



Dr. Jude Capper



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**Sustainability
and livestock
farming in an
environment
driven by
consumer
perceptions**

*Purina/Land O' Lakes
Technical Innovation
Conference*

12th January 2022

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s

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

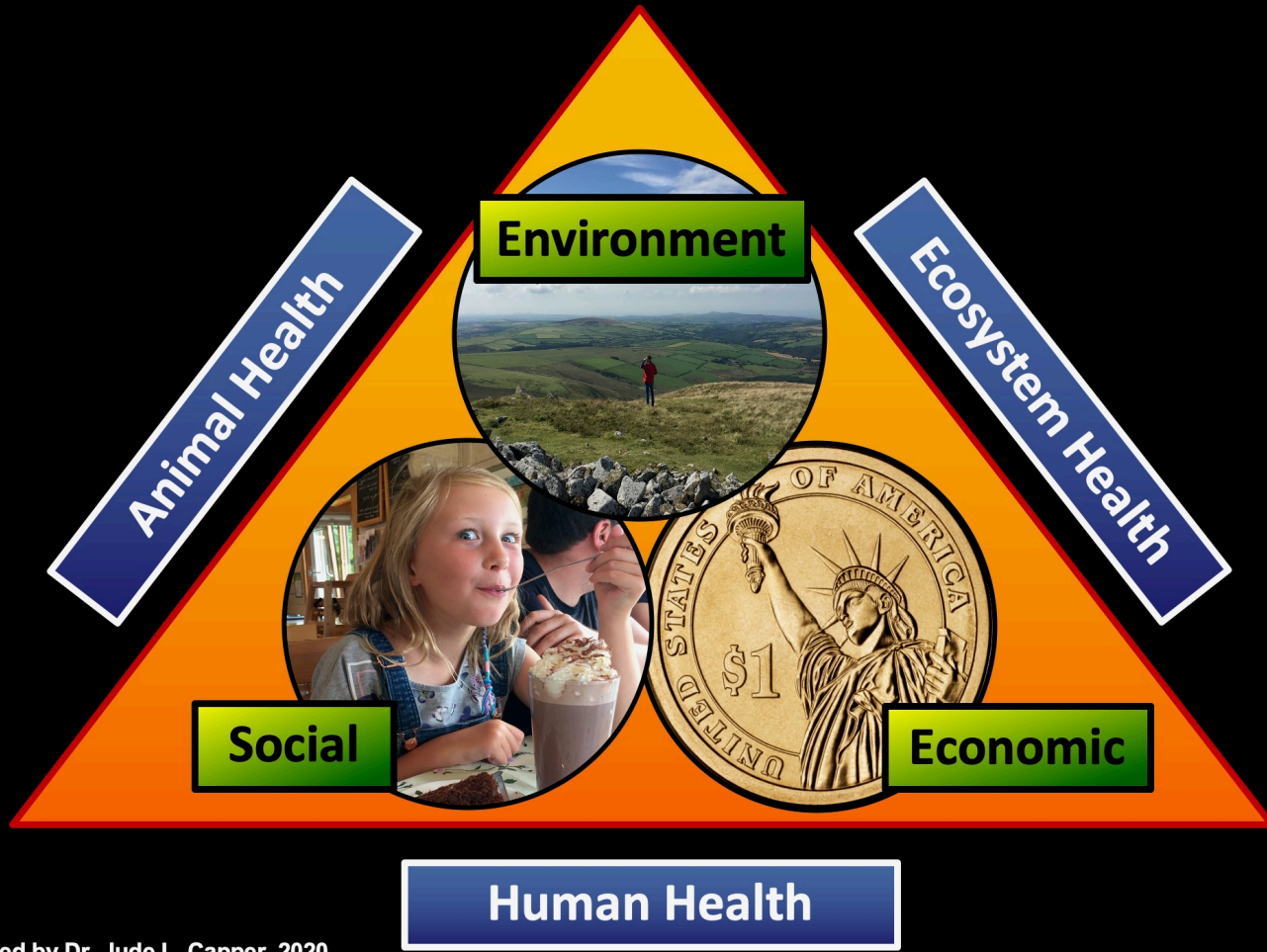
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Source: Created and photos by Dr. Jude L. Capper, 2020

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



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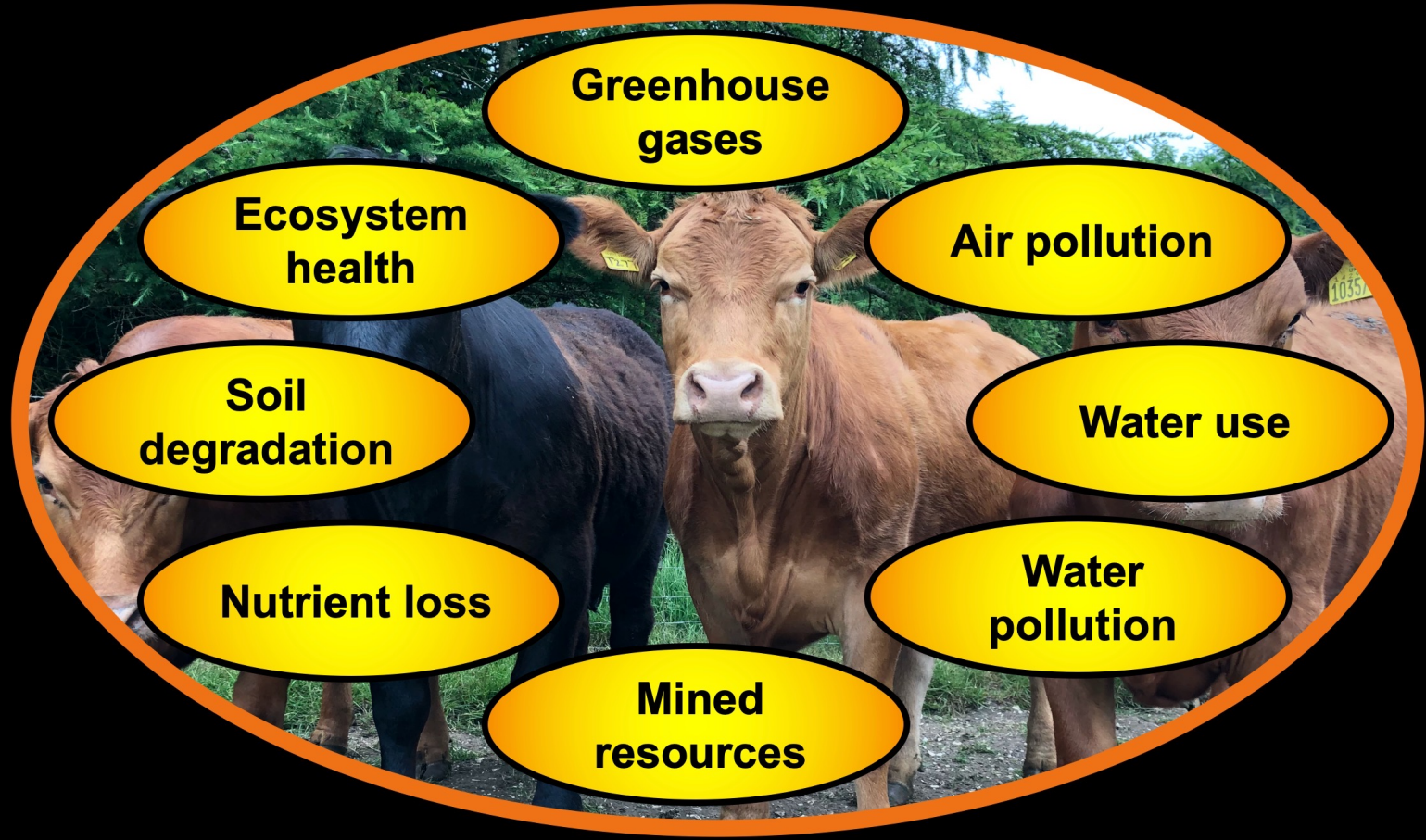


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B

Environmental impacts are not limited to greenhouse gas emissions



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Source: Created by Dr. Jude L. Capper, 2020

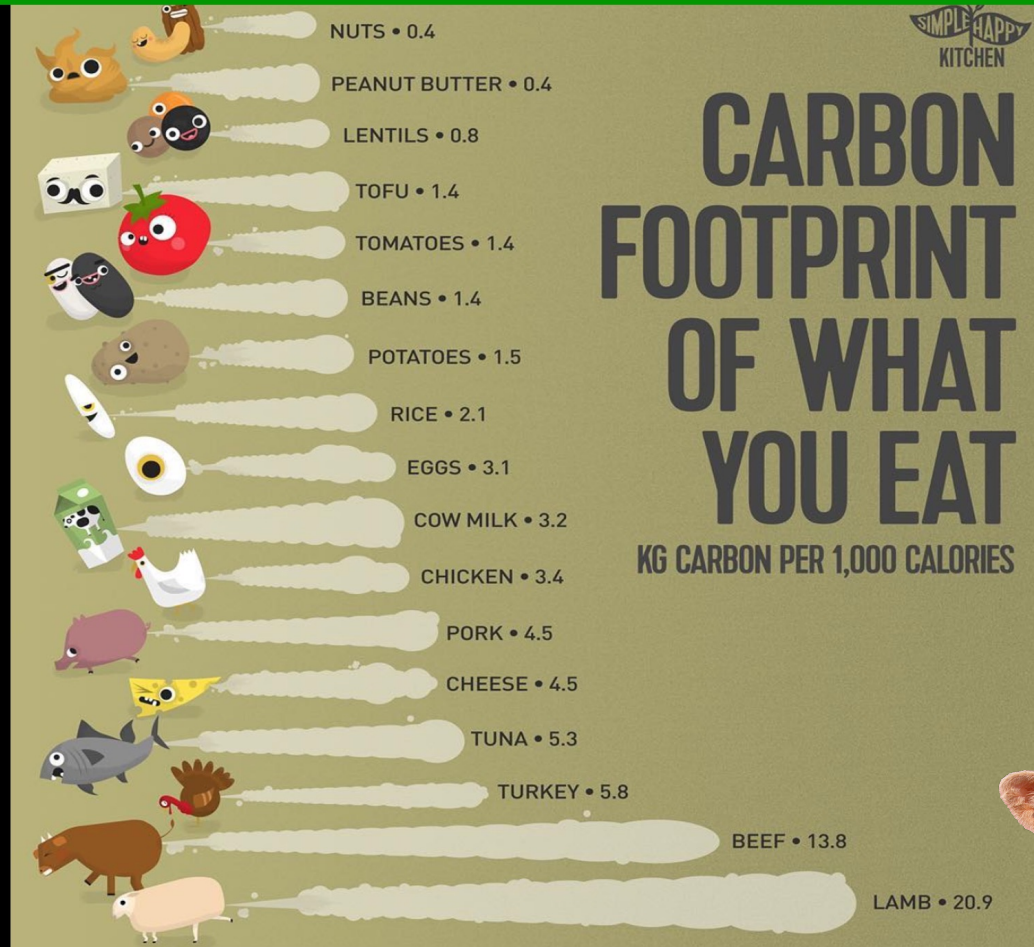
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Global averages are meaningless

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



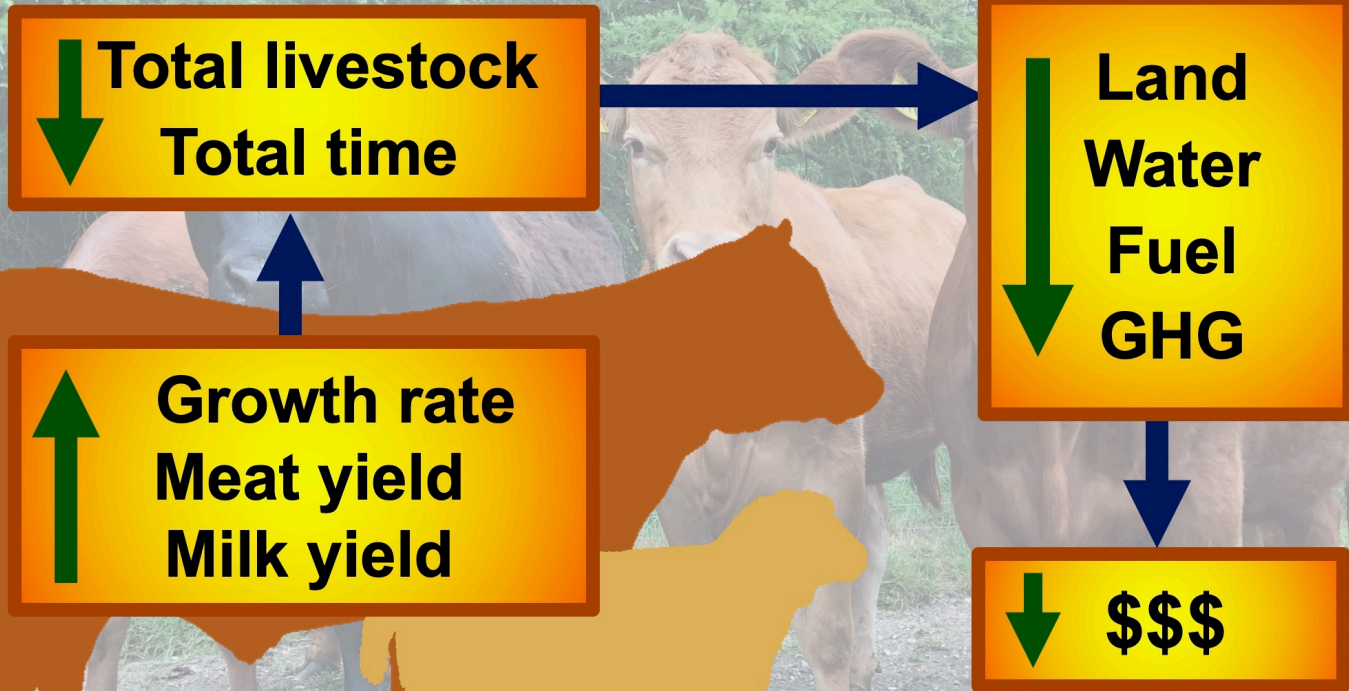
Source: Created by Dr. Jude L. Capper, 2020, infographic from: https://www.instagram.com/simple_happy_kitchen/

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Improving animal productivity reduces the environmental impact of milk and meat



Source: Created by Dr. Jude L. Capper, 2022. Data from: Capper, J.L. 2015. Sustainability and One Health. In: Cockcroft, P. *Bovine Medicine*. Wiley-Blackwell, Oxford, UK.

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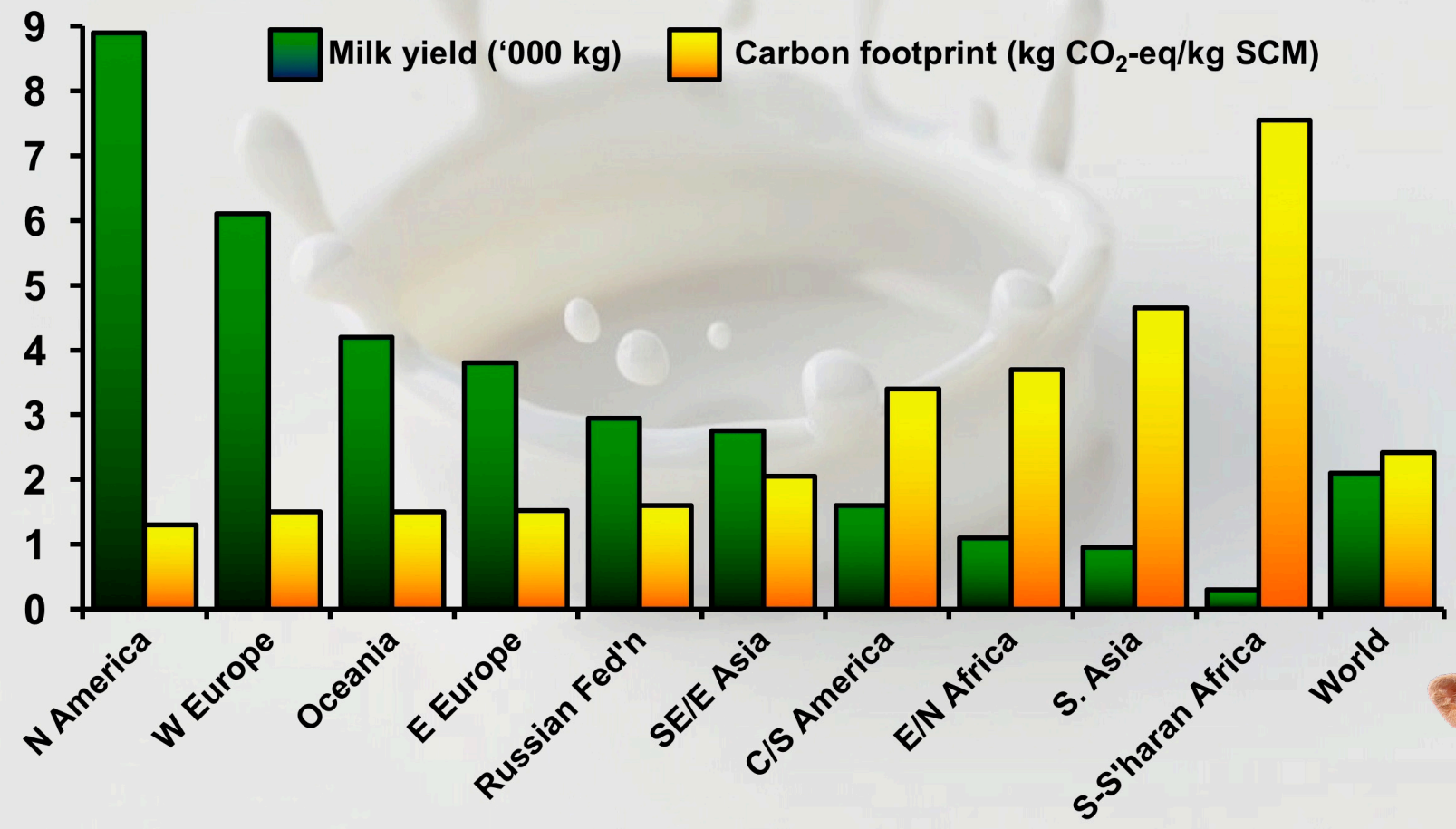


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DS

A negative correlation exists between milk yield and carbon emissions



Source: Created by Dr. Jude L. Capper, 2016; data from: FAO (2010) Greenhouse Gas Emissions from the Dairy Sector. FAO, Rome, Italy.

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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%)

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

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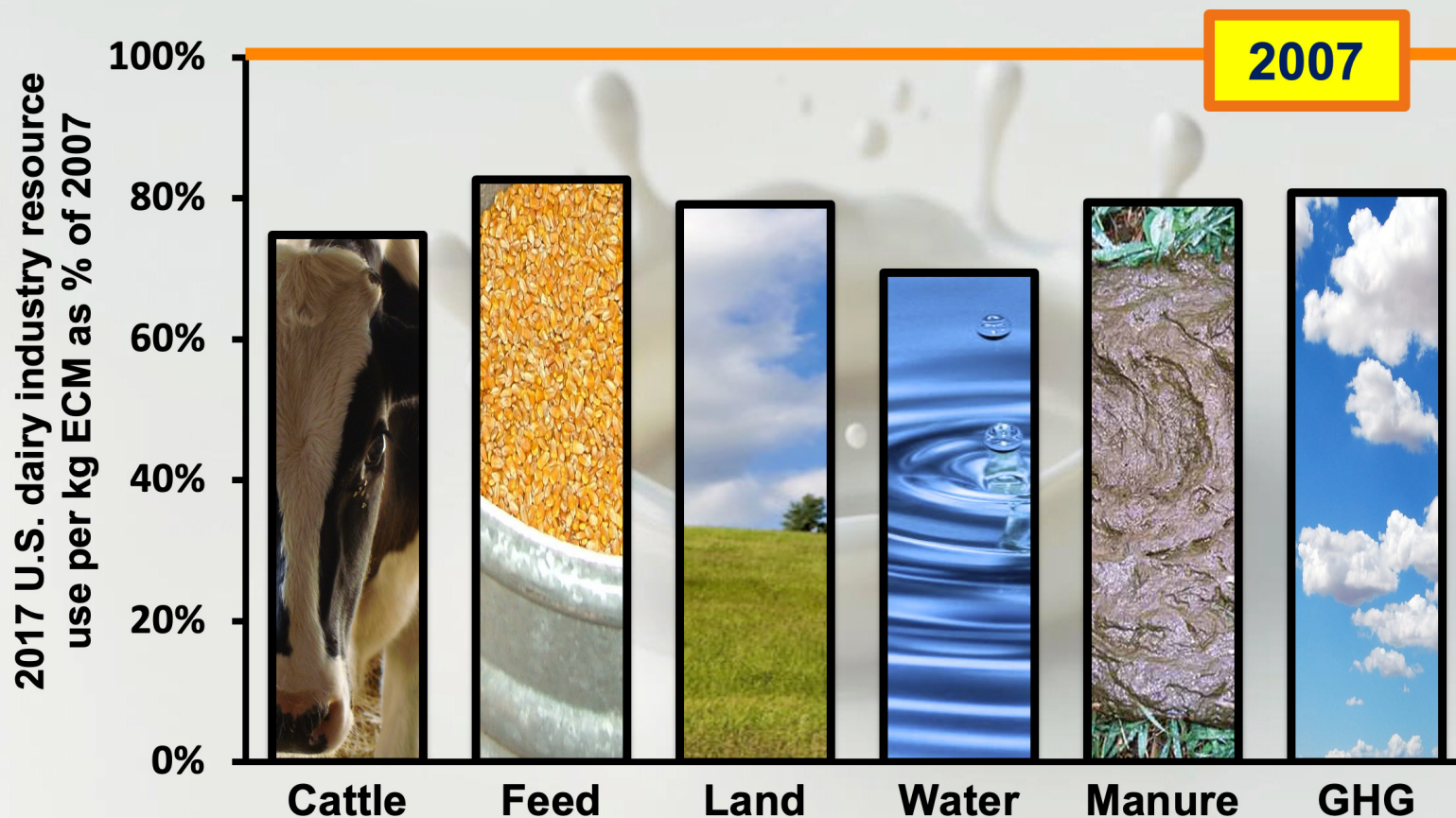


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U.S. dairy producers cut greenhouse gas emissions by 19% between 2007-2017



Source: Created by Dr. Jude L. Capper, 2021. Data from: Capper, J. L. and Cady, R. A. 2019. The effects of improved performance in the U.S. dairy cattle industry on environmental impacts between 2007 and 2017. *Journal of Animal Science*. <https://doi.org/10.1093/jas/skz291>

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Efficiency losses increase environmental impact and economic cost

Inadequate nutrition
Reproductive failure
Lameness
Mastitis
Metabolic disease
Infectious disease
Long dry period
Late age at first calving
Antibiotic residues
Feed wastage
Poor pasture management



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

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Sustainability indices will be increasingly present on meat labels in future

Beef (animal-based) patty

Nutritional value*

Serving size: 227 g (8 oz) steak

78%

Pure beef protein
- contains no
lab-based
ingredients!

Sustainability index



Carbon footprint (under GWP*)



Water footprint



Antibiotic footprint



Community support rating



Farm webcam and sustainability assessment data



*compared to ideal protein



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Source: Created by Dr. Jude L. Capper, 2020.

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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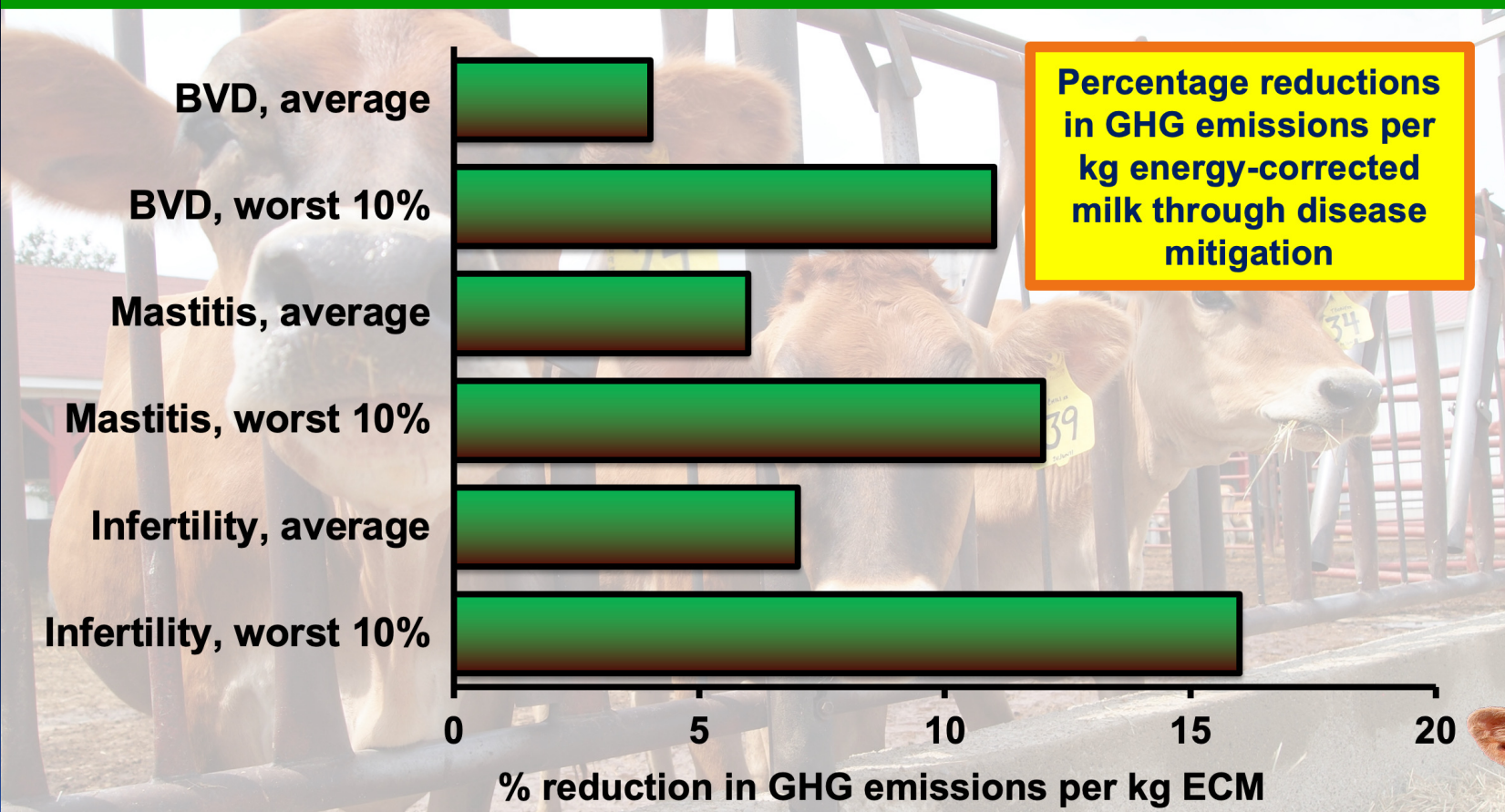
Source: Created by Dr. Jude L. Capper, 2020. Data from: World Organization for Animal Health. 2008. <http://www.oie.int/for-the-media/editorials/detail/article/feeding-the-world-better-by-controlling-animal-diseases>

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DS

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



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

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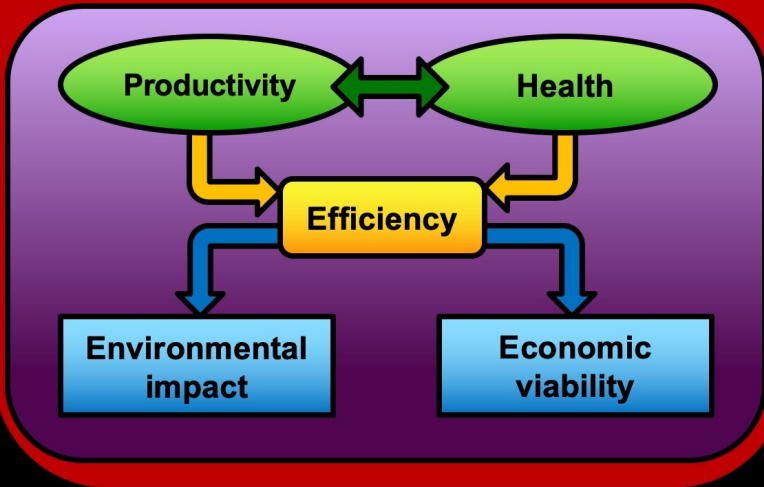
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Social acceptability and consumer trust are vital for sustainable livestock production

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Social Acceptability



Sustainability



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Source: Created by Dr. Jude L. Capper, 2020.

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Welfare, health and environmental concerns are paramount for people giving up dairy

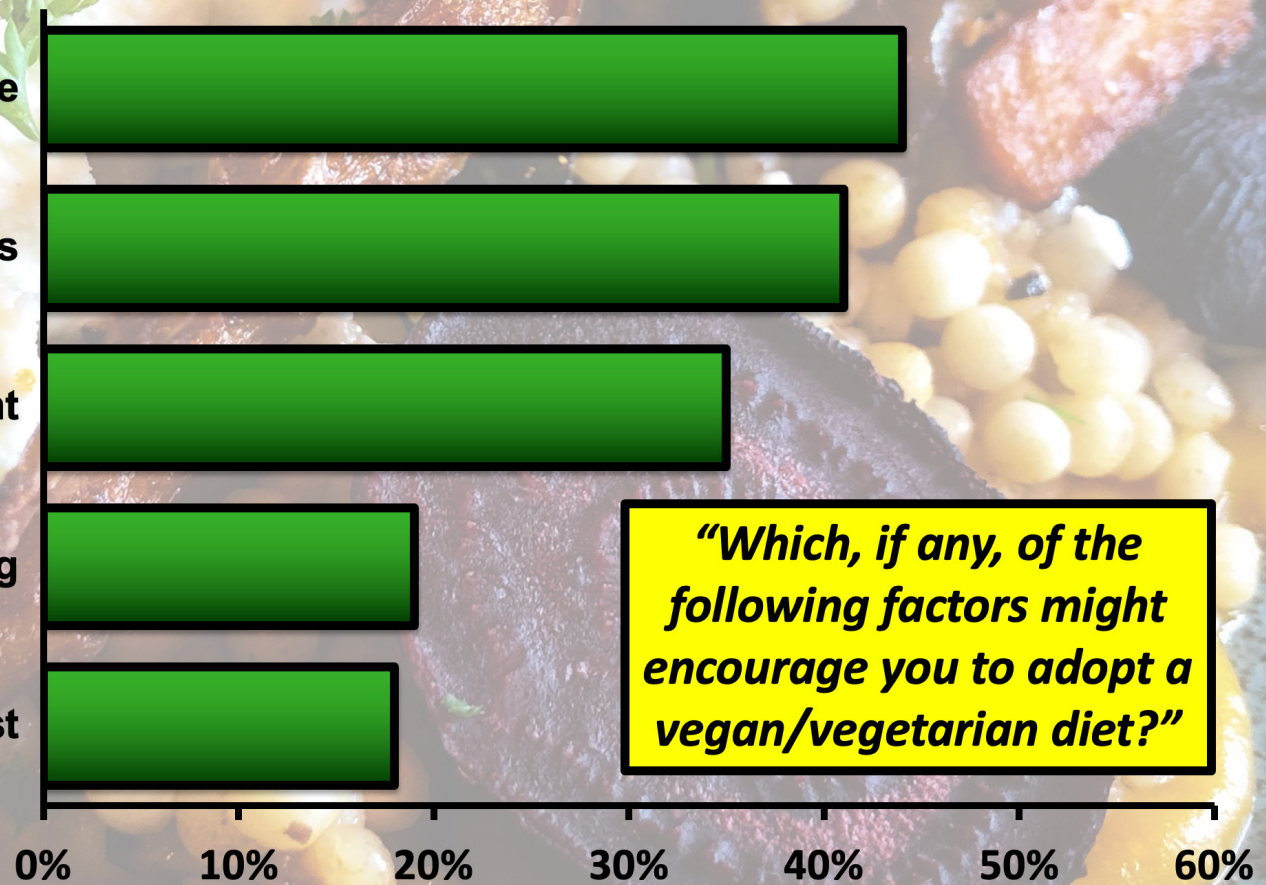
Animal welfare

Healthiness

Environment

Labelling

Economic cost



Source: Created by Dr. Jude L. Capper, 2021. 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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Guilt is a primary motivator for people considering going vegetarian or vegan

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"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 Dr. Jude L. Capper, 2020. 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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Are plant-based foods taking over from dairy?

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Source: Created by and photos from Dr. Jude L. Capper, 2020.

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Is the rise in plant-based food sales related to consumer demand?



Lockdown preparations in local food hall indicate that dairy may be a priority for many panic-buyers

Source: Created and photo by Dr. Jude L. Capper, 2020.

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Do 582,538 Veganuary participants amount to more than a hill of beans?

**JOIN THE
NEW YEAR'S
REVOLUTION**



- Slightly smaller than the population of Milwaukee
- If all participants were based in the USA they would comprise <0.18% of the population
- Average of 2,787 per participating country
- 62% of participants already vegan, vegetarian or pescatarian

Source: Created by Dr. Jude L. Capper, 2022. Information from: <https://veganuary.com/>

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Attractively presented misinformation can be difficult to counter

the leading cause of climate change



So much is being emitted that life on Earth is collapsing!



get.plant.ed Is animal agriculture responsible for 87% of annual greenhouse gases? A new study by [@climatehealers](#) says yes! When accounting for cumulative human-made greenhouse gas, aerosol emissions and the impact of deforestation, the scientists found that animal agriculture is responsible for more global warming than all the CO2 from fossil fuel sources combined. This contradicts other reports that claim animal agriculture only causes 14.5% of greenhouse gases. Either way, the consensus is that animal agriculture is unsustainable, and switching to a plant-based diet is the most effective action you can take to help the planet

Source: Slide created by Dr. Jude L. Capper, 2021. Screenshot from [@get.plant.ed](#) on Instagram.

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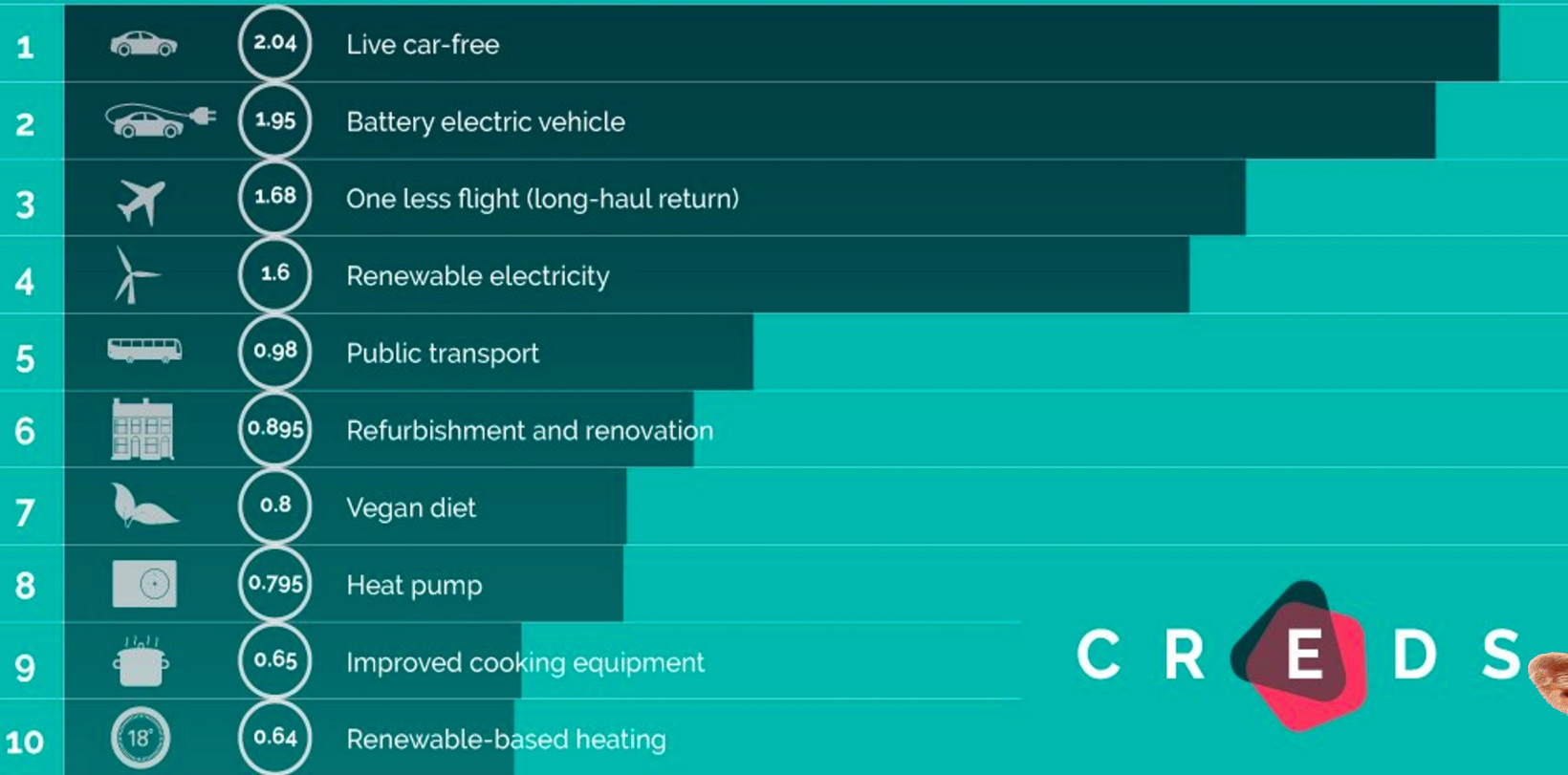
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CV

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

Top 10 options for reducing your carbon footprint



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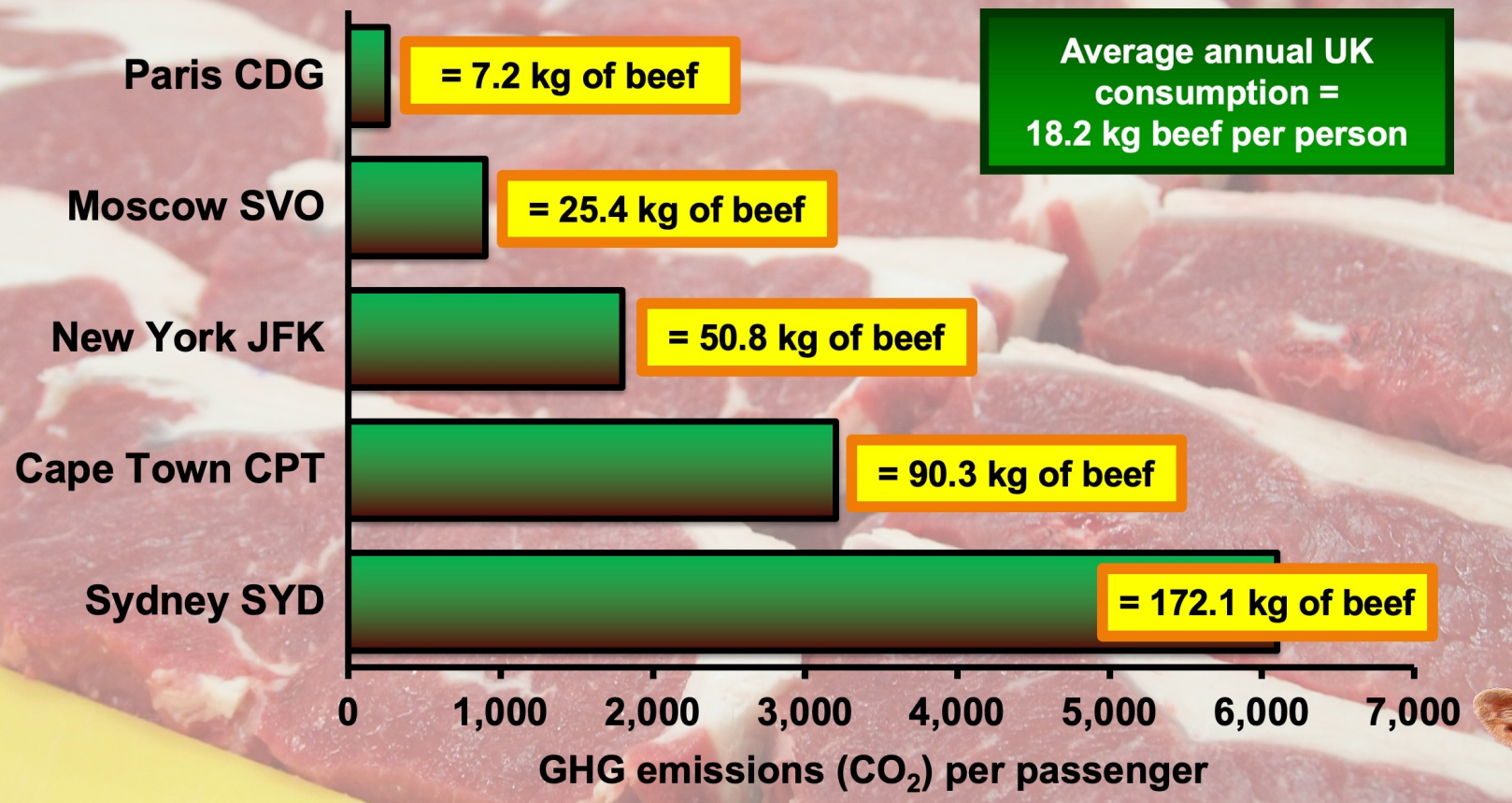
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Source: Created by Dr. Jude L. Capper, 2020. . Infographic adapted from Centre for Research into Energy Demand Solutions (2020). Available at: https://twitter.com/CREDS_UK/status/1262984570175176704?s=20

CV

International flights emit considerable quantities of carbon compared to beef production



Source: Created by Dr. Jude L. Capper, 2020. 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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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

Source: Created by Dr. Jude L. Capper, 2020. Data from: Smedman et al. (2010). Nutrient density to climate impact (NDCI) index of beverages. Food & Nutr. Res.

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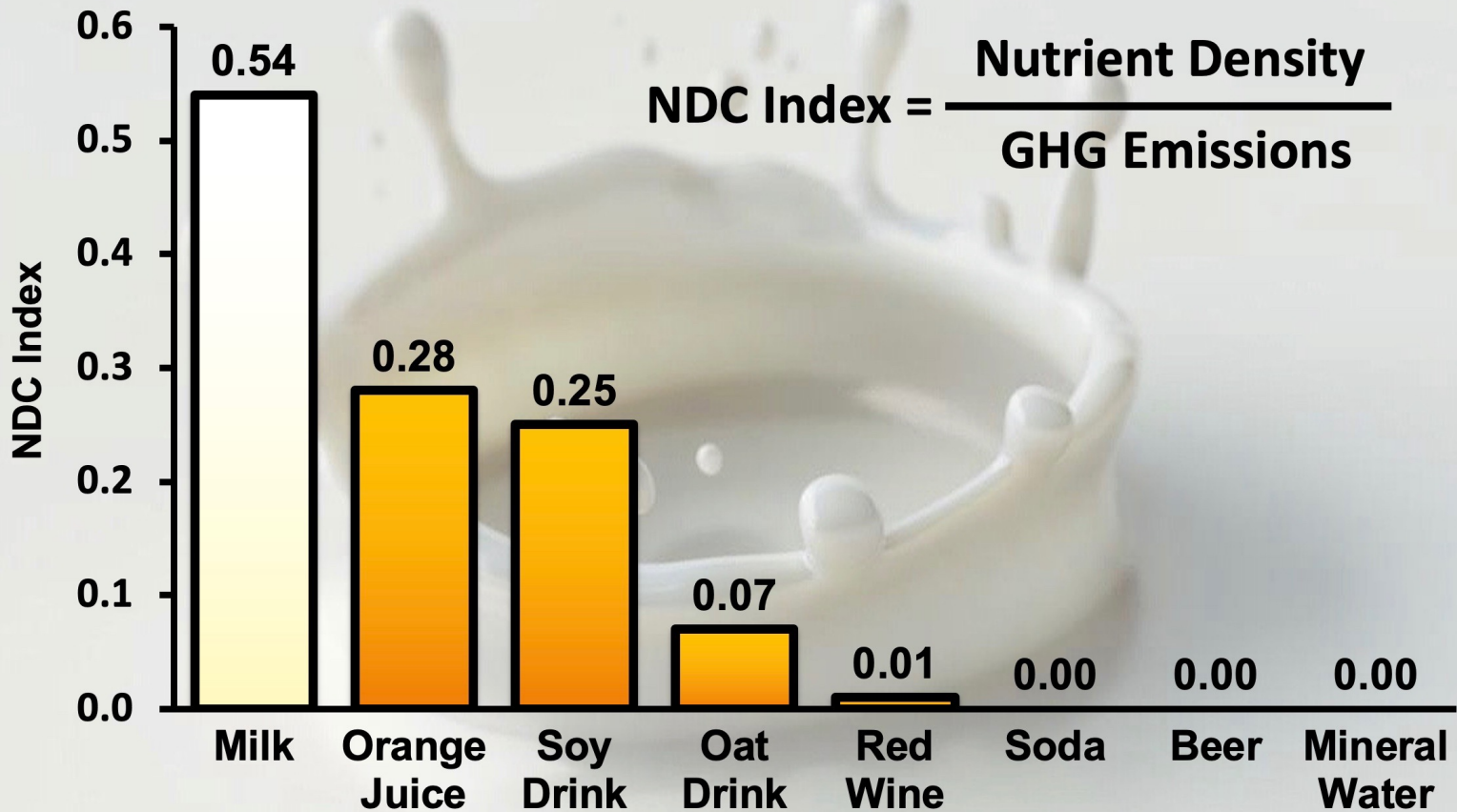


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Nutrient density should be included when assessing carbon footprint



Source: Created by Dr. Jude L. Capper, 2020. Data from: Smedman et al. (2010). Nutrient density to climate impact (NDCI) index of beverages. Food & Nutr. Res.

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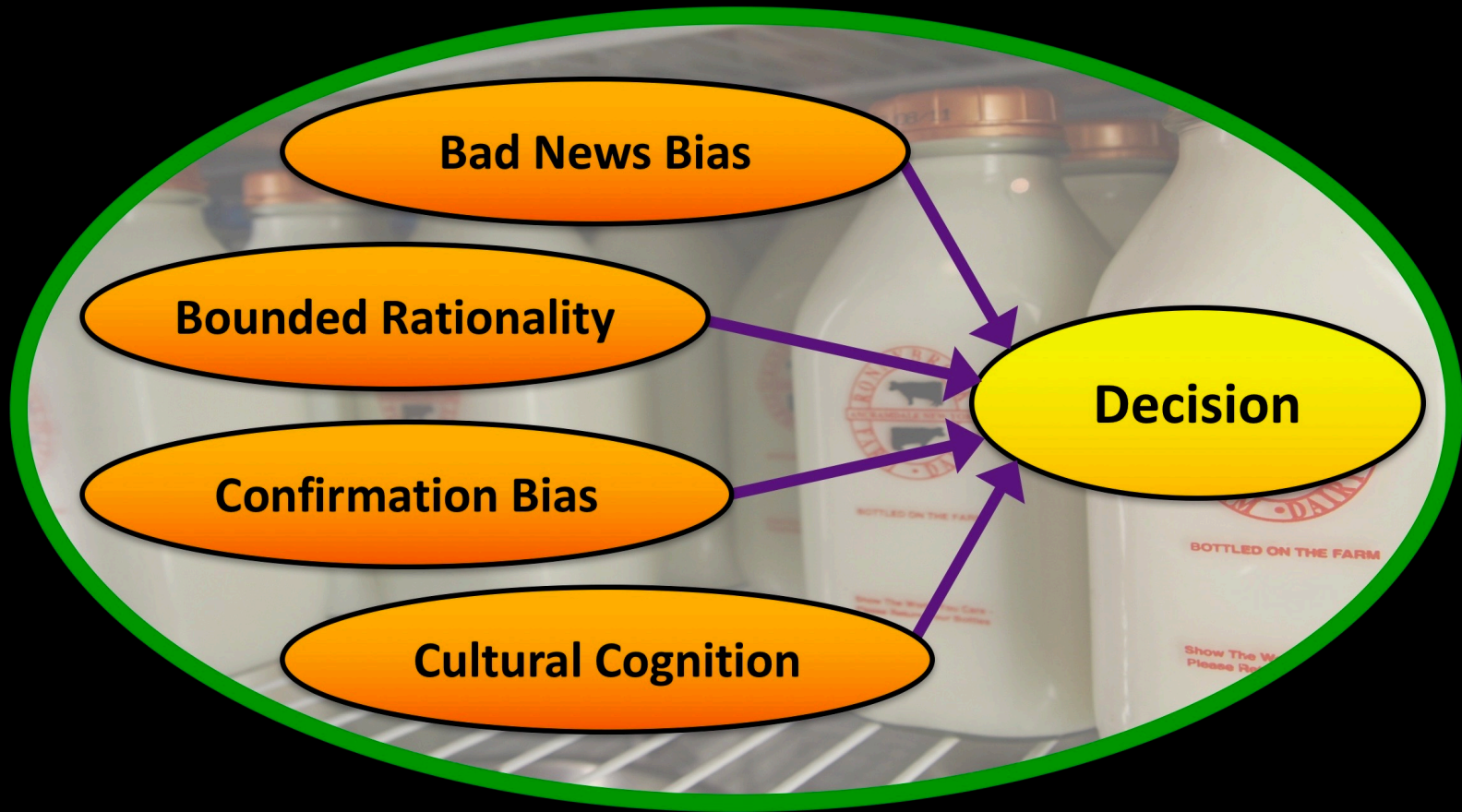


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Four major processes influence consumer decision-making



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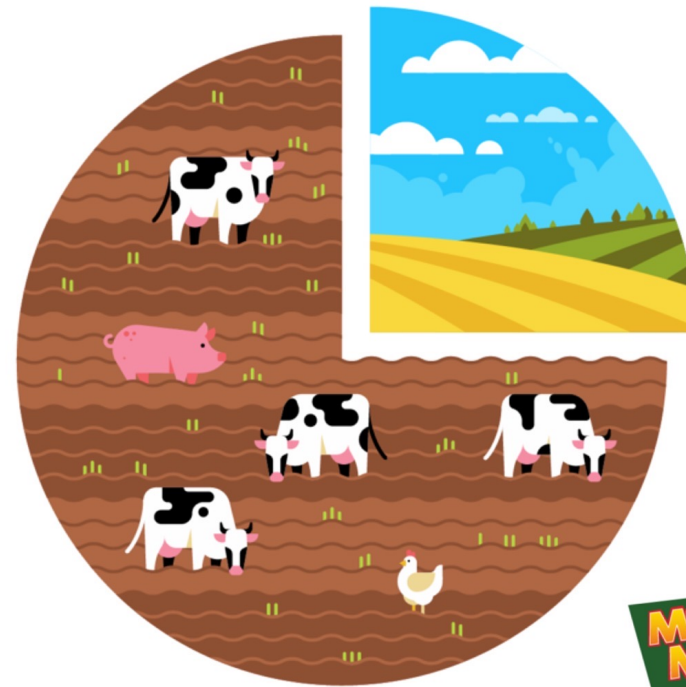
Source: Created by Dr. Jude L. Capper, 2017. Information from: Capper and Yancey (2015). Communicating Animal Science to the General Public. *Animal Frontiers*.

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Bad news bias – need five positive stories to cancel out each negative

We are programmed to believe bad news stories. Tidal wave of factual information needed to overcome them.

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



MEATLESS MONDAY

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Source: Created by Dr. Jude L. Capper, 2020. Infographic 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 Dr. Jude L. Capper, 2021

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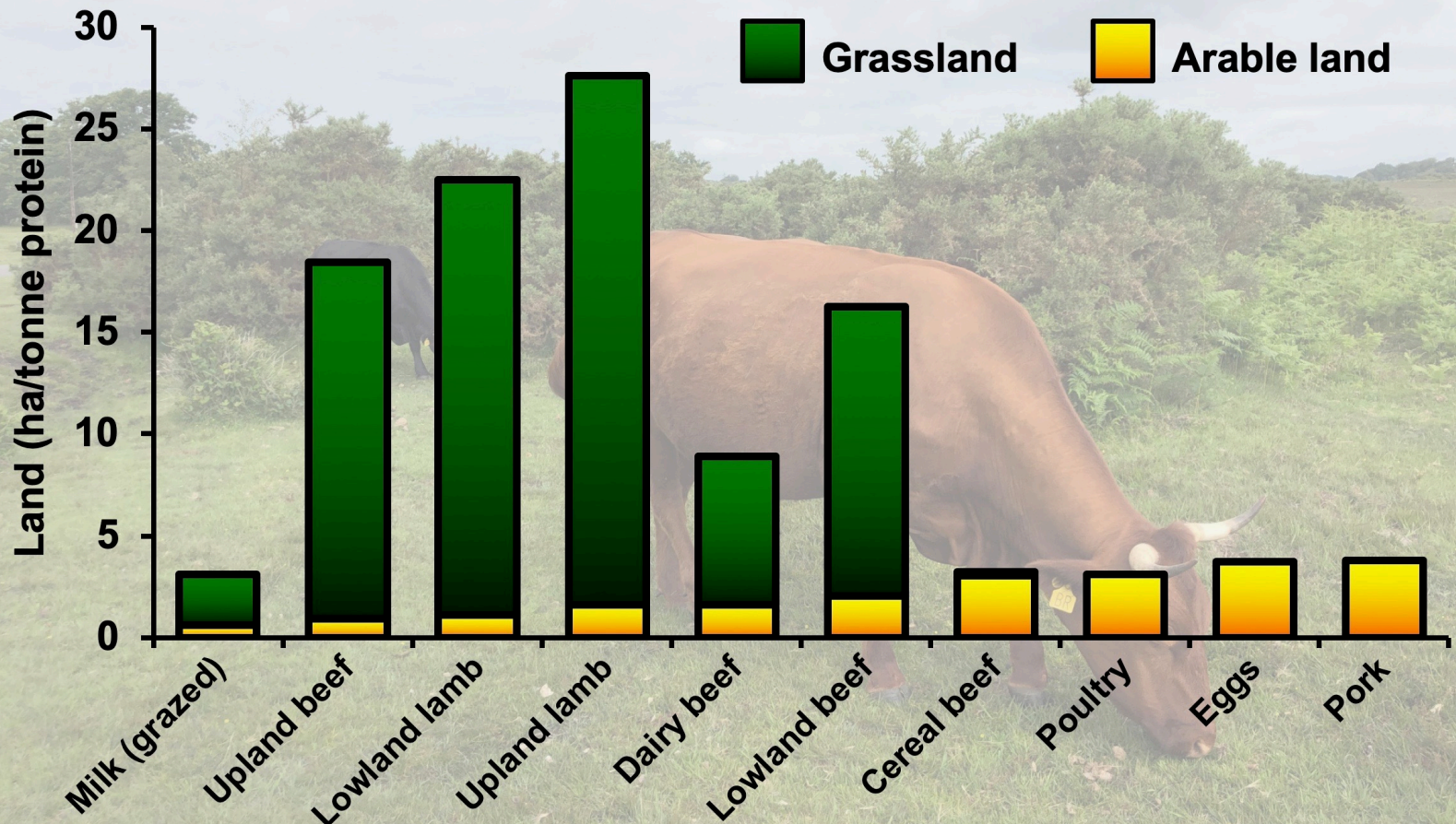


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5

Livestock systems vary widely in arable and grassland use



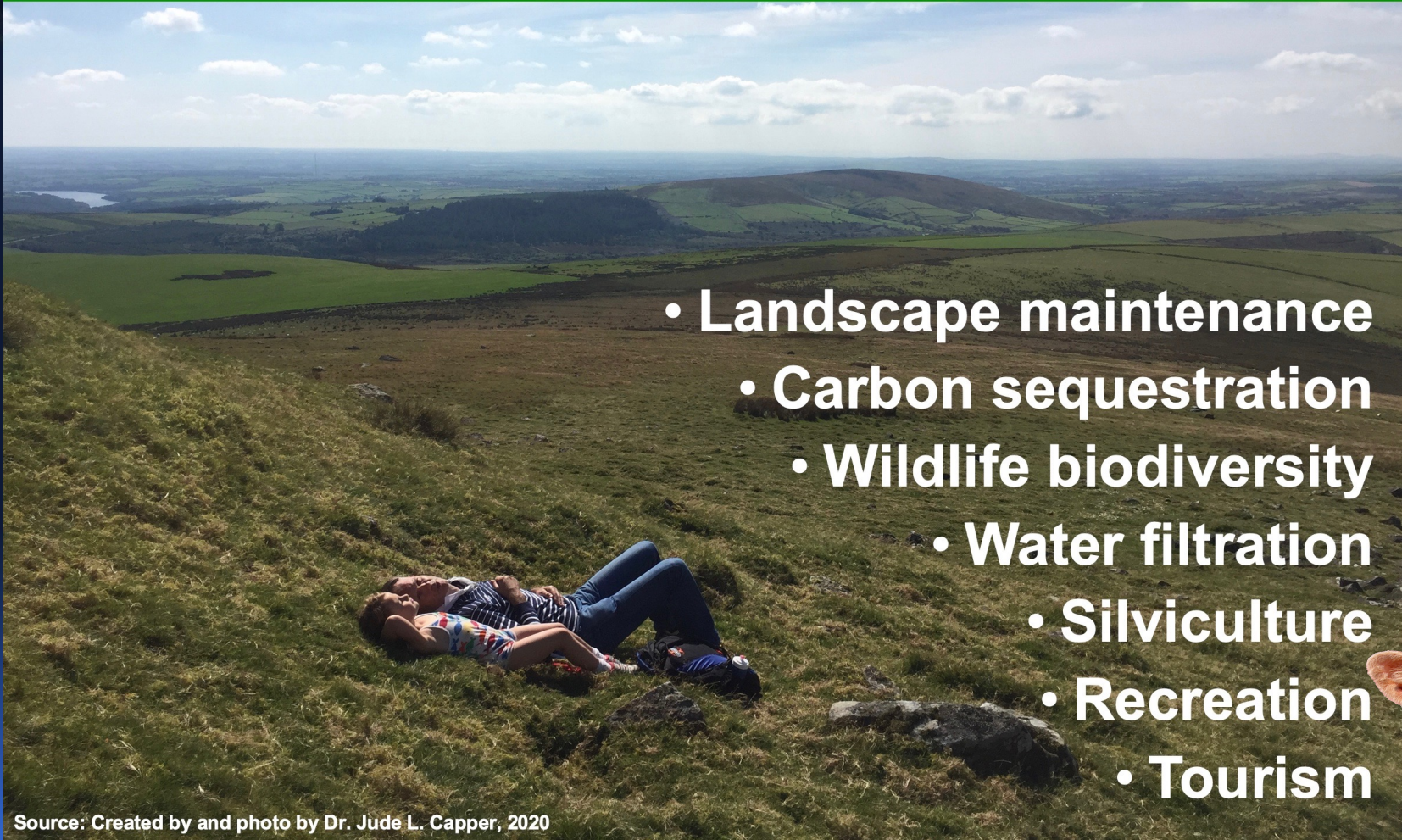
Source: Created by Dr. Jude L. Capper, 2020; data from Wilkinson and Lee (2018) Review: Use of human-edible animal feeds by ruminant livestock. *Animal*.

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Grazed land provides much more than food



- Landscape maintenance
- Carbon sequestration
- Wildlife biodiversity
- Water filtration
- Silviculture
- Recreation
- Tourism

Source: Created by and photo by Dr. Jude L. Capper, 2020

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

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Confirmation bias – tapping into consumers' inherent beliefs to improve trust

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Consumers may interpret bottle-feeding a calf as caring or cruel, depending on pre-conceived ideas

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Source: Created by Dr. Jude L. Capper, 2020.

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

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

Source: Created by Dr. Jude L. Capper, 2019. Screenshot from: <http://www.telegraph.co.uk/rugby-union/2017/02/02/england-prop-joe-marler-reveals-secret-behind-hisremarkable/>

The Telegraph

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England prop Joe Marler reveals the secret behind his remarkable recovery in time for Six Nations

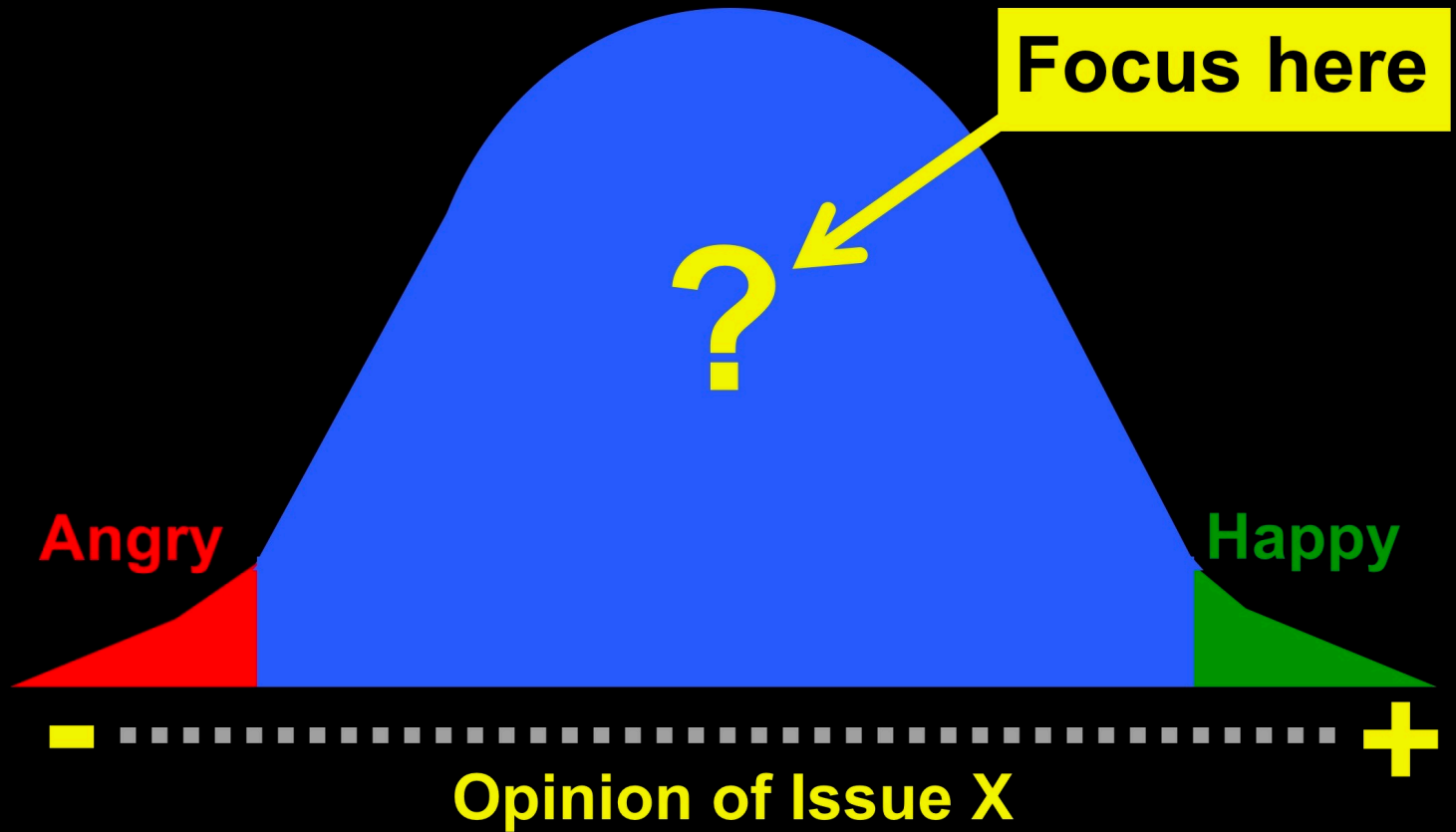


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We need to communicate with consumers who don't yet have fixed opinions of agriculture



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

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5 easy 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 Dr. Jude L. Capper, 2019. Adapted from: Capper and Yancey. 2015. Communicating Animal Science to the General Public. *Animal Frontiers*.



B

Thank you!

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<http://bovidiva.com/presentationlinks>

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Questions?



Source: Created by Dr. Jude L. Capper, 2020. Cartoon from: <http://RubesCartoons.com>

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