



**Sustainable  
livestock systems  
– producing  
animal-source  
foods while  
improving  
environmental  
impacts**

*23<sup>rd</sup> November 2023*

Source: Jude L. Capper, 2023



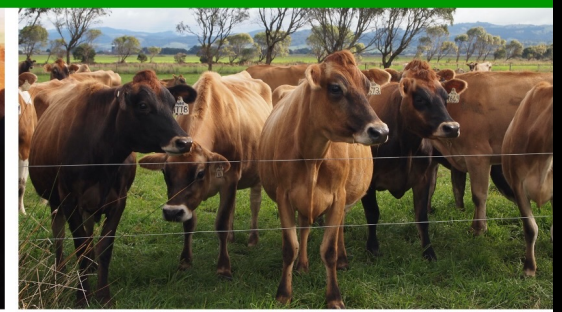
**Icelandic Agricultural Advisory Centre**





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



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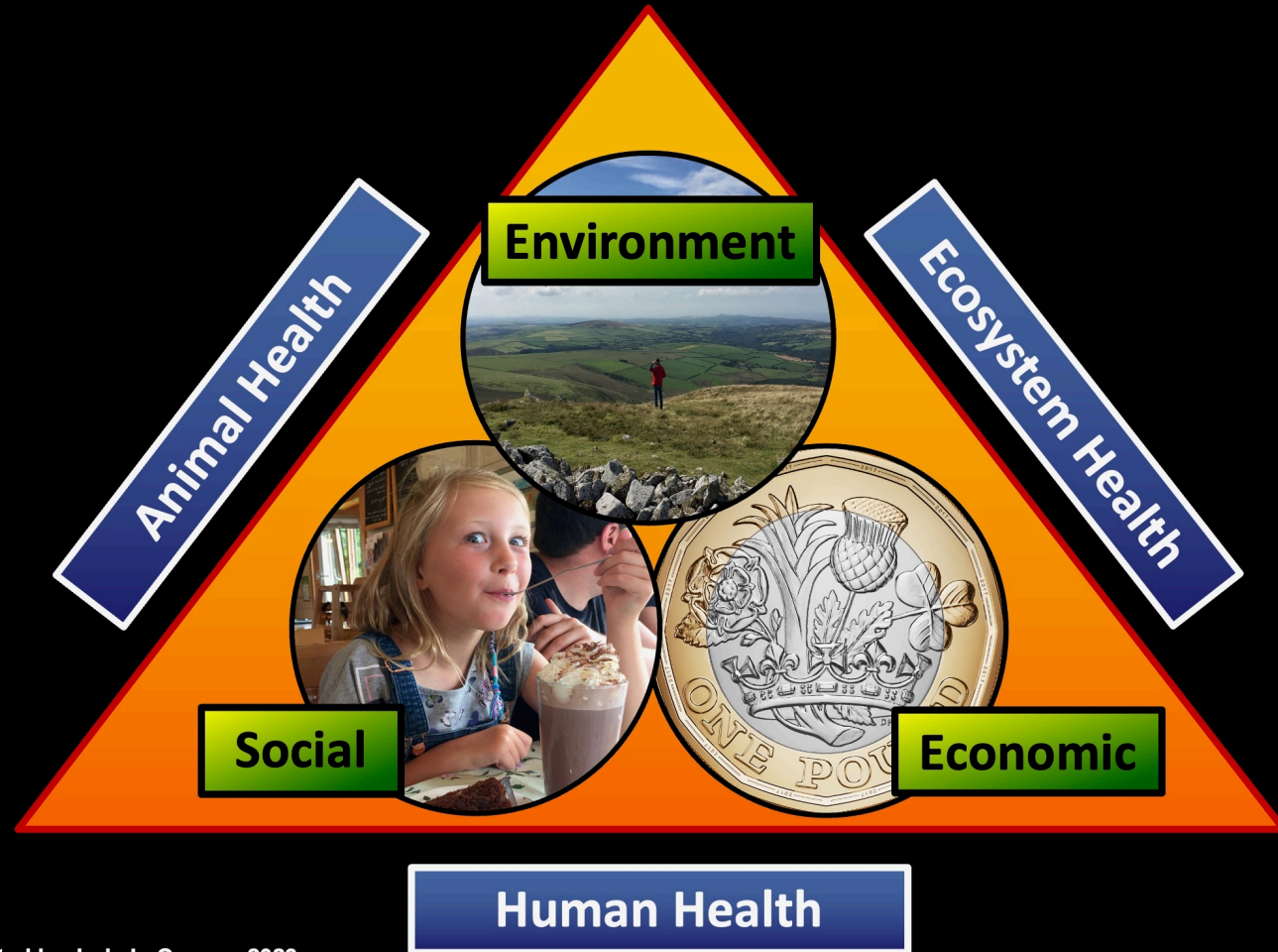


Source: Created and photos by Jude L. Capper, 2023.



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



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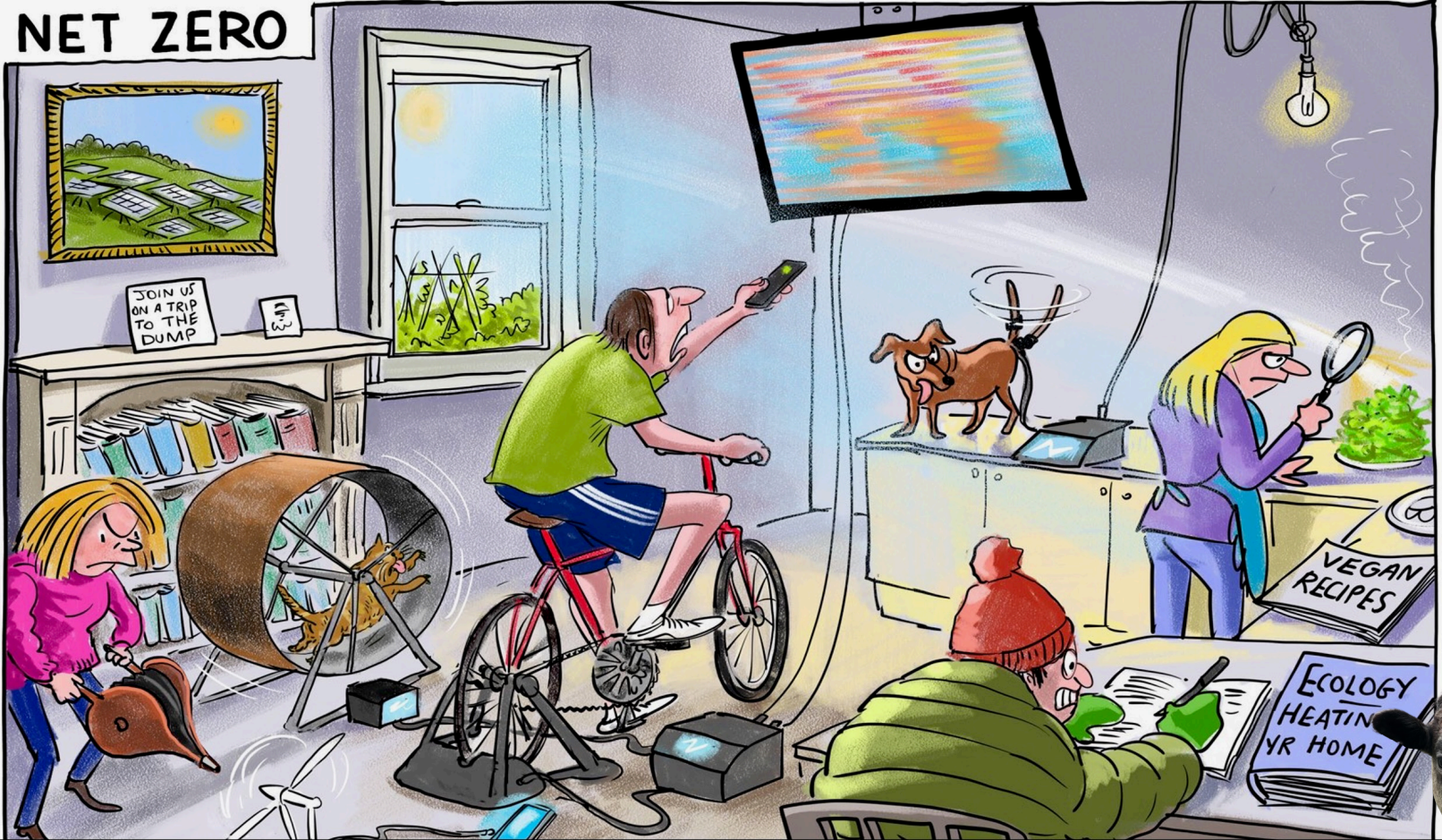
Source: Created by Jude L. Capper, 2023.





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# 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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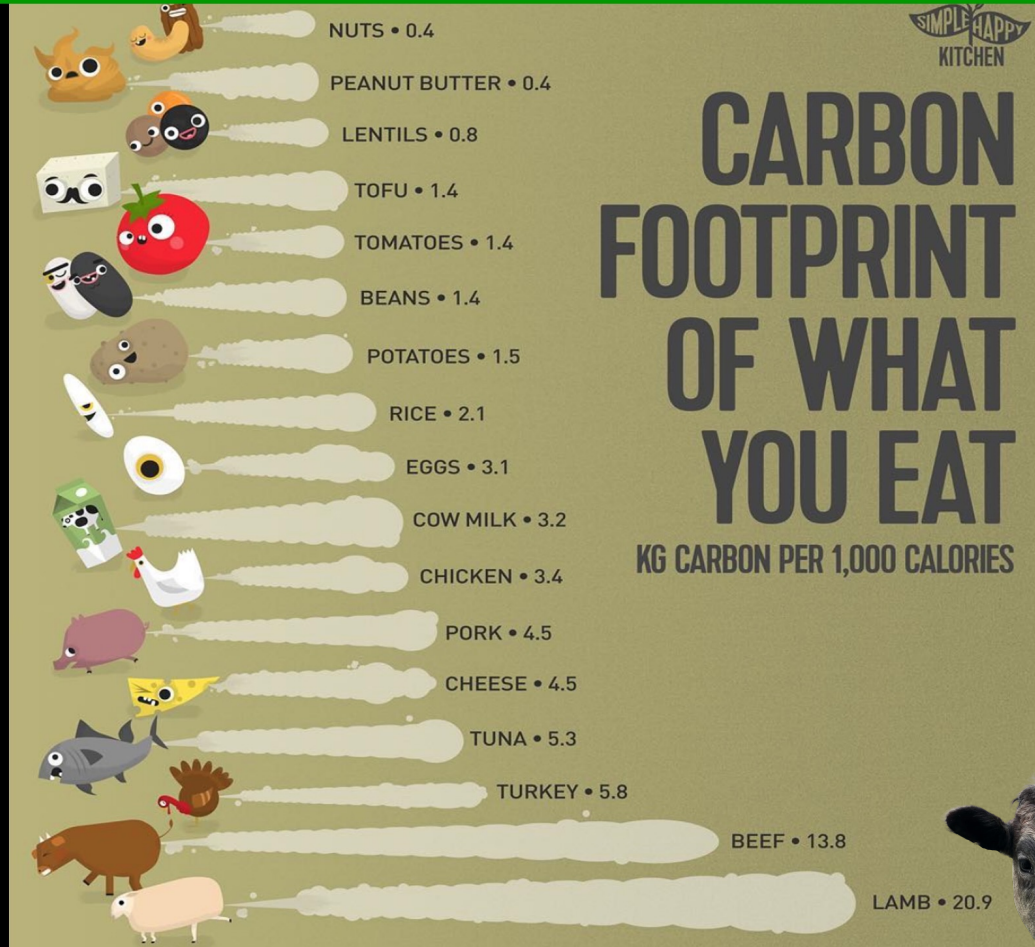




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# Global averages are meaningless

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/](https://www.instagram.com/simple_happy_kitchen/)





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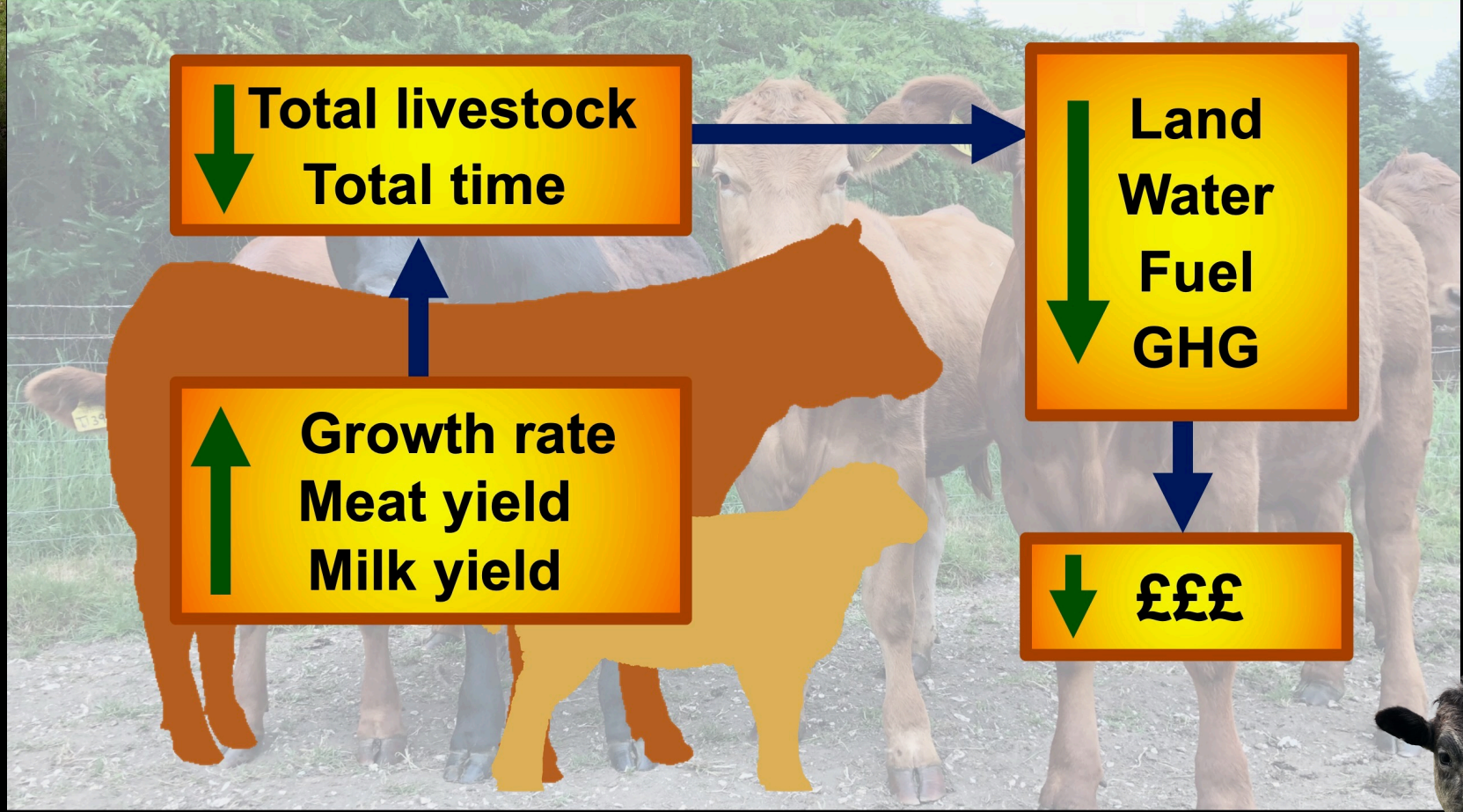
# Improving animal productivity reduces the environmental impact of milk and meat

↓ Total livestock  
↓ Total time

↓ Land  
↓ Water  
↓ Fuel  
↓ GHG

↑ Growth rate  
↑ Meat yield  
↑ Milk yield

↓ £££



Source: Created by Jude L. Capper, 2023. Data from: Capper.(2015) Sustainability and One Health. In: Cockcroft, P. *Bovine Medicine*. Wiley-Blackwell, Oxford, UK.



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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>





AH

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



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





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



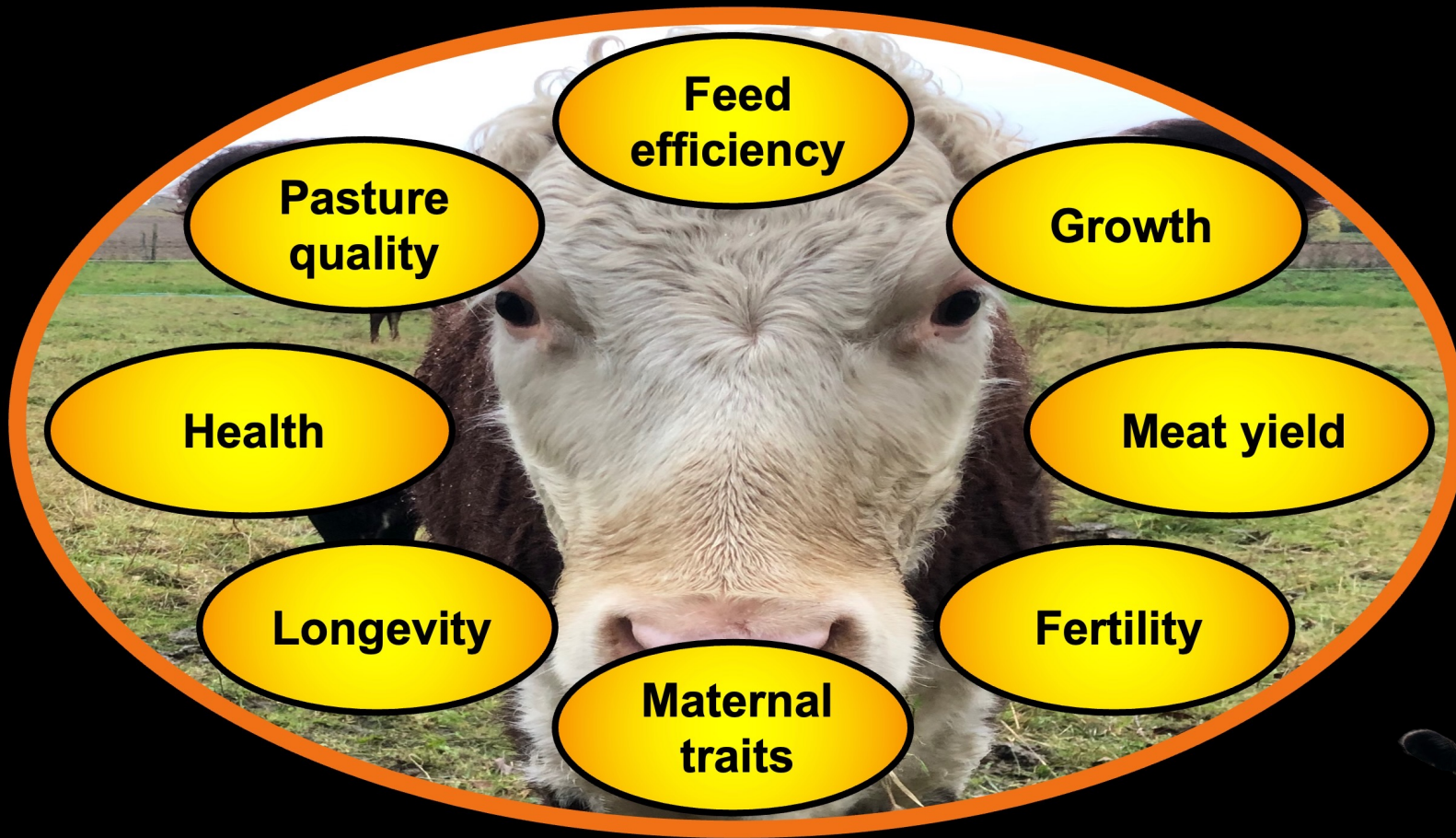
Source: Created by Jude L. Capper, 2023. Economic data from Mason-D’Croz et al. (2020) <https://doi.org/10.1038/s43016-020-0057-2>. Other data – J. Capper – submitted.





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# Improving key performance indicators reduces environmental impacts



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Source: Created by Jude L. Capper, 2023





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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.





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



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Source: Created by Jude L. Capper, 2023



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# Can livestock farms reach net zero?



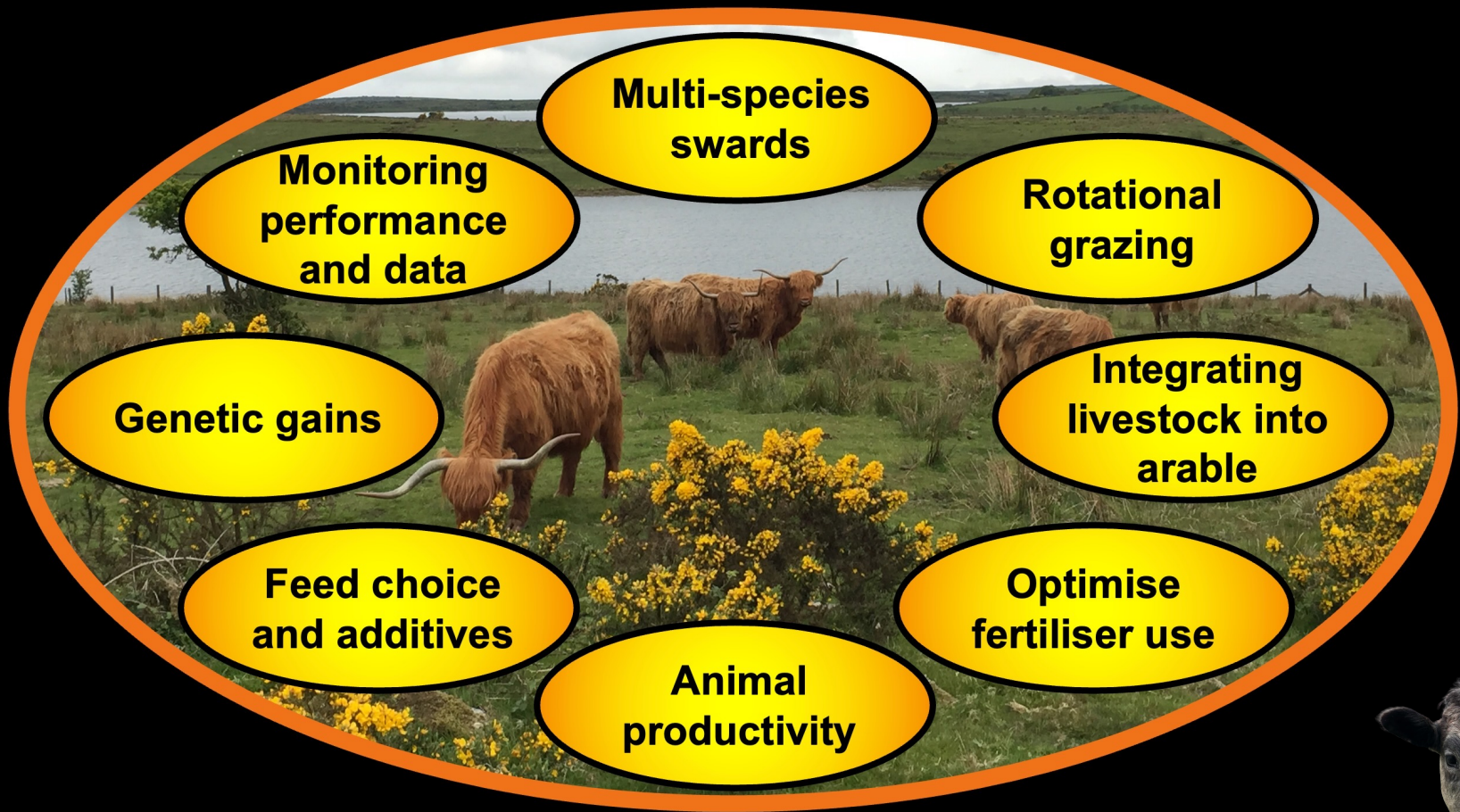
Source: Created by Jude L. Capper, 2023.





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



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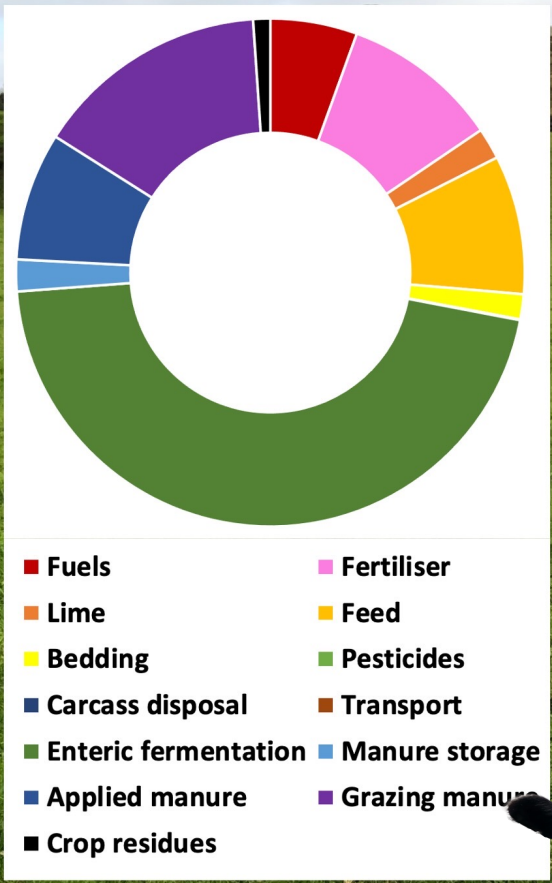
Source: Created by Jude L. Capper, 2023





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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.

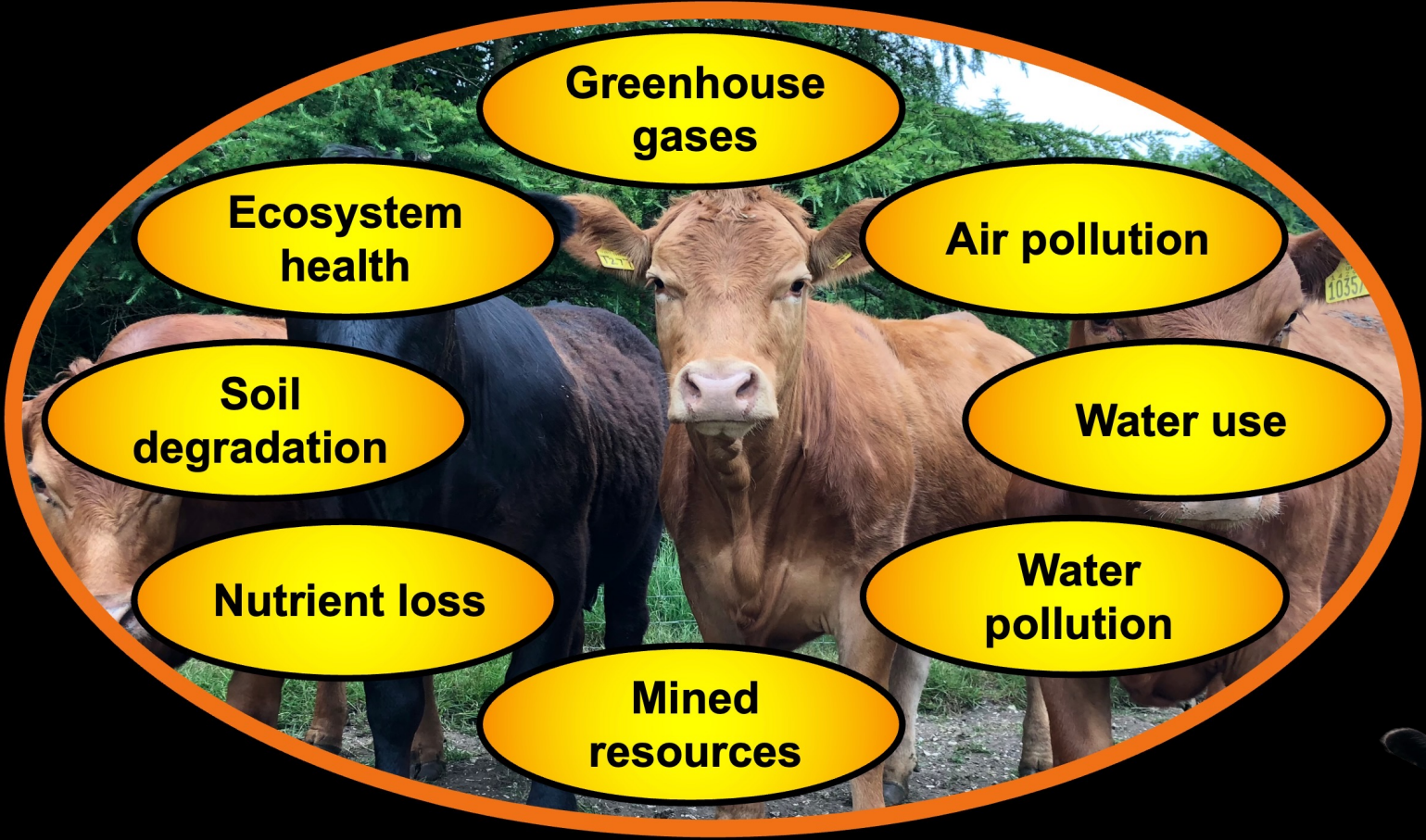
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# Environmental impacts are not limited to greenhouse gas emissions



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Source: Created by Jude L. Capper, 2023



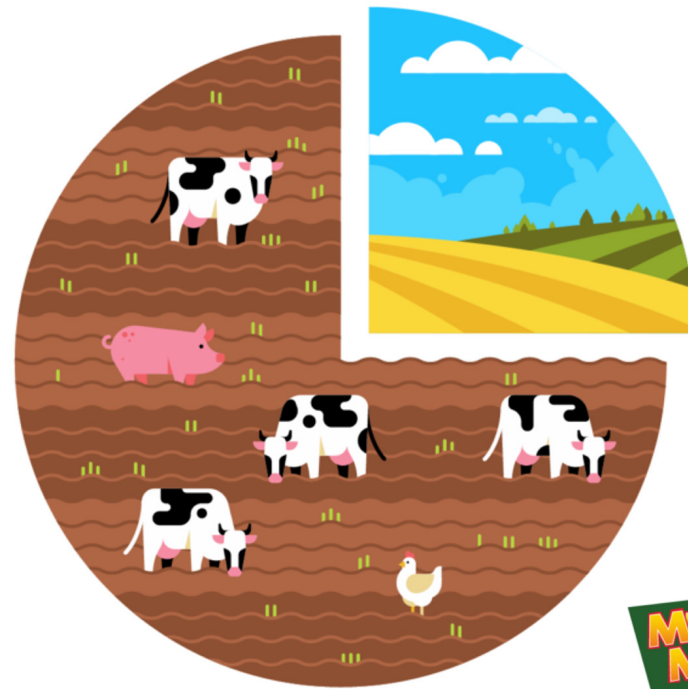


COM

“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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# Can we grow human food crops everywhere?



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Source: Created by Jude L. Capper, 2023.





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Source: Created by Jude L. Capper, 2023



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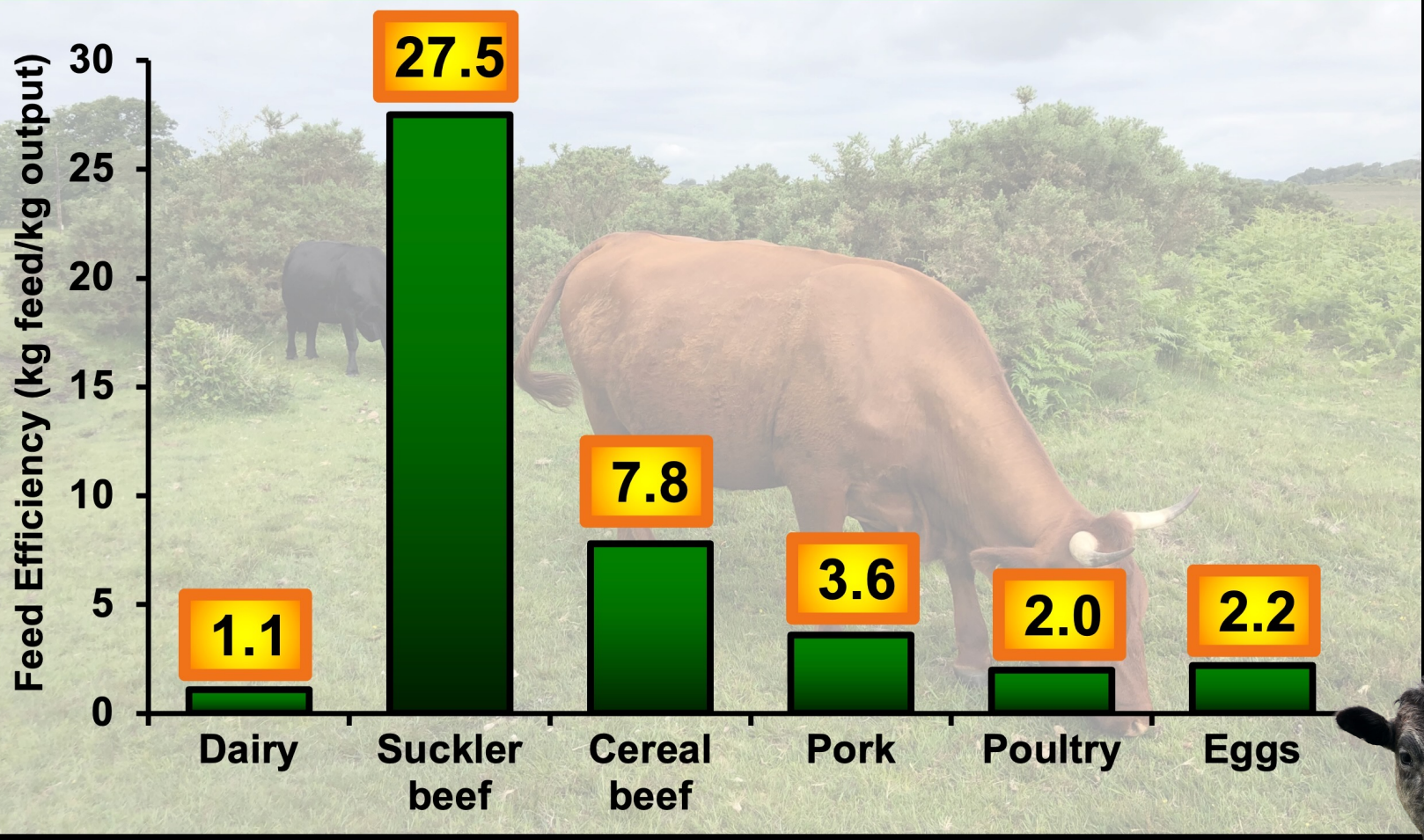
Source: Created by Jude L. Capper, 2023





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# Feed efficiency ratios vary between systems and species



Harper Adams University  
**Beef & Sheep Group**

 Harper Adams University

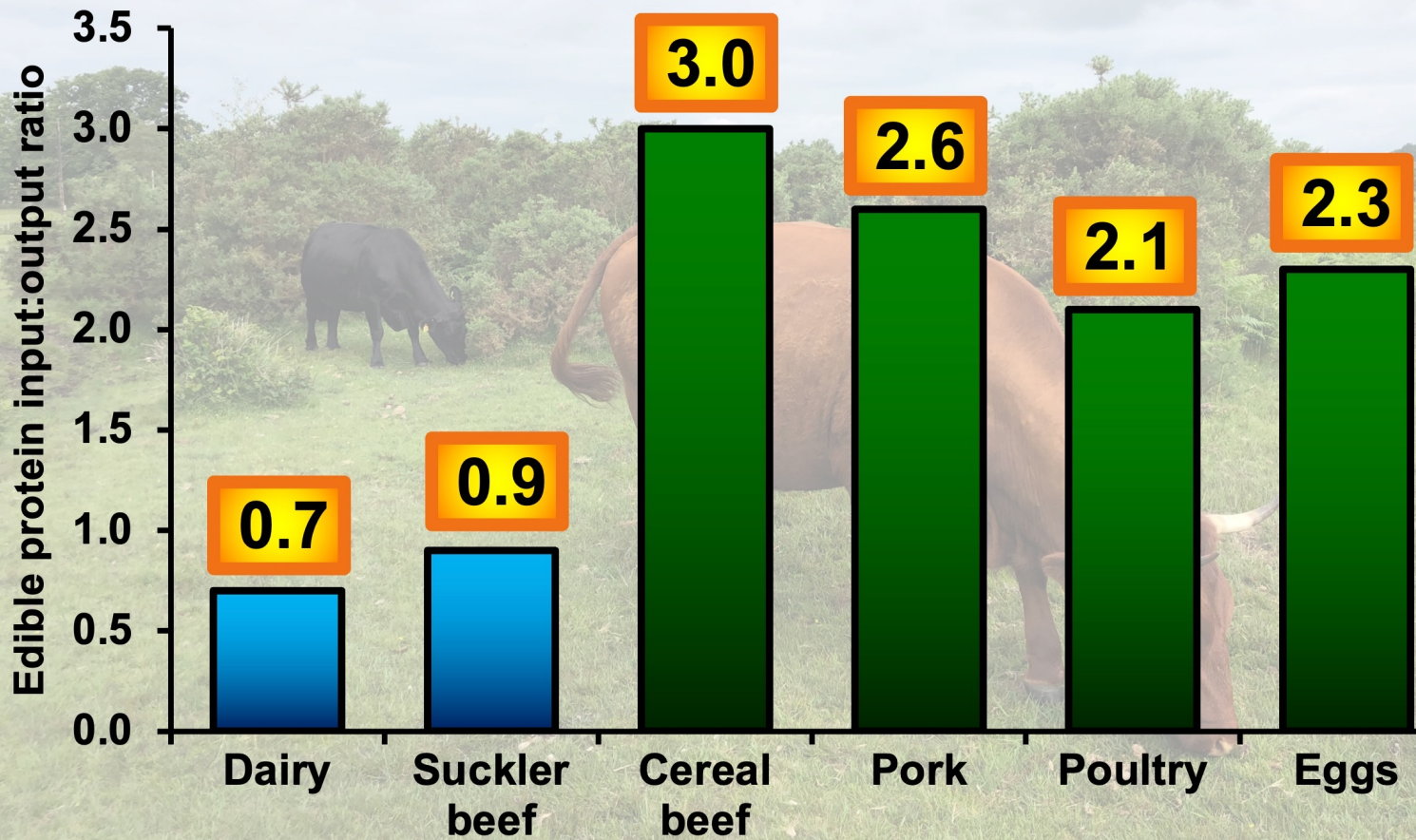
Source: Created by Jude L. Capper, 2023; data from Wilkinson (2011) <https://doi.org/10.1017/S175173111100005X>

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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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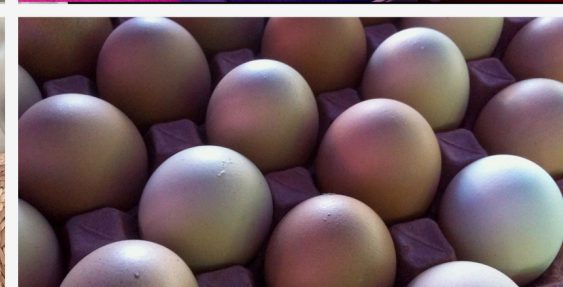


Source: Created by Jude L. Capper, 2023.



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(Almost) all of our food comes from the soil



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Source: Created by 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 equals 500% of the population of Reykjavik – or 188% of the population of Iceland
- Average of 3,663 per participating country
- 60% of participants already vegan, vegetarian or pescatarian



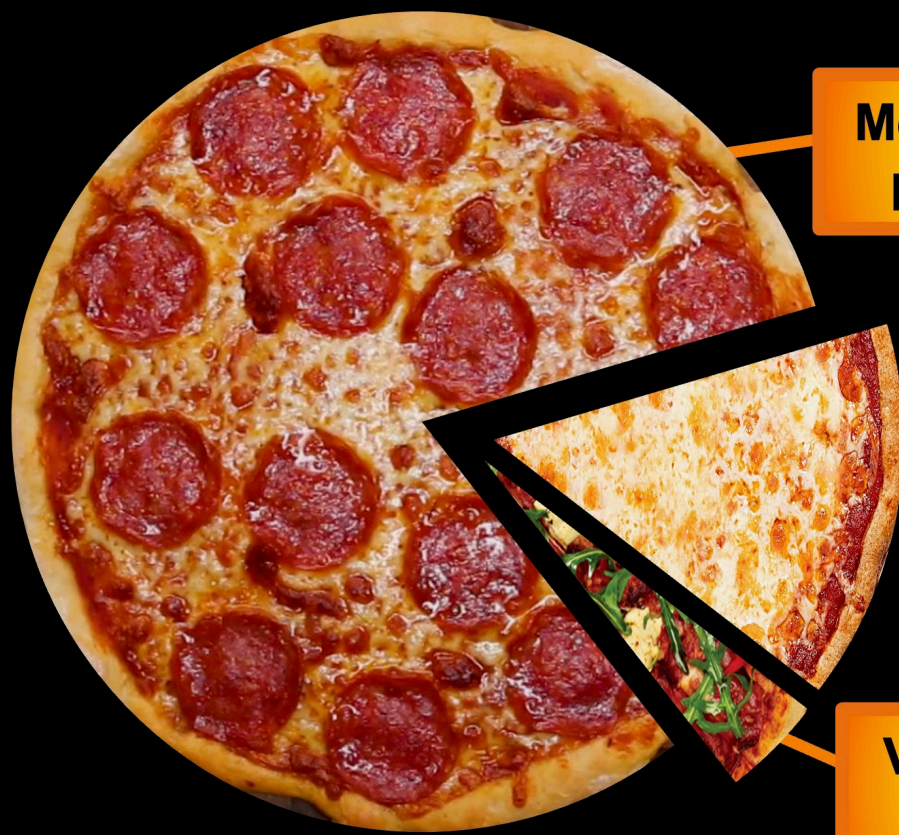
Source: Created by Jude L. Capper, 2023. Information from: <https://veganuary.com/blog/>





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



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

**Flexitarian (15%)**

**Vegetarian (3%) or vegan (1%)**



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%).







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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%**



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>



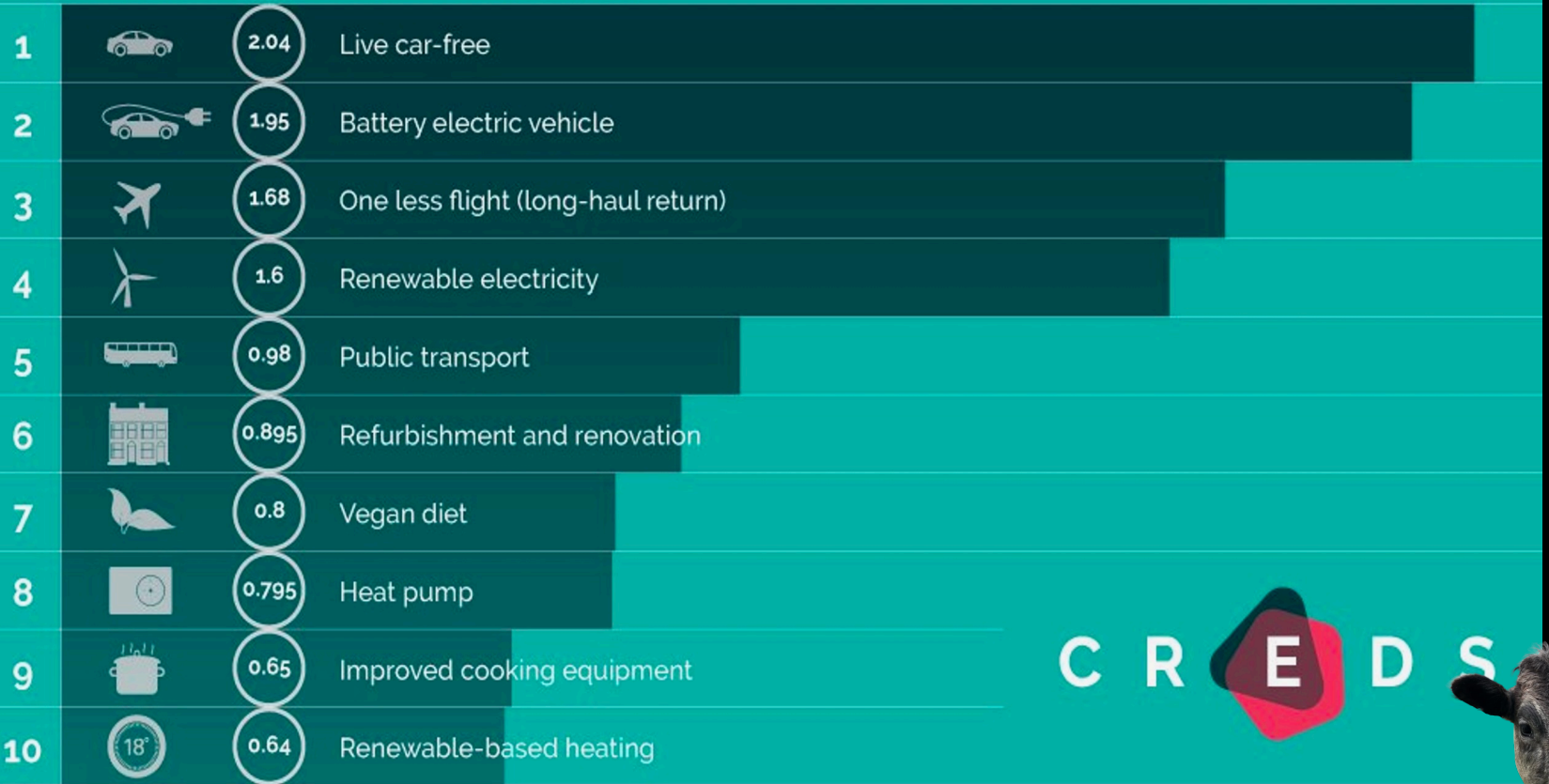




CV

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

## Top 10 options for reducing your carbon footprint



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](https://twitter.com/CREDS_UK/status/1262984570175176704?s=20)

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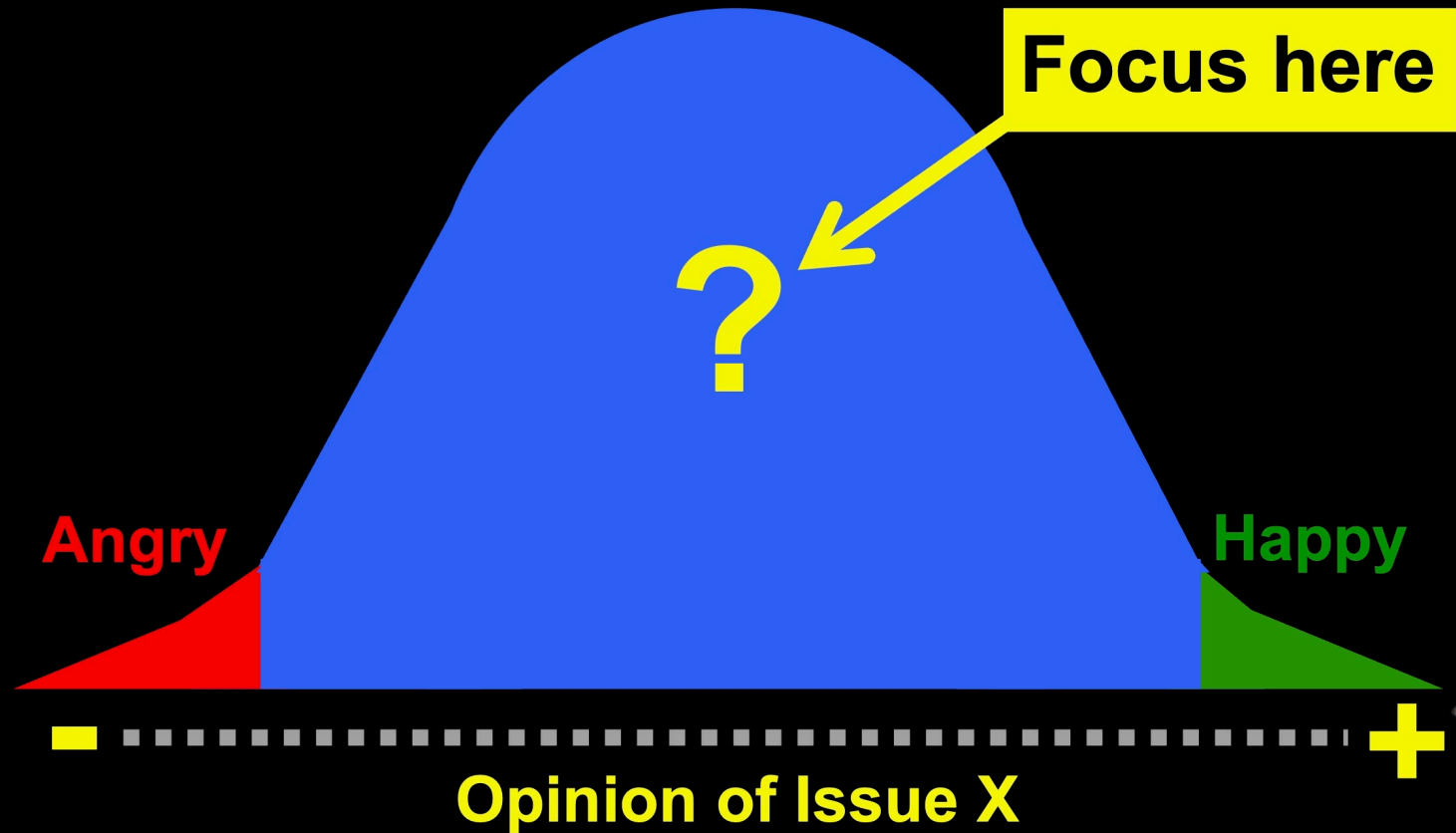




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We need to communicate with consumers who don't yet have fixed opinions of agriculture

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Source: Created by Jude L. Capper, 2023







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# Thank you!

JCapper@harper-adams.ac.uk

<http://bovidiva.com/presentationlinks>

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# Questions?



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

