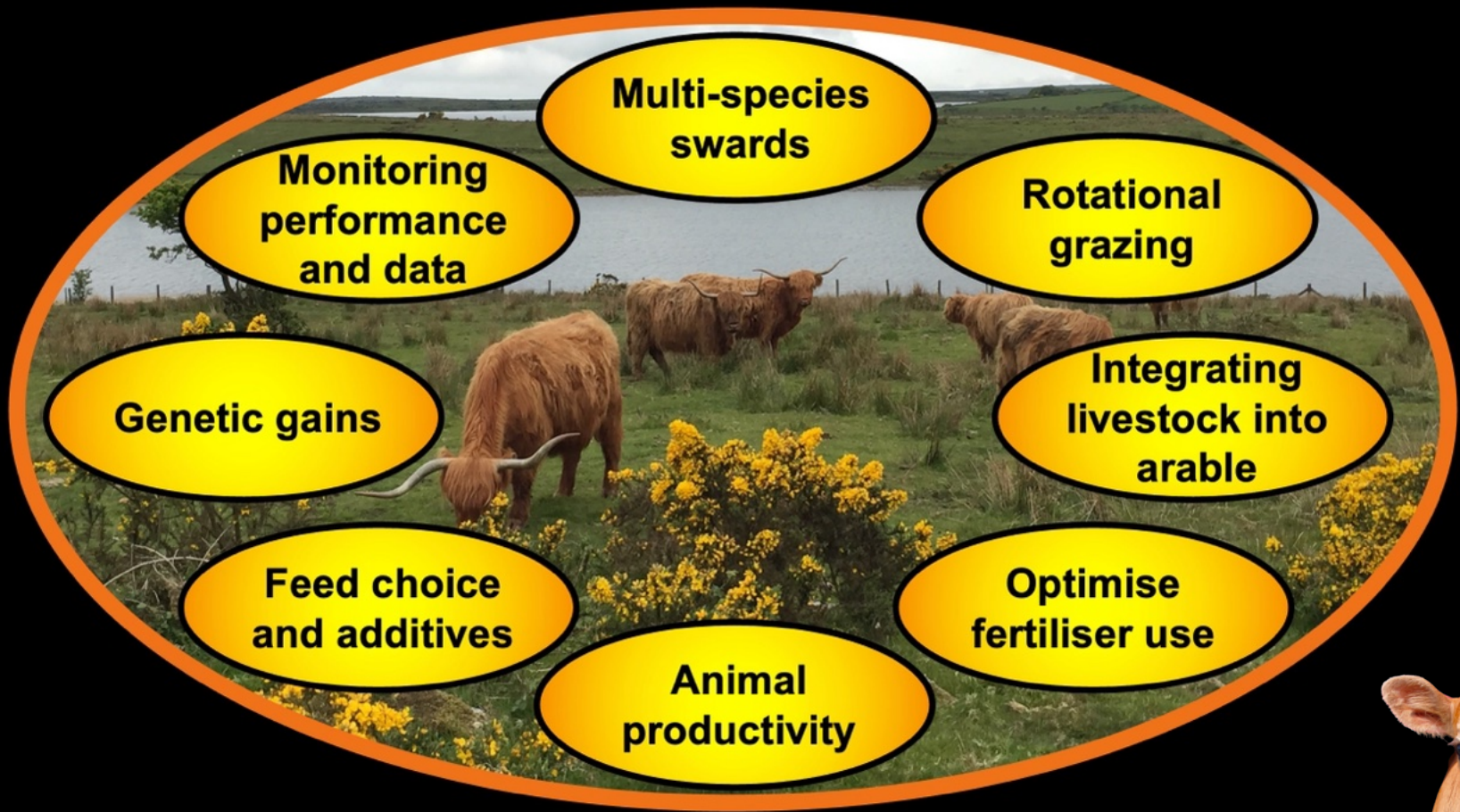
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Source: Created by Jude L. Capper, 2024.

B

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

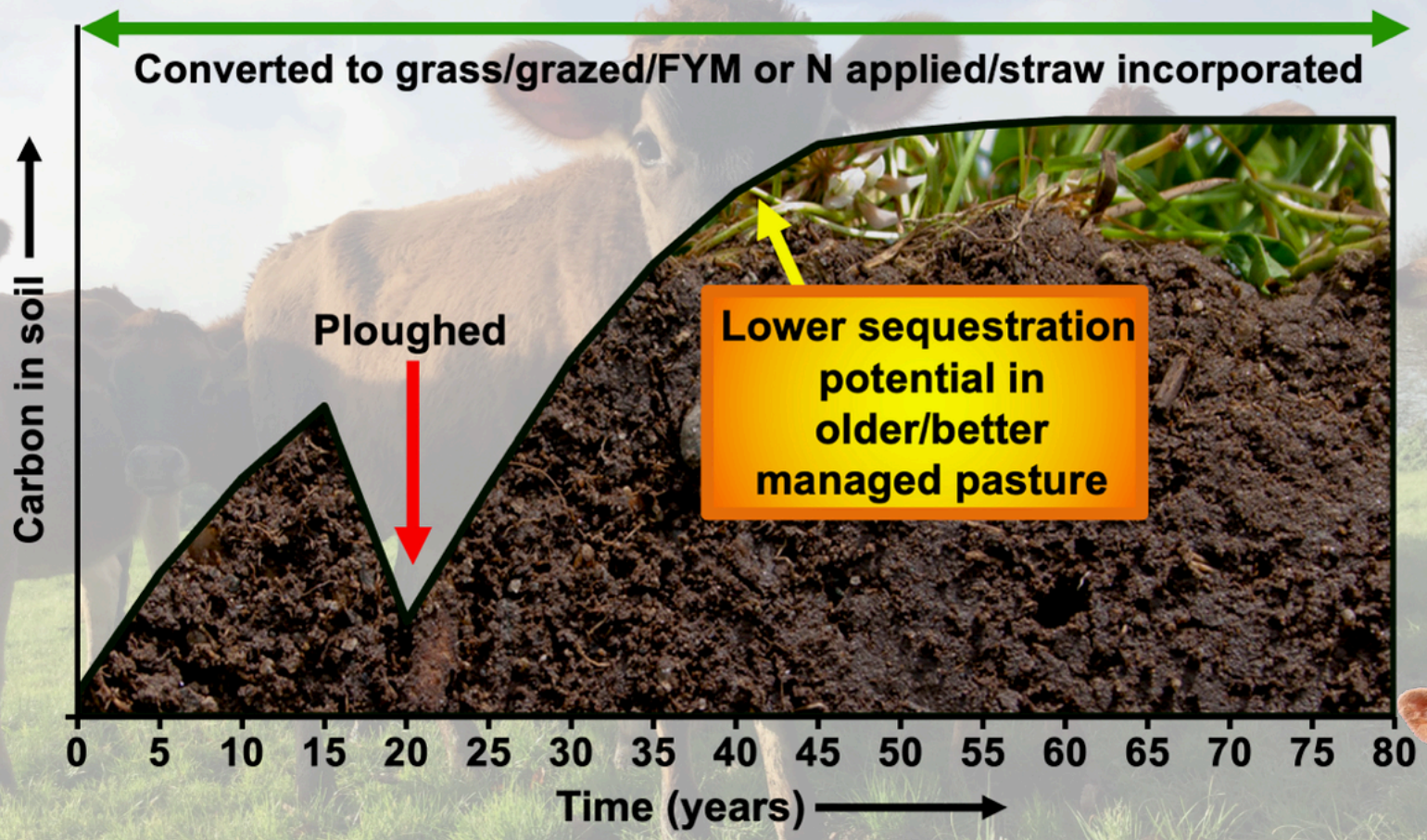


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S

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



Source: Created by Jude L. Capper, 2023 as an example of soil carbon sequestration. Data from: Poulton et al. (2017) *Global Change Biology*.



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AH

Disease losses are significant and preventable, but the sustainability impacts aren't quantified

Lost: 20%

Harvested: 80%

At the worldwide level, average losses due to animal diseases are more than 20% (OIE, 2008)

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Source: Created by Jude L. Capper, 2024. Data from: World Organization for Animal Health. 2008.
<http://www.oie.int/for-the-media/editorials/detail/article/feeding-the-world-better-by-controlling-animal-diseases>



AH

Impacts of disease on maintaining livestock production

Reduced milk/meat yield = need more animals

Increased mortality = need more animals

Failure to wean = need more animals

Failure to conceive = need more time

Reduced growth rates = need more time

Greater resource use
Higher economic cost

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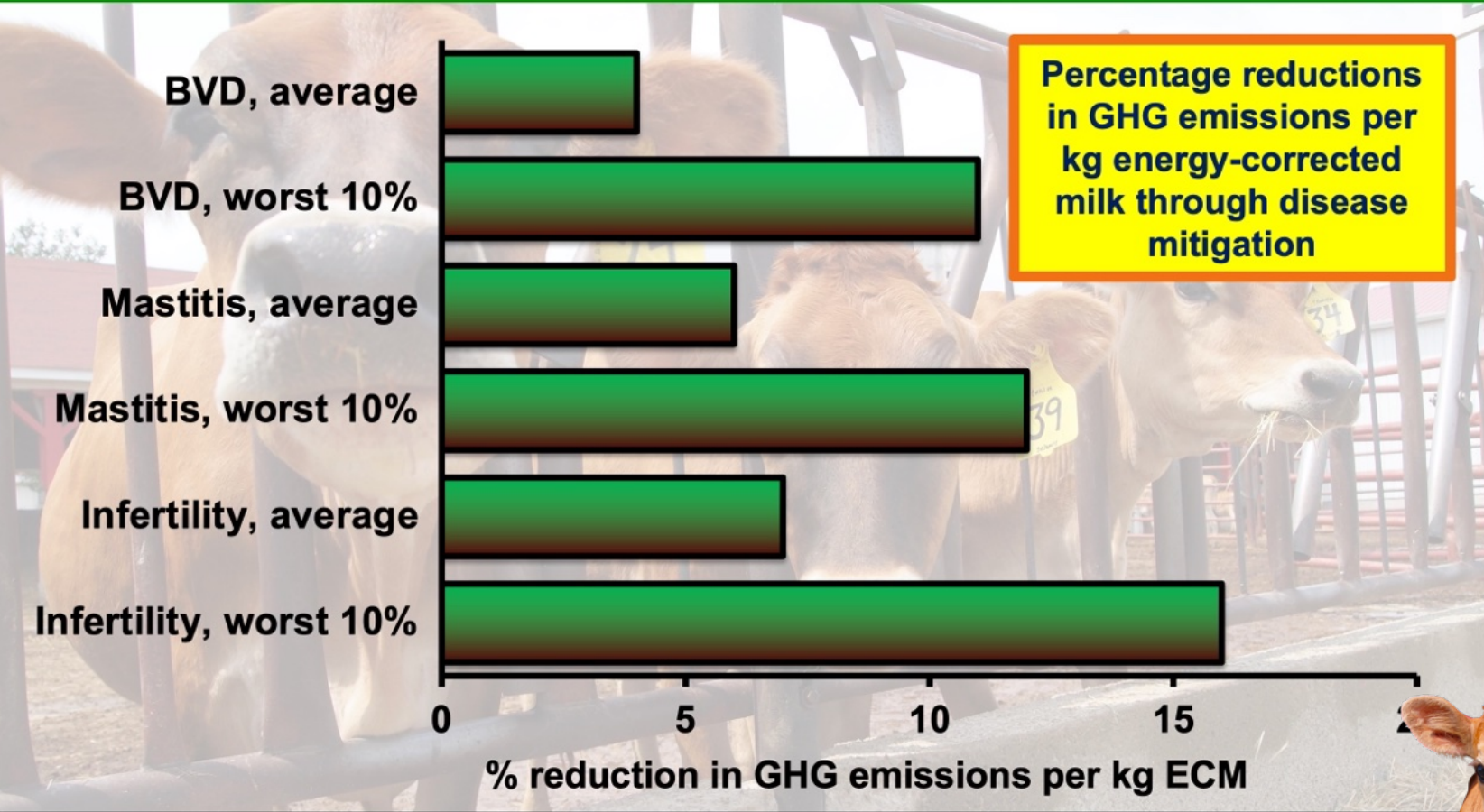


Source: Created by Jude L. Capper, 2023. Data from: Capper & Williams (2023) <https://doi.org/10.1016/j.tvjl.2023.105988>





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



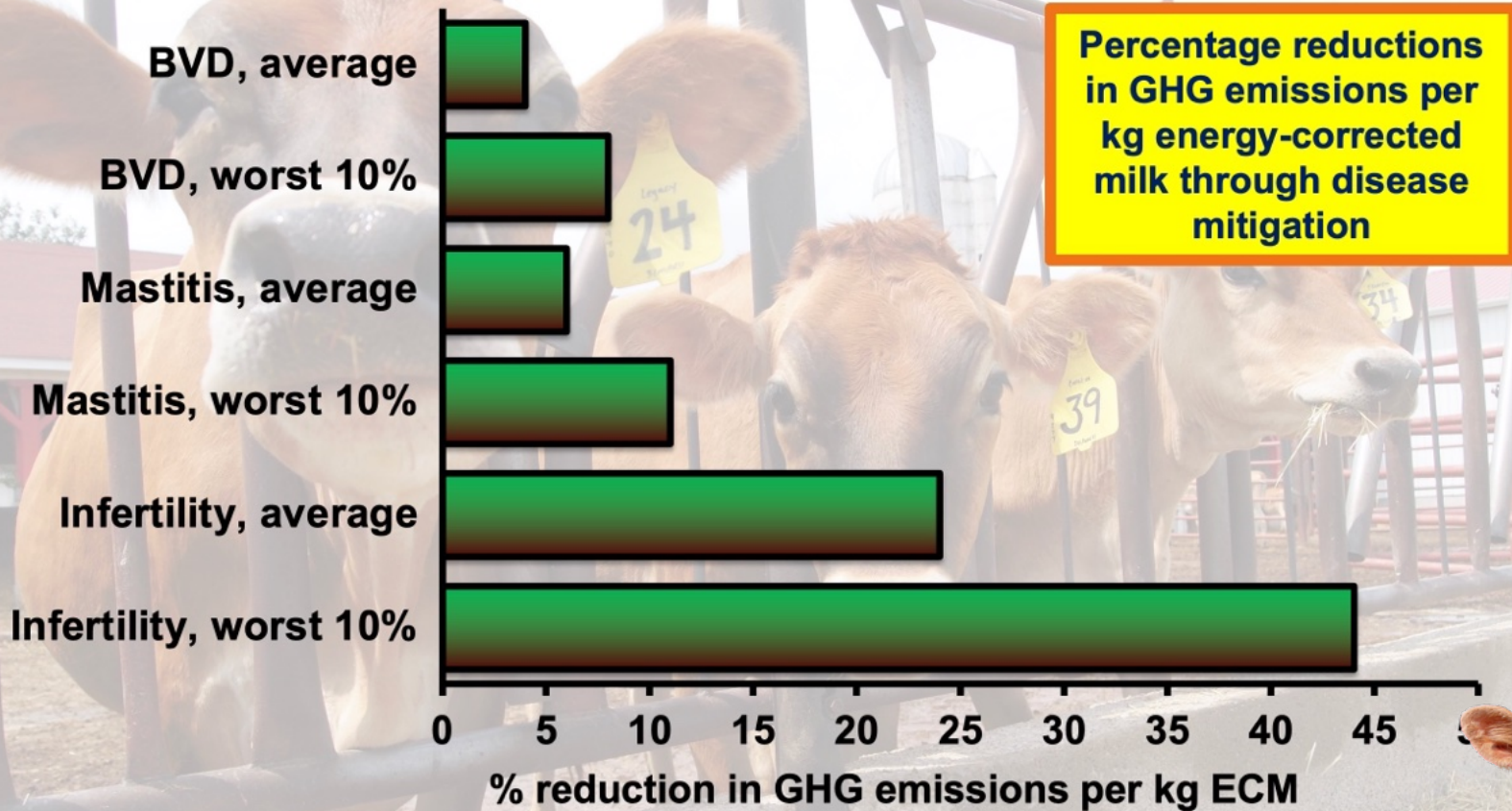
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Source: Created by Jude L. Capper, 2023. Data from: Statham et al. 2021. Dairy Cattle Health and Greenhouse Gas Emissions Pilot Study: Chile, Kenya and the UK.
Available from: <https://dairysustainabilityframework.org/wp-content/uploads/2020/10/Dairy-Cattle-Health-and-GHG-Emissions-Pilot-Study-Report.pdf>



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



HfA

“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

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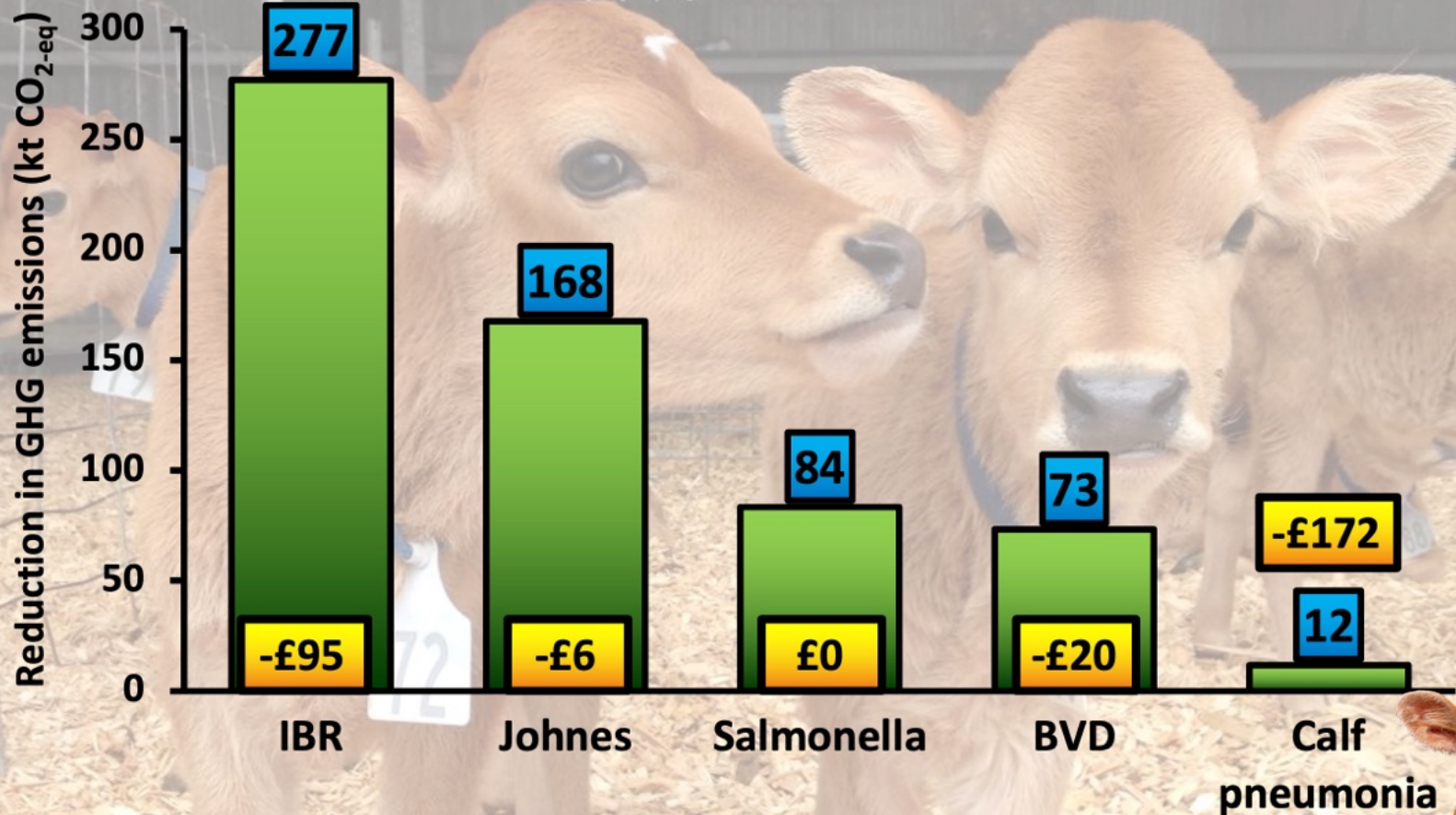
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Source: Created by Jude L. Capper, 2023. Economic data from Mason-D’Croz et al. (2020) <https://doi.org/10.1038/s43016-020-0057-2>. Other data – J. Capper – submitted.



AH

Vaccination against endemic disease reduces GHG emissions and is cost-effective



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Source: Created by Jude L. Capper, 2023. Data from: ADAS (2015) Study to Model the Impact of Controlling Endemic Cattle Diseases and Conditions on National Cattle Productivity, Agricultural Performance and Greenhouse Gas Emissions. ADAS UK Ltd, Helsby, UK.

AH

94% of consumers believe that animal welfare is important

As citizens, we care about health and welfare; as consumers, we choose on price, taste and nutrition: weak willingness to pay for welfare



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Source: Created by Jude L. Capper, 2023. Data from: Eurobarometer. 2015. Attitudes of Europeans towards Animal Welfare. The European Commission, Brussels, Belgium.



B

Is there always a trade-off between low carbon and high welfare?



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Source: Created by Jude L. Capper, 2023



D

Does this farm have good welfare?



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





D

Does this farm have good welfare?



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





D

Does this farm have good welfare?



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





D

Do welfare and productive life compliment or conflict? Should cows live for 25 years?

WHEN THEY ARE ALLOWED TO LIVE NATURALLY, COWS CAN LIVE AS LONG AS 25 YEARS.



BUT ON FACTORY FARMS, COWS LIVE ONLY A FEW YEARS BEFORE THEY ARE KILLED AND TURNED INTO A PAIR OF SHOES OR A BELT.



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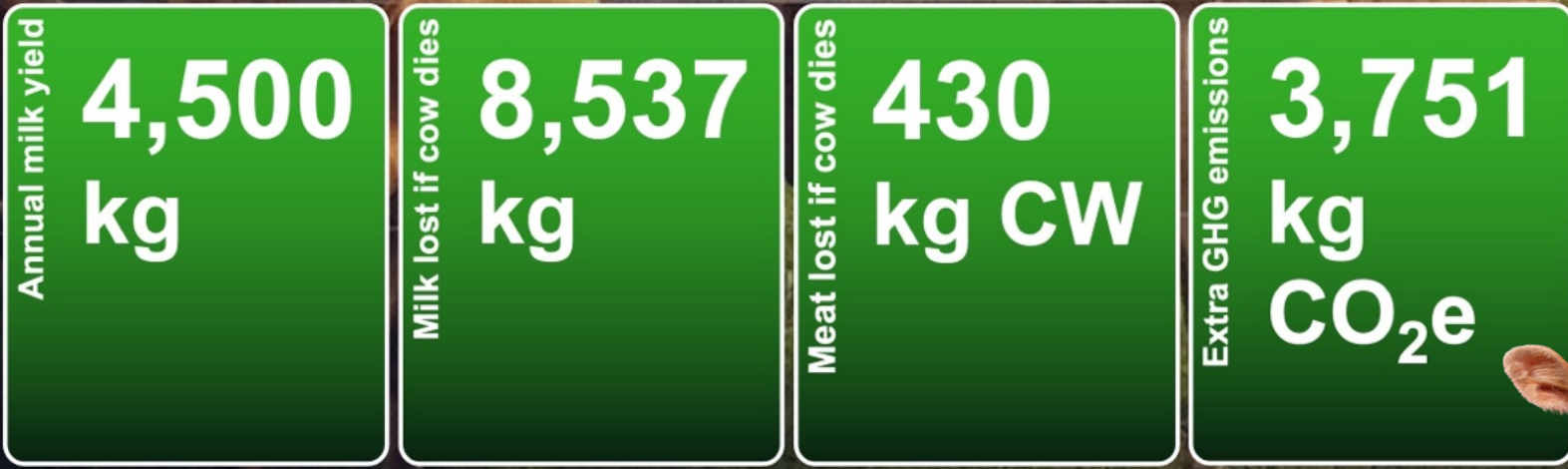
Source: Created by Jude L. Capper, 2023. Infographic from PETA (2023) "A Cow's Life" comic book: <https://www.petakids.com/comics/cows-life/>

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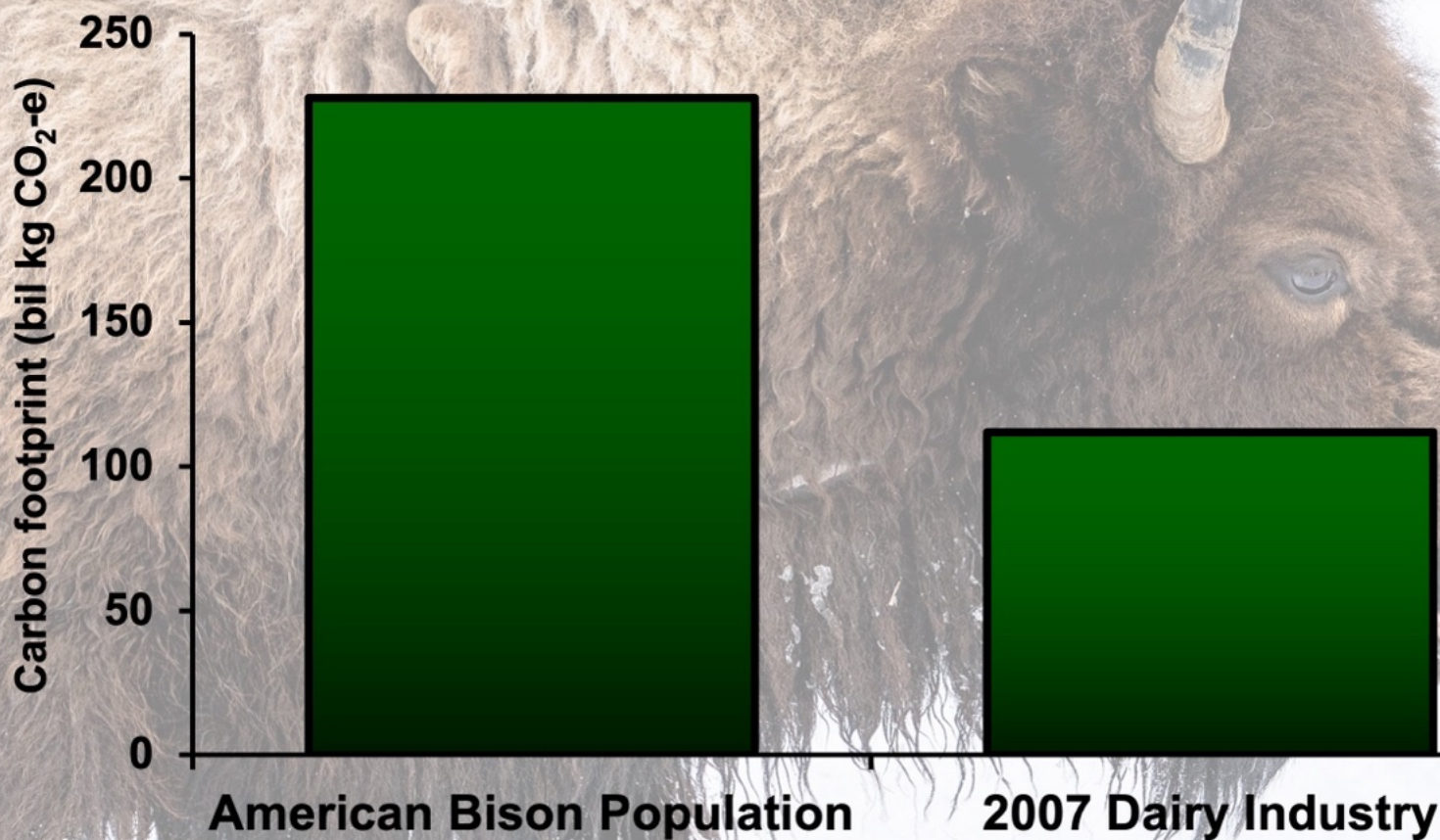


D

What are the milk, meat and greenhouse gas implications of global dairy cow mortality?



D
Historical bison population had GHG emissions twice that of the 2007 US dairy industry



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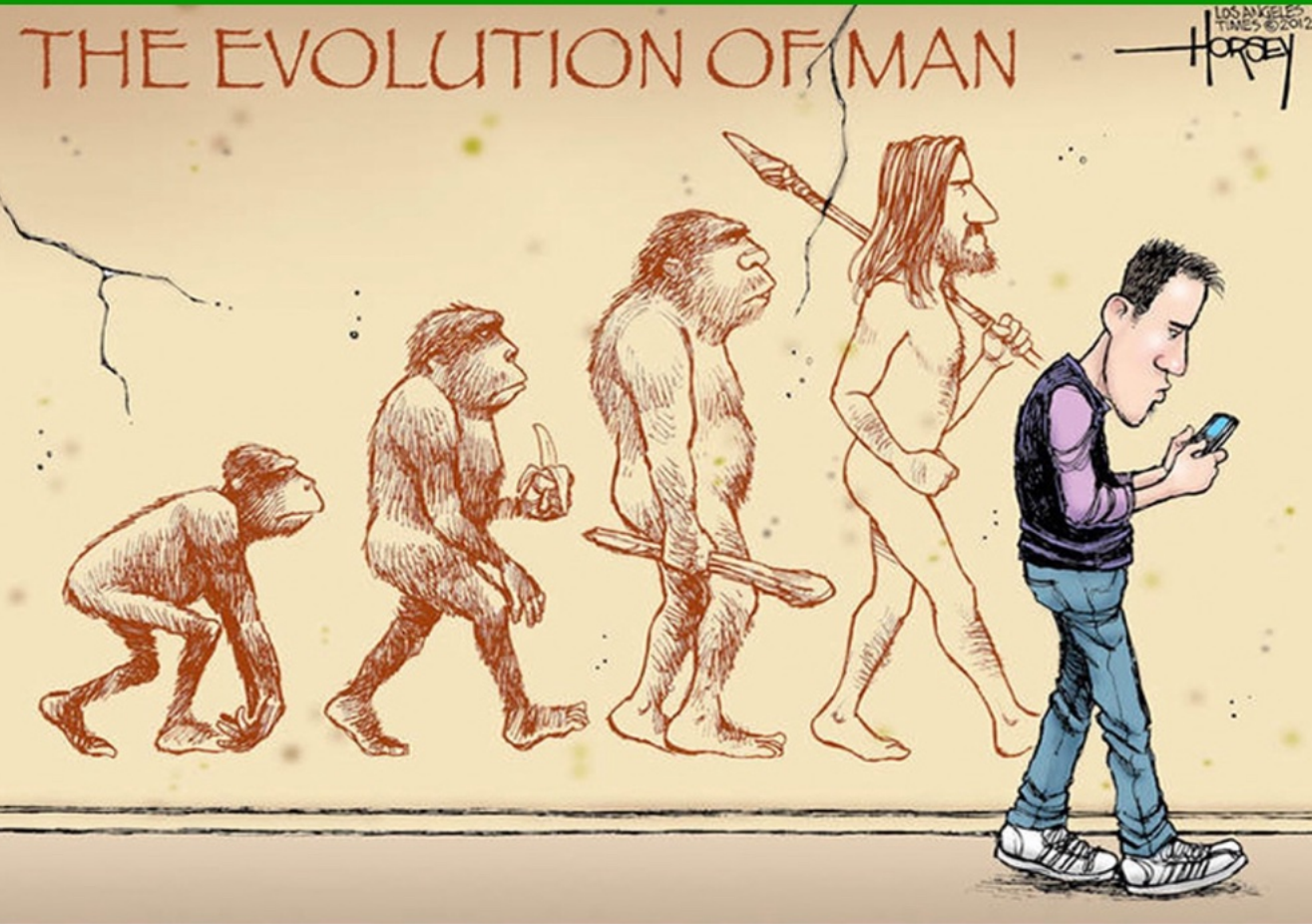


Source: Created by Jude L. Capper, 2023. Data from Capper (2011) <https://doi.org/10.2527/af.2011-0009> based on the bison population in 1800. Photo from: Aleksomber, CC BY-SA 4.0 <<https://creativecommons.org/licenses/by-sa/4.0/>>, via Wikimedia Commons.



COM

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





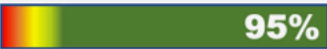





Sustainability indices will be increasingly present on meat labels in future

Beef (animal-based) patty

Nutritional value* 78%
Serving size: 227 g (8 oz) steak

Sustainability index		76%
Carbon footprint (under GWP*)		81%
Water footprint		66%
Antibiotic footprint		88%
Community support rating		95%

Farm webcam and sustainability assessment data 

*compared to ideal protein

Pure beef protein
– contains no
lab-based
ingredients!



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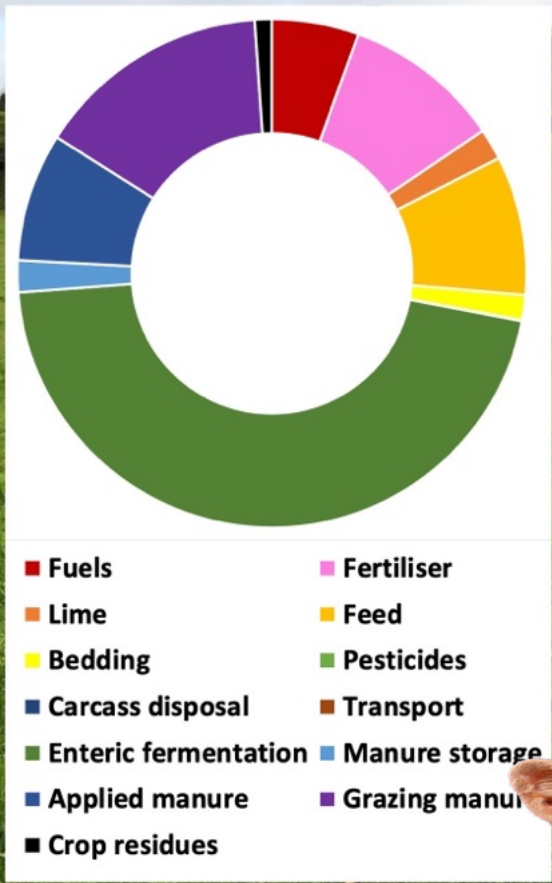


Source: Created by Jude L. Capper, 2023.



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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.

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A variety of sustainability tools, checklists and policies already exist

GREENER VETERINARY PRACTICE CHECKLIST

The **Vet Sustain Greener Veterinary Practice Checklist** outlines the points a veterinary practice may consider to become more sustainable.



PRACTISE RESPONSIBLE RESOURCE USE

- Reduce fossil fuel use for energy and heating by remembering to turn appliances off and switching to renewable energy
- Reduce disposable materials usage, including single-use plastics, such as disposable surgical textiles, where possible
- Use paper-free management systems where possible and ensure responsible paper sourcing, use and disposal
- Put water-saving measures in place
- Make sustainable choices when purchasing equipment or consumables
- Review and optimise waste management:



USE MEDICINES RESPONSIBLY

- Practise responsible antimicrobial and parasiticide use
- Avoid drug wastage through good stocking principles
- Dispose of drugs correctly (avoid ecotoxicity).



EMPOWER THE TEAM

- Support staff wellbeing and development, eg through sustainability education and projects, and encourage formation of a



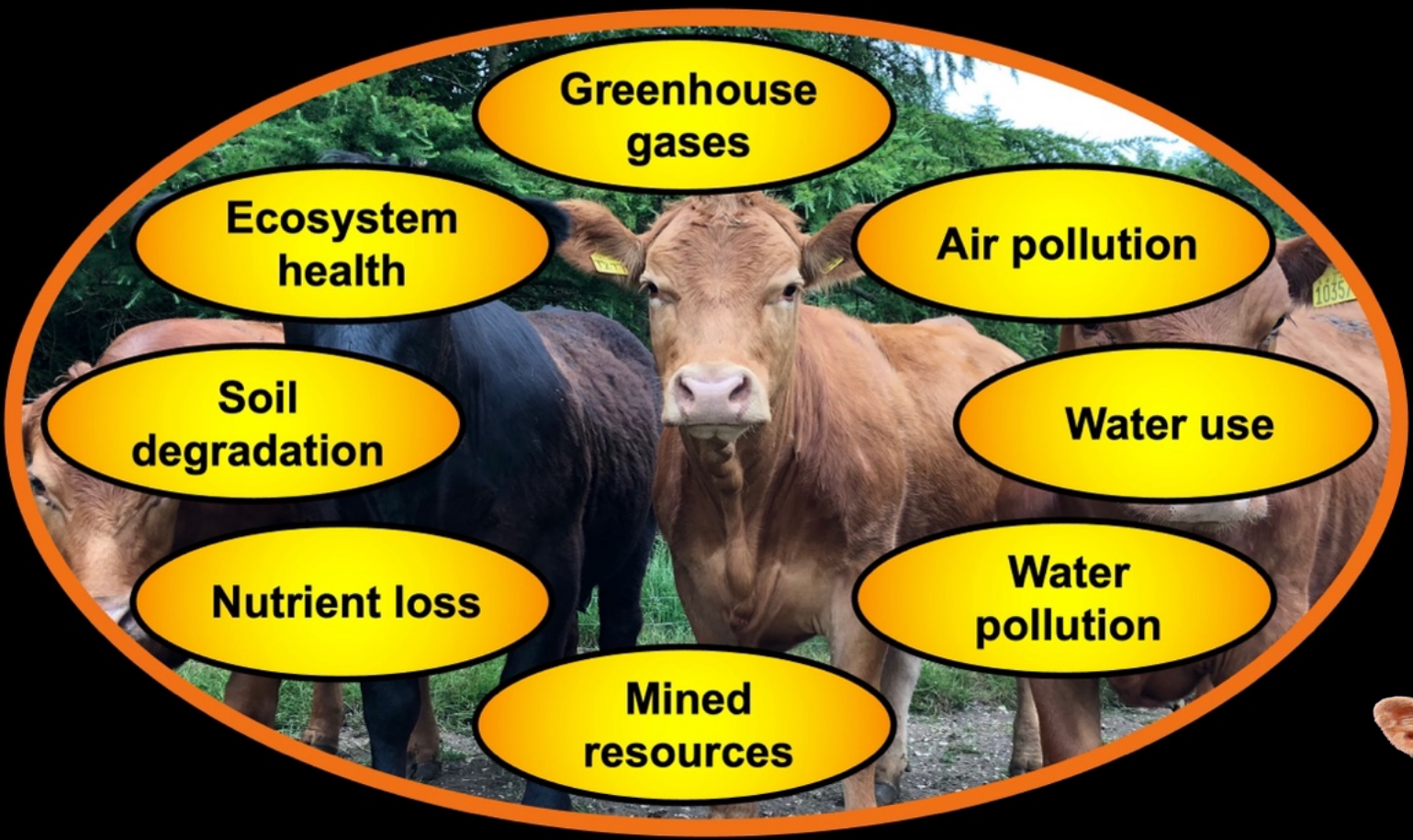
Source: Slide created by Jude L. Capper, 2023. Greener Veterinary Practice Checklist from Vet Sustain <https://vetsustain.org/resources/vet-practice-checklist>

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B

Environmental impacts are not limited to greenhouse gas emissions



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Source: Created by Jude L. Capper, 2023



B

Suckler cows must demonstrate ecosystem services to justify environmental impacts

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



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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 😂

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 25 7 May 2023 - Scotland, United Kingdom		Eurasian Oystercatcher 17 29 May 2023 - Isle of Man, Isle of Man
	House Sparrow 24 7 May 2023 - Scotland, United Kingdom		Ring-necked Pheasant 5 31 May 2023 - Meadow
	Willow Warbler 29 May 2023 - Isle of Man, Isle of Man		Common House-Martin 4 31 May 2023 - Home
	Eurasian Wren 11 29 May 2023 - Isle of Man, Isle of Man		Mistle Thrush 31 May 2023 - Magher Breck
	European Starling 10 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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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 benefits



**Improved soil quality,
herbage yields and
cattle productivity.**

**Reduced fertilisers,
pest flies and GI
parasites.**

**Dung beetles may
save UK cattle
farmers £367
million/year.**

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 **Beef & Sheep
Group**

 **Harper Adams
University**

Source: Created by Jude L. Capper, 2023. Data from: Benyon et al. (2015) <https://doi.org/10.1111/een.12240>

S

(Almost) all of our food comes from the soil



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**Beef & Sheep
Group**

 **Harper Adams
University**

Source: Created by Jude L. Capper, 2023.

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COM

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.

COM

Bad news bias – do we believe all that we read/see?



TRACEY ALISON
@TRACEYALISON1

Follow

This calf is about to be killed with a bolt gun.
Give a [redacted] & go #vegan



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University**

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

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COM

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

JOIN THE NEW YEAR'S REVOLUTION



- Equal to 61% of the population of Copenhagen
- If all participants were based in Denmark they would comprise 11.9% of the population
- Average of 3,663 per participating country
- 60% of participants already vegan, vegetarian or pescatarian



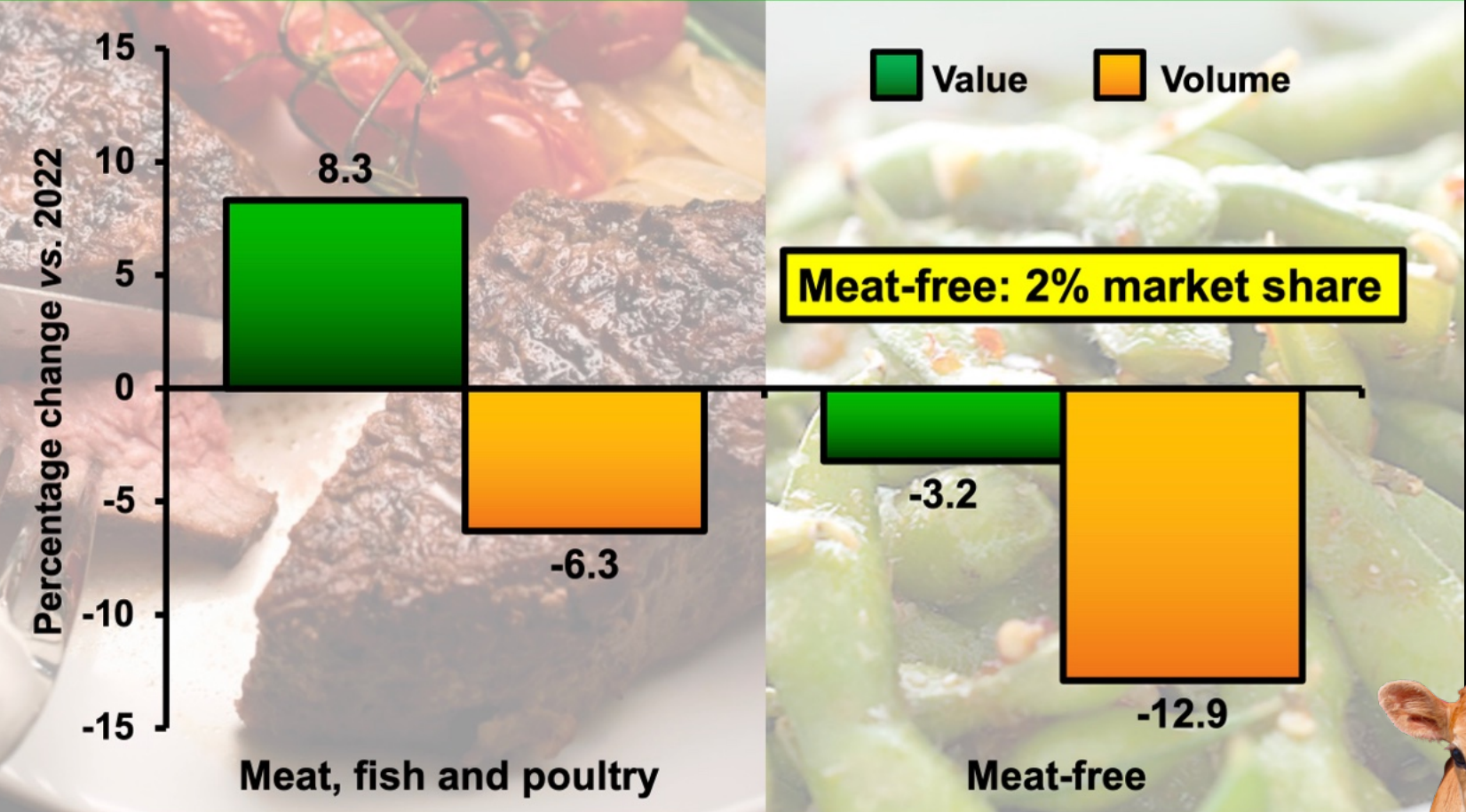
Source: Created by Jude L. Capper, 2024. Information from: <https://veganuary.com/blog/>

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B Sales of meat-free products declined in the 3 weeks ending 22/1/2023



Source: Created by Jude L. Capper, 2023; Data from AHDB (2023) <https://ahdb.org.uk/news/consumer-insight-meat-alternative-sales-decline-this-veganuary>





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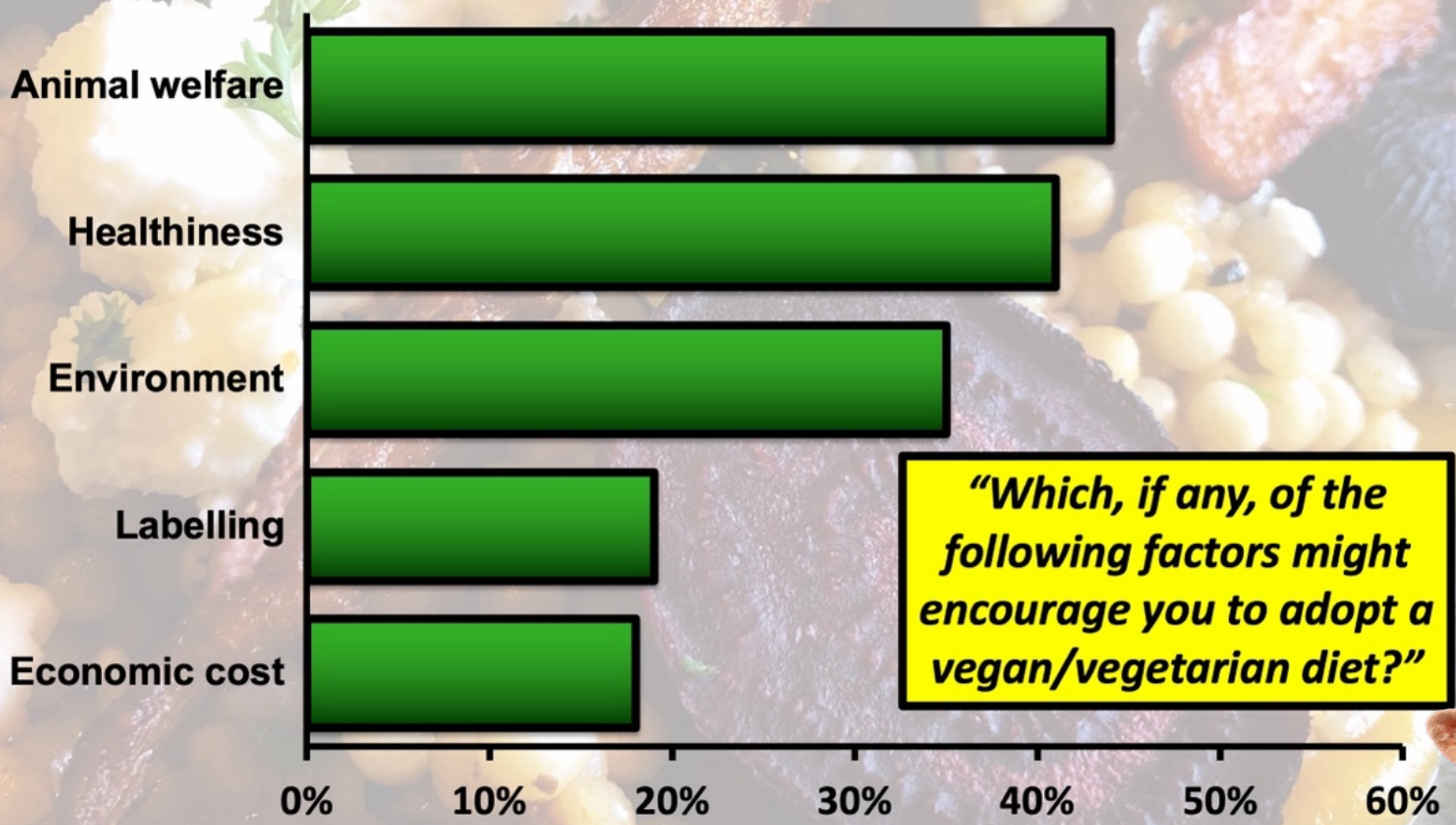
Source: Created by Jude L. Capper, 2023. Information from YouGov (2019) Is the future of food flexitarian?
<https://yougov.co.uk/topics/resources/articles-reports/2019/03/18/future-food-flexitarian>





COM

Animal welfare, health and the environment are primary consumer concerns



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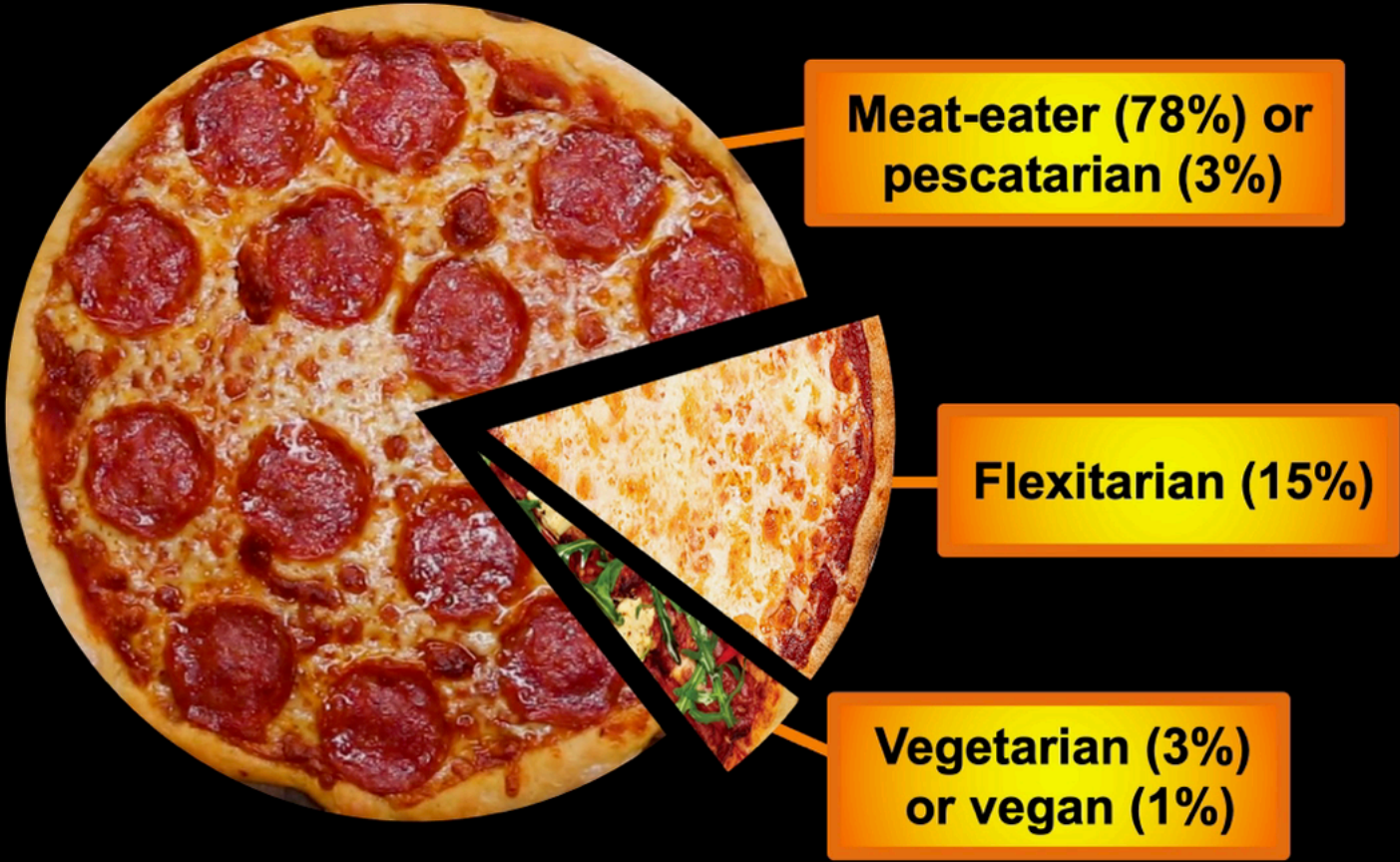
Source: Created by Jude L. Capper, 2023. Information from: YouGov (2019) Is the future of food flexitarian?
<https://yougov.co.uk/topics/resources/articles-reports/2019/03/18/future-food-flexitarian>





B

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

Activist groups make numerous (outdated?) claims about dairy

5 REASONS TO SWITCH TO PLANT MILKS

- 1 Cows must be made pregnant to produce milk, which they make specifically to feed their young, just like humans
- 2 The calf is taken away from the mother within 48 hours of birth
- 3 Many male calves are shot at birth. Others may be reared for veal or low-grade beef
- 4 The mother will be milked and reimpregnated - until she is 'spent'. Then, she will be sent to slaughter
- 5 Producing a glass of dairy milk results in almost three times the greenhouse gas emissions of any non-dairy milks



weareveganuary • Follow

weareveganuary • Already made the switch? Share your tips and favourite milk alternative products with us! 🥛👉

#Veganuary
62w

fufidefufis ❤️
58w 1 like Reply

waterbearnetwork 🥰🌱💚 We love oat milk! 🥛🙌
58w 1 like Reply

julie_natalie0213 @staceydubs 🙌
60w 1 like Reply

camilaxmedi Not even for that but just start thinking about how the milk of the cow effects your health!!!!
62w 1 like Reply

faylen.plant I never drank milk prior to being vegan as I disliked the smell and taste, so for me, almond milk as it has a nutty flavour to it but friends tell me oat milk is closest alternative to dairy milk for coffee etc 🙌
62w 1 like Reply

tumishangnkosi The dairy industry industry is cruel. I started with soymilk then moved to rice milk then settled o



TRY VEGAN THIS MONTH



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



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

D

Left Two 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**

Right Two 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.)	42g	120g	A+
Water Usage (L. eq.)	180L	440L	D
Water Pollution (PO ₄ -P eq.)	0.30g	0.79g	A
Biodiversity (Species Loss Index)	0.010	0.025	A

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



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

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D

Drinks vary in nutrient density and greenhouse gas emissions

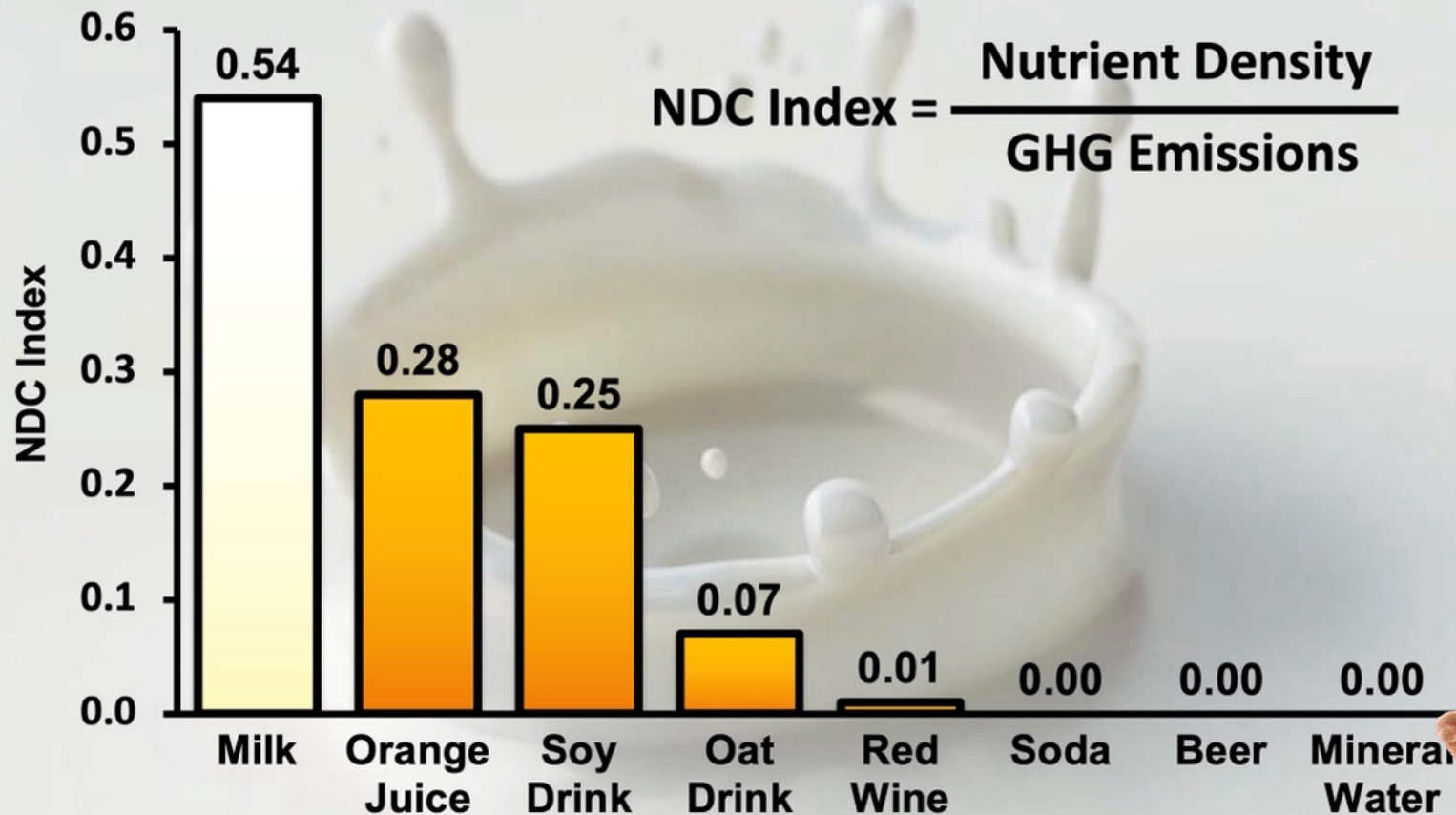
	Nutrient density	Carbon footprint g CO ₂ /100 g drink
Whole milk	53.8	99
Orange juice	17.2	61
Soya juice	7.6	30
Oat juice	1.5	21
Red wine	1.2	204
Soda	0.0	109
Beer	0.0	101
Water	0.0	10

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Source: Created by Jude L. Capper, 2023. Data from: Smedman et al. (2010). <https://doi.org/10.3402/fnr.v54i0.5170>

Nutrient density should be included when assessing carbon footprint



Source: Created by Jude L. Capper, 2023. Data from: Smedman et al. (2010). <https://doi.org/10.3402/fnr.v54i0.5170>

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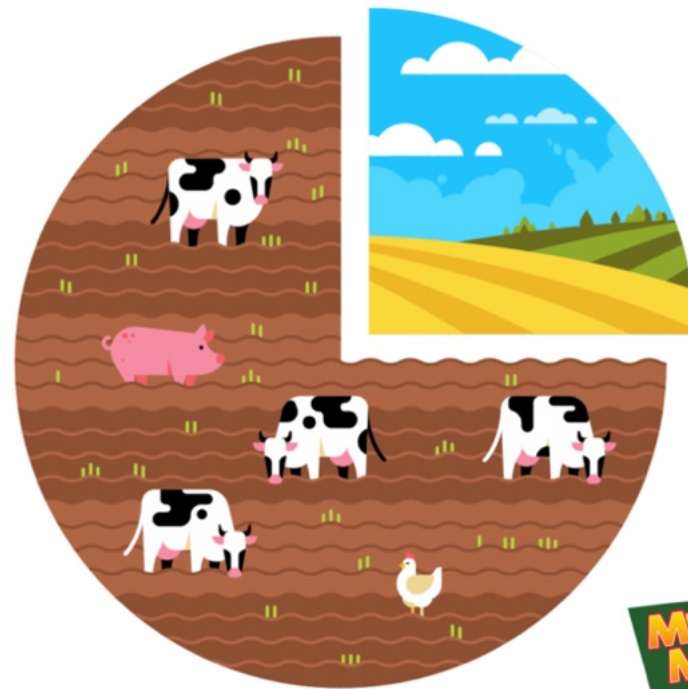


COM

“Bad news” stories often gain traction –
but lack context

This statistic is
true – yet
seems like a
high percentage
to many outside
agriculture and
food
production.

LIVESTOCK PRODUCTION USES
75% OF THE EARTH'S
AGRICULTURAL LAND.



Source: Slide created by Jude L. Capper, 2023. Photo from: <https://www.pinterest.co.uk/pin/254383078939543245/>

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s

Can we grow human food crops everywhere?



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Harper Adams University
**Beef & Sheep
Group**

 **Harper Adams
University**

Source: Created by Jude L. Capper, 2023.



S

Can we grow human food crops everywhere?



Vintermøde 2024



Source: Created by Jude L. Capper, 2023

s

Can we grow human food crops everywhere?



Vintermøde 2024



Source: Created by Jude L. Capper, 2023





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



s

Feed efficiency is one of the principal issues used to denigrate animal agriculture

IF EVERY AMERICAN STOPPED EATING MEAT THERE WOULD BE ENOUGH GRAIN TO FEED 1.4 BILLION PEOPLE

#IMAGREENMONSTER

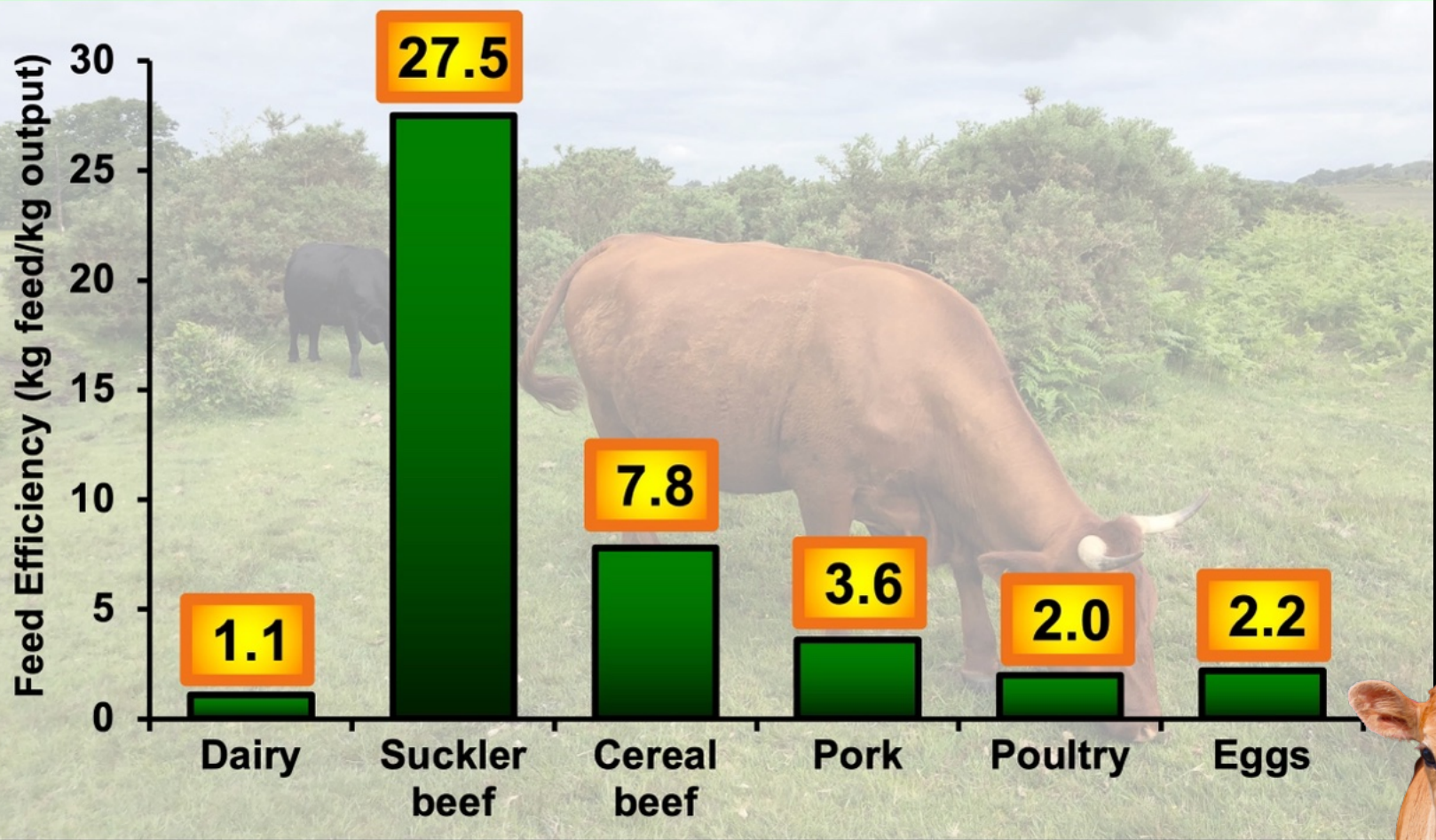
Source: Created by Jude L. Capper, 2023. Infographic from <https://www.onegreenplanet.org/animalsandnature/eat-for-the-planet-meat-and-the-environment/>

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s

Feed efficiency ratios vary between systems and species



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Beef & Sheep Group

Harper Adams University

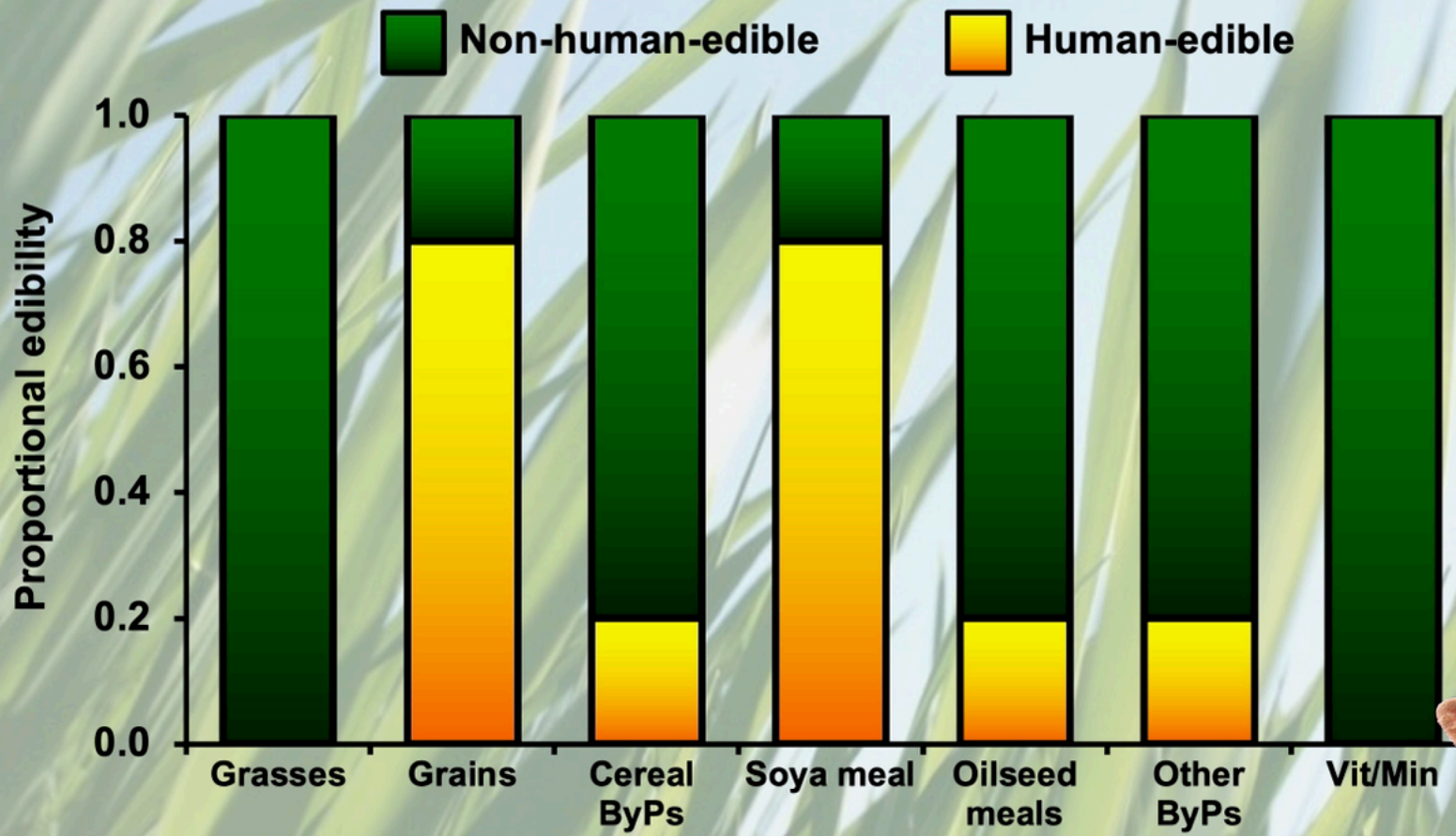
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Source: Created by Jude L. Capper, 2023; data from Wilkinson (2011) <https://doi.org/10.1017/S175173111100005X>

s

Feed efficiency metrics must consider competition for human-edible foods



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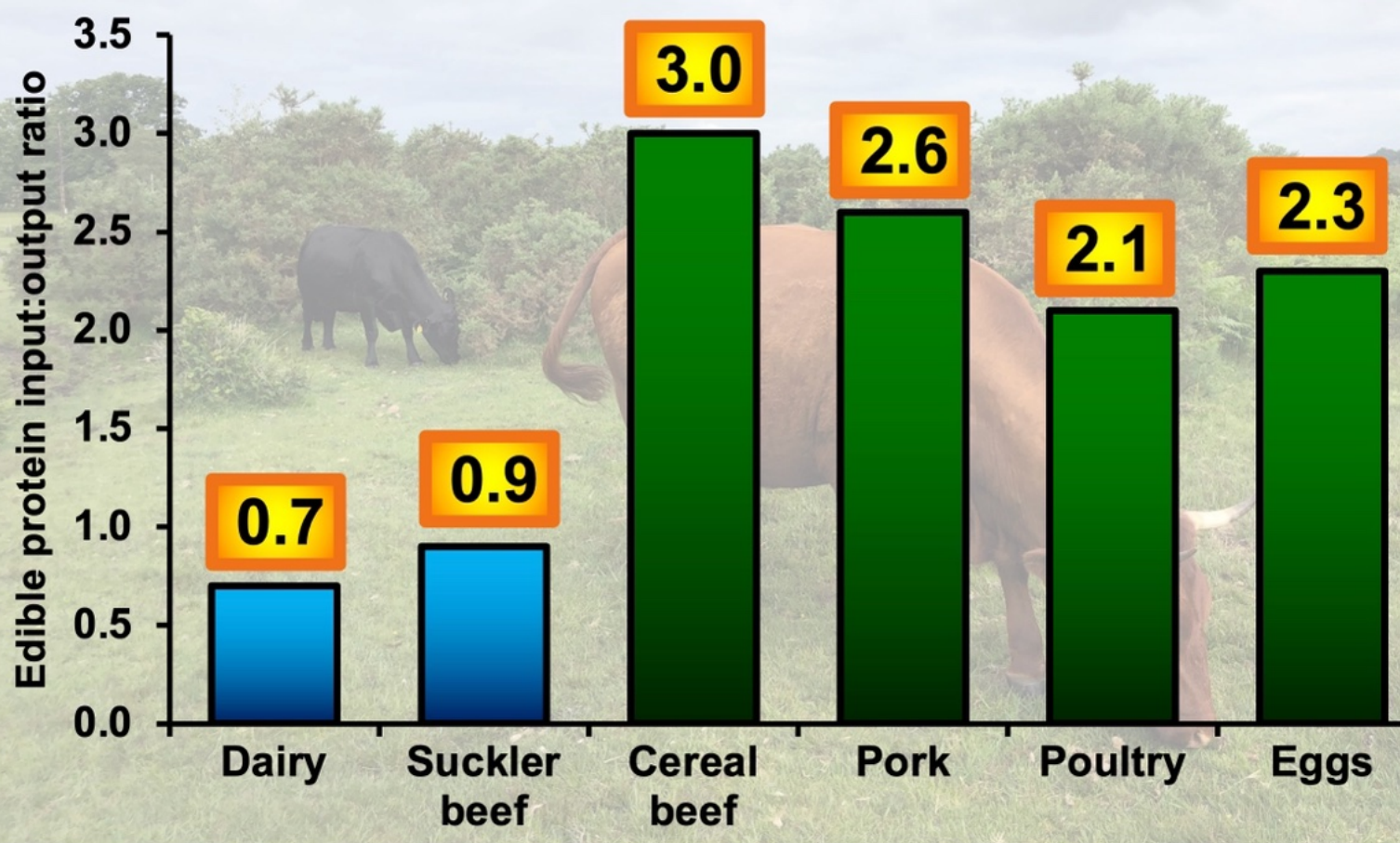
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Source: Created by Jude L. Capper, 2023; data from Wilkinson (2011) <https://doi.org/10.1017/S175173111100005X>

s

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



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



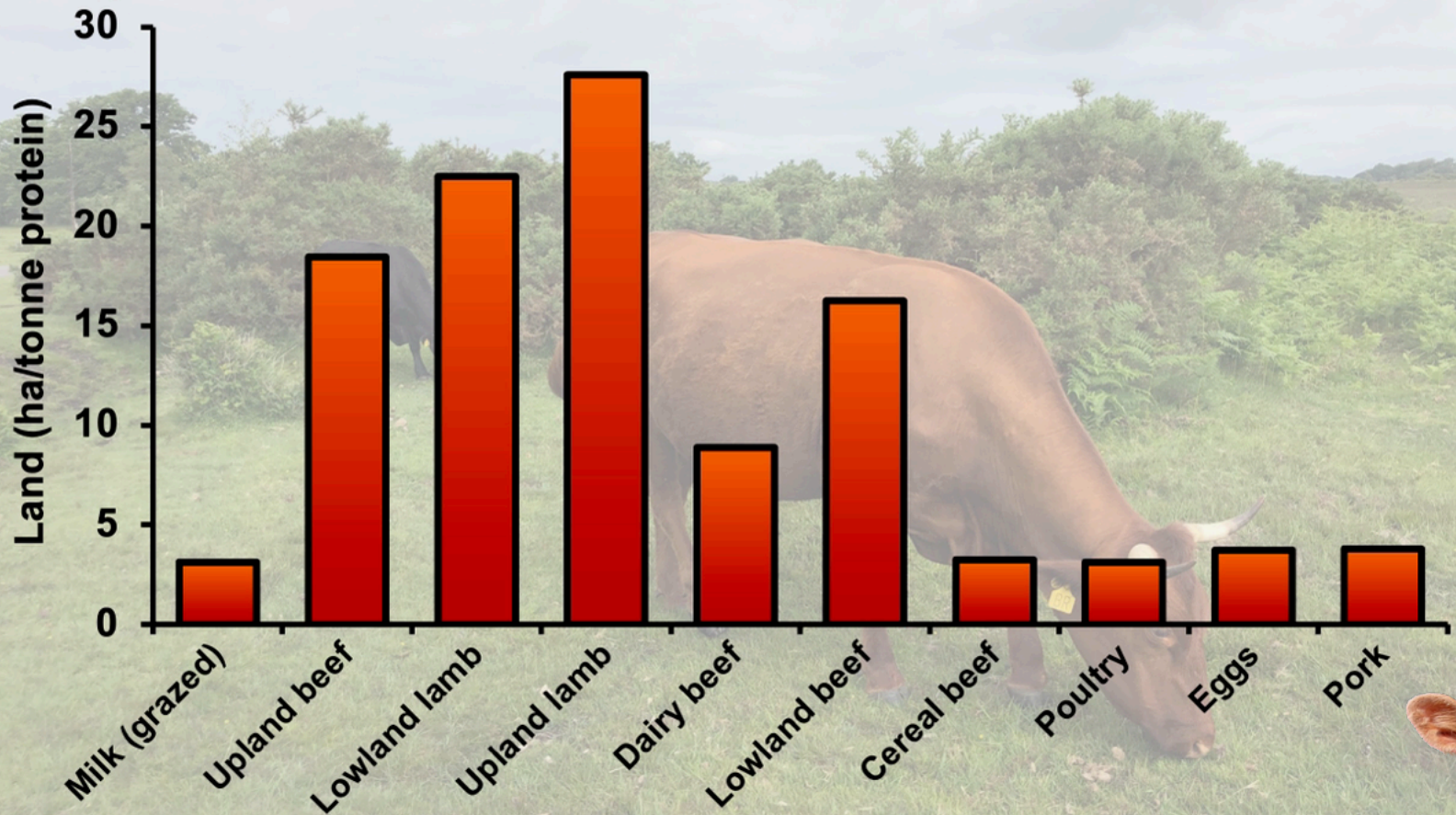
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Livestock systems vary widely in land use



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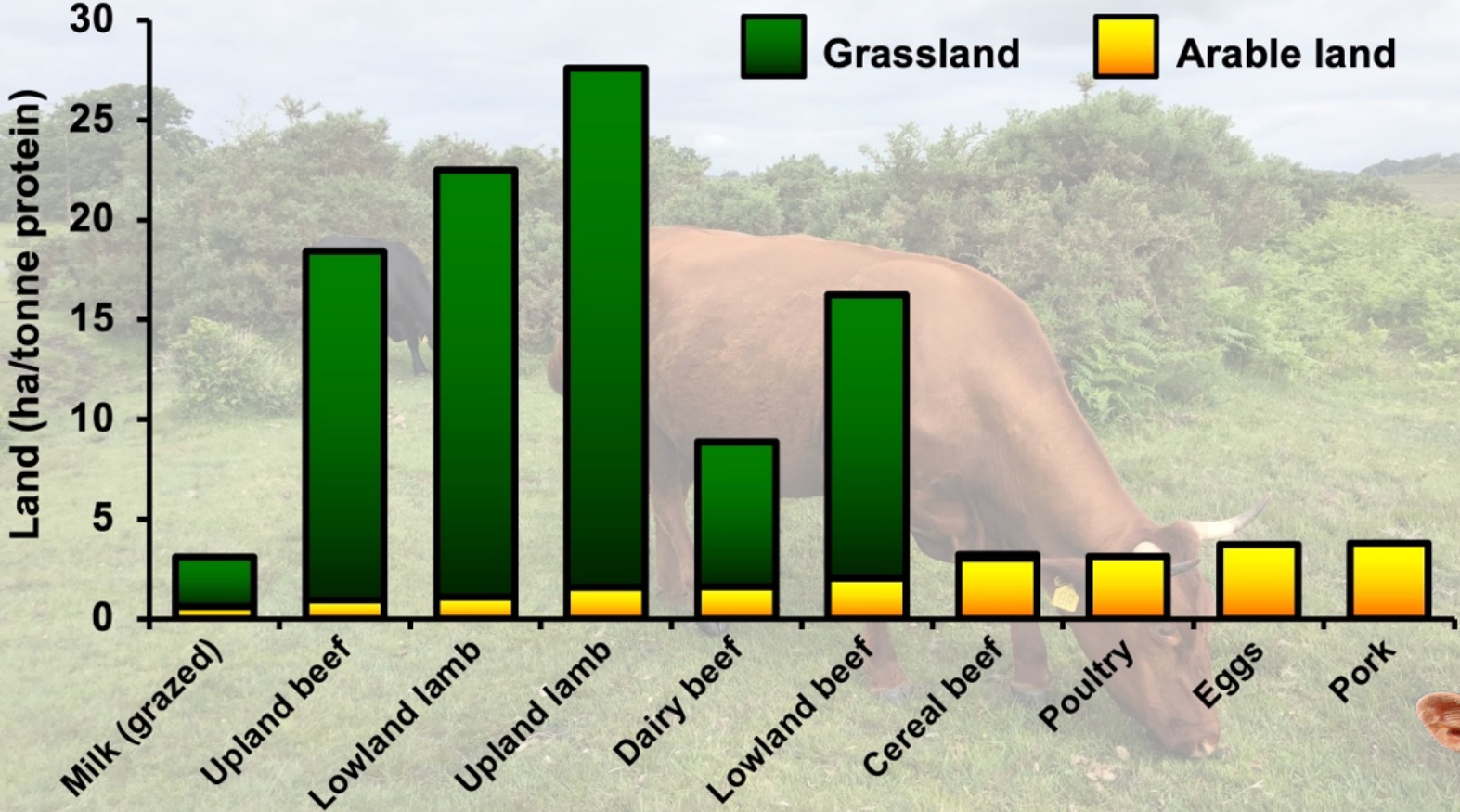
Source: Created by Jude L. Capper, 2023; data from Wilkinson and Lee (2018) <https://doi.org/10.1017/S175173111700218X>





s

Livestock systems vary widely in arable and grassland use



Source: Created by Jude L. Capper, 2023; data from Wilkinson and Lee (2018) <https://doi.org/10.1017/S175173111700218X>

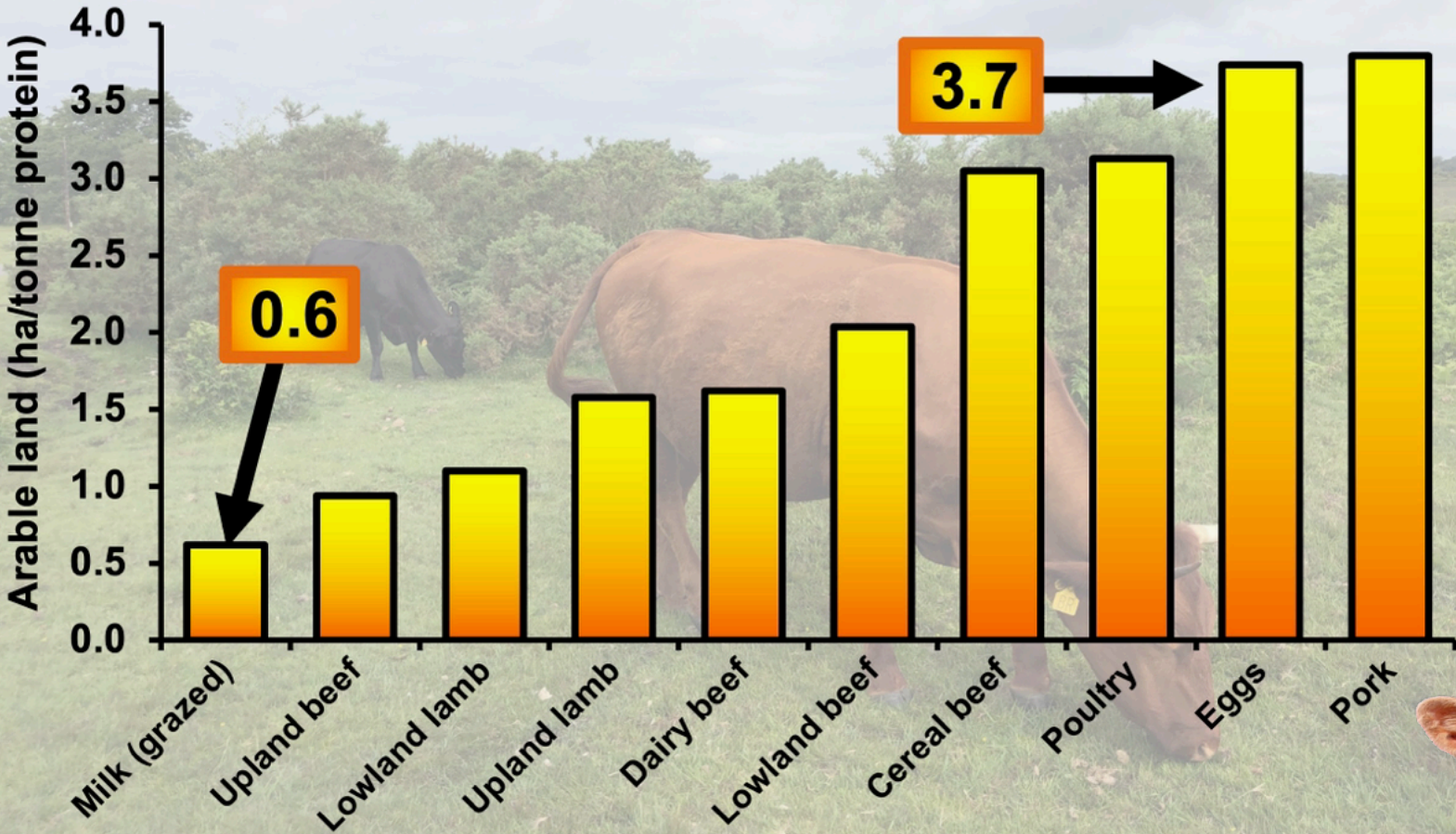
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s

Livestock systems vary widely in arable land use



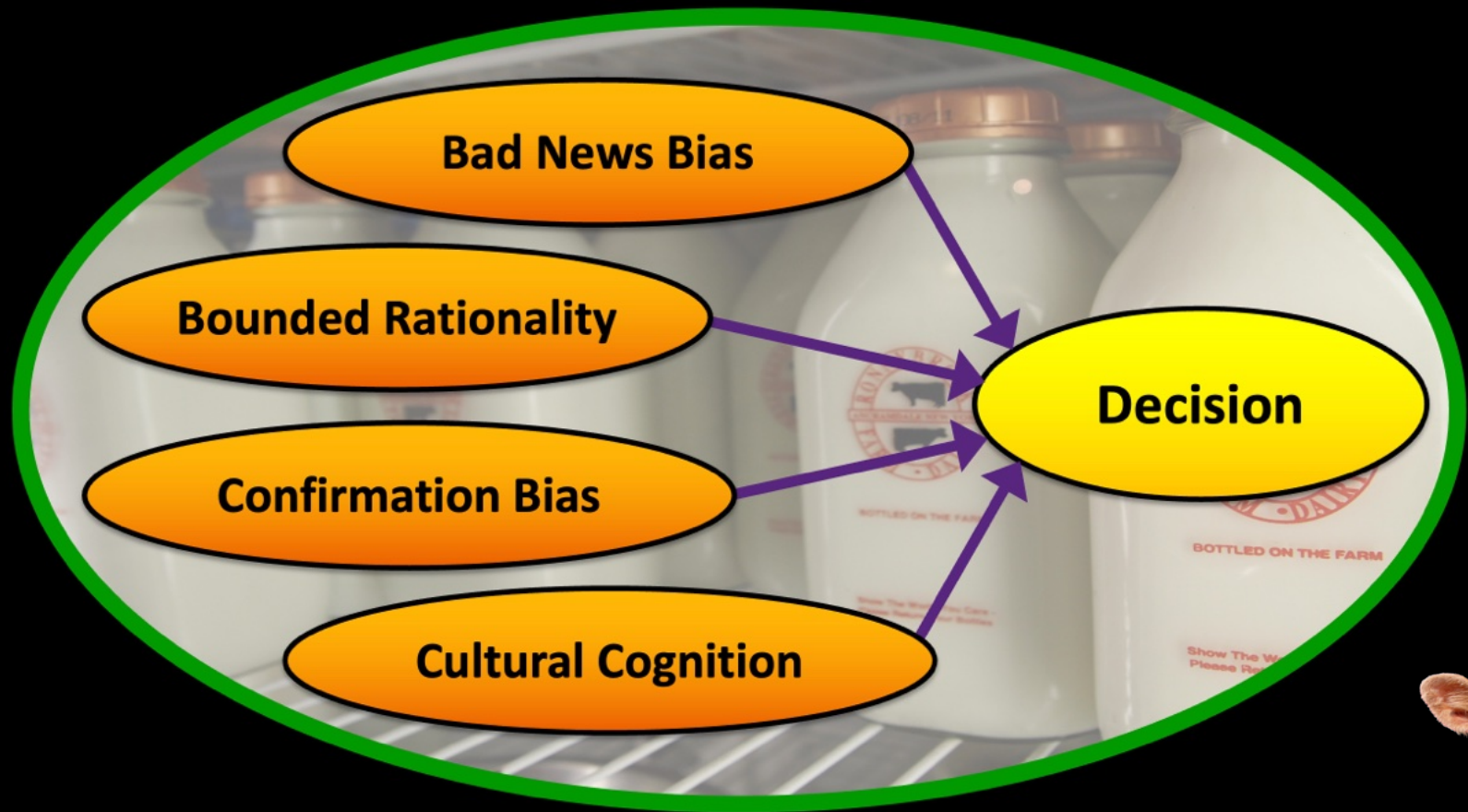
Source: Created by Jude L. Capper, 2023; data from Wilkinson and Lee (2018) <https://doi.org/10.1017/S175173111700218X>

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COM

Four major processes influence consumer decision-making



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Source: Created by Jude L. Capper, 2023. Information from: Capper and Yancey (2015) <https://doi.org/10.2527/af.2015-0028>



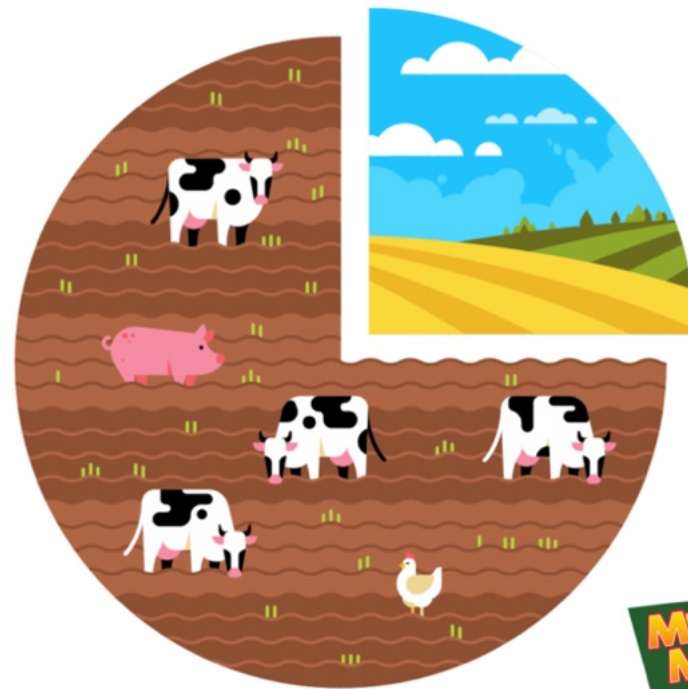


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Source: Slide created by Jude L. Capper, 2023. Photo from: <https://www.pinterest.co.uk/pin/254383078939543245/>

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COM

Bounded rationality - we don't have time to research, so need quick, simple explanations

Based on the average UK diet

30%

of our protein intake comes from red meat...

...which is vital for our body's growth, maintenance and muscle recovery!



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 **Harper Adams University**

Source: Created by Jude L. Capper, 2023. Infographic from HCC (2020): <https://meatpromotion.wales/en/news-industry-info/download>

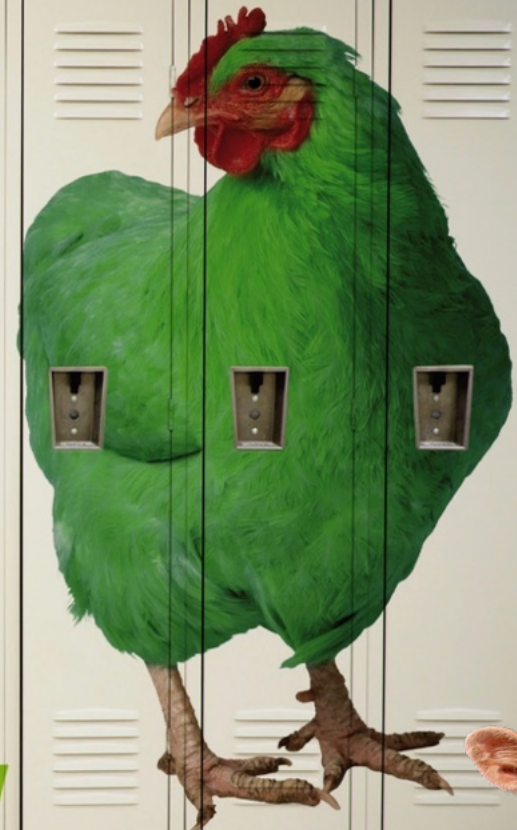
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COM

Activist groups use simple effective messaging

MEAT'S
NOT
GREEN

Save the planet. Go vegan! **peta2**
FREE FOR ALL



Vintermøde 2024



Source: Slide created by Jude L. Capper, 2023. Photo from: istockphoto.com





COM

Cultural cognition – we trust people with whom we share values and wish to emulate

England rugby player credited <3 week recovery from broken leg to drinking 2 pints of milk per day



Source: Created by Jude L. Capper, 2023. Screenshot from: <http://www.telegraph.co.uk/rugby-union/2017/02/02/england-prop-joe-marler-reveals-secret-behind-hisremarkable/>

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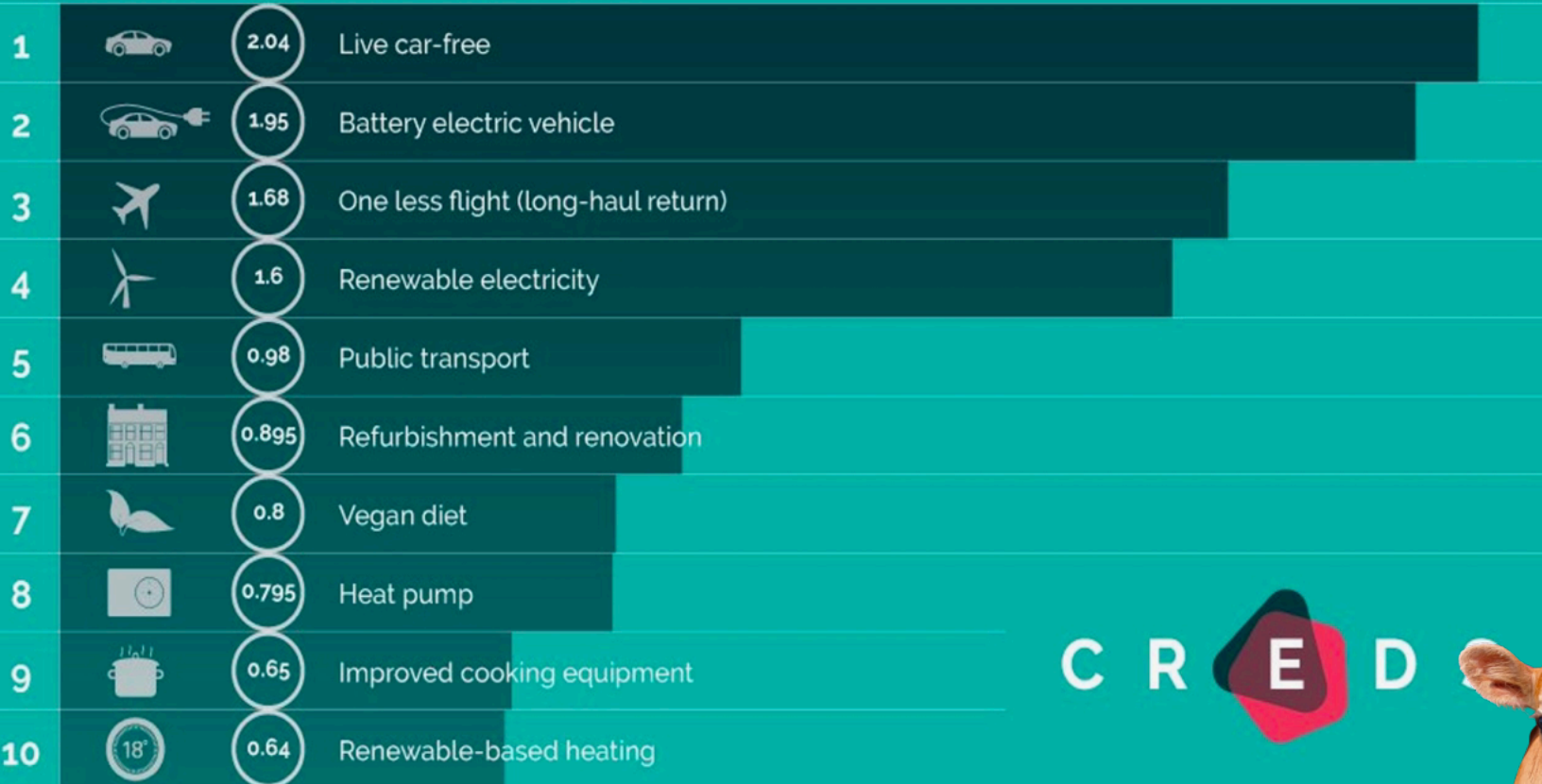




CV

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

Top 10 options for reducing your carbon footprint



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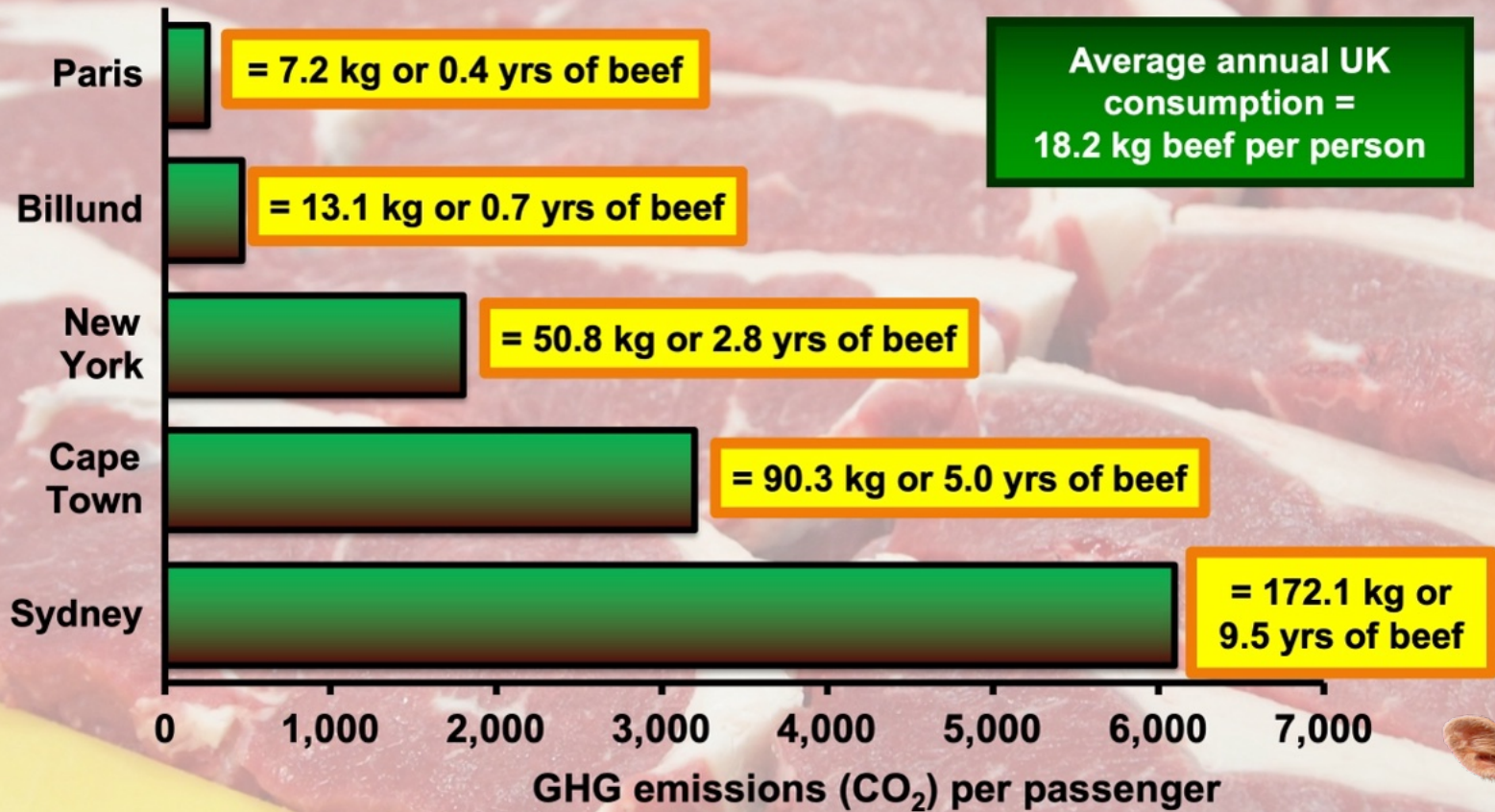


Source: Created by Jude L. Capper, 2023. Infographic adapted from Centre for Research into Energy Demand Solutions (2020). Available at: https://twitter.com/CREDS_UK/status/1262984570175176704?s=20



CV

International flights emit considerable quantities of carbon compared to UK beef production



Source: Created by Jude L. Capper, 2024. 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

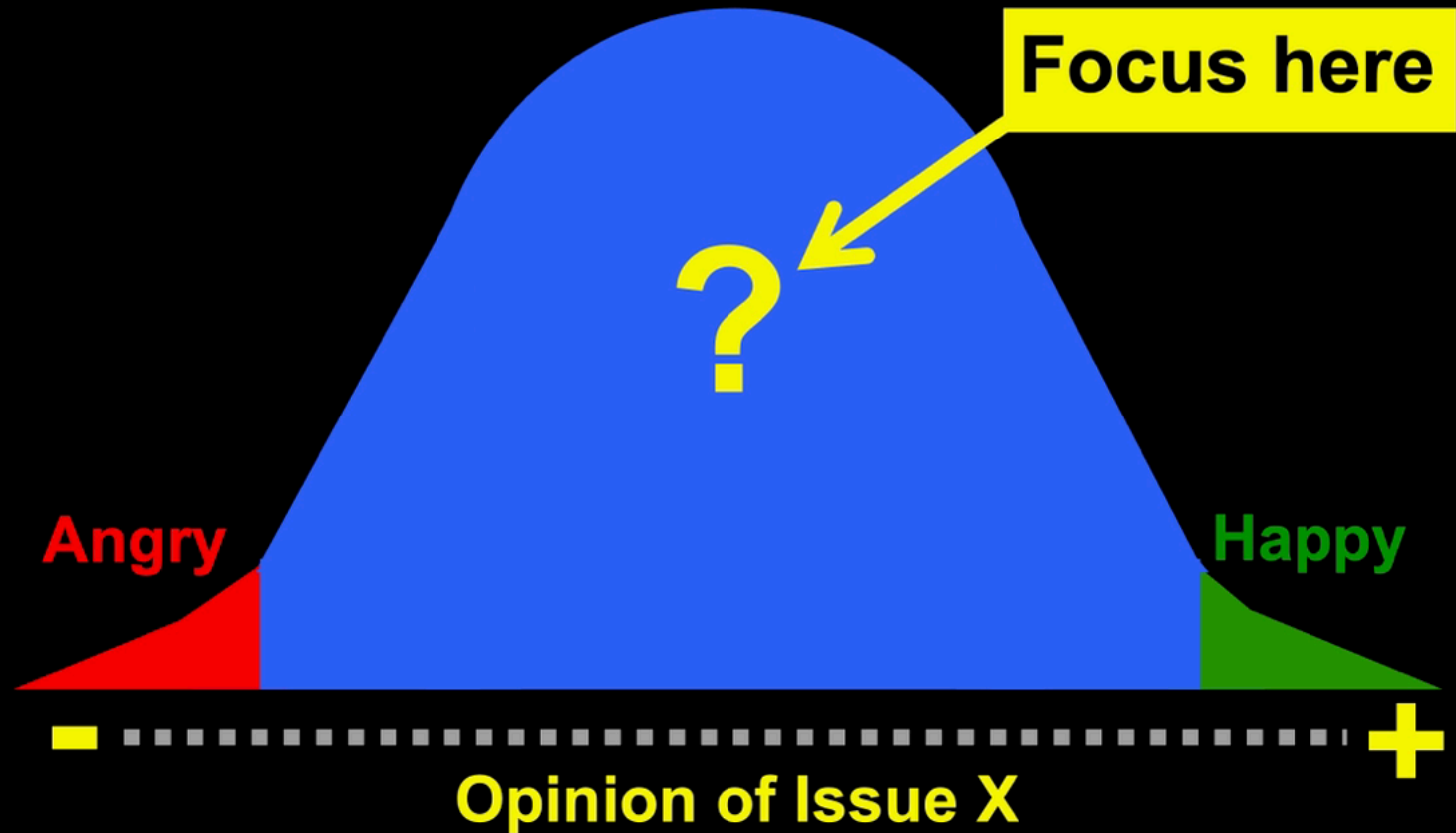


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COM

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>





B

Thank you!

JCapper@Harper-Adams.ac.uk



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



Questions?

Harper Adams University
**Beef & Sheep
Group**

 **Harper Adams
University**

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

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