



Prof. Jude Capper

@bovidiva



How do we  
move beyond  
carbon to  
look at the  
whole  
picture?

*3<sup>rd</sup> November 2022*

Source: Dr. Jude L. Capper, 2022

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

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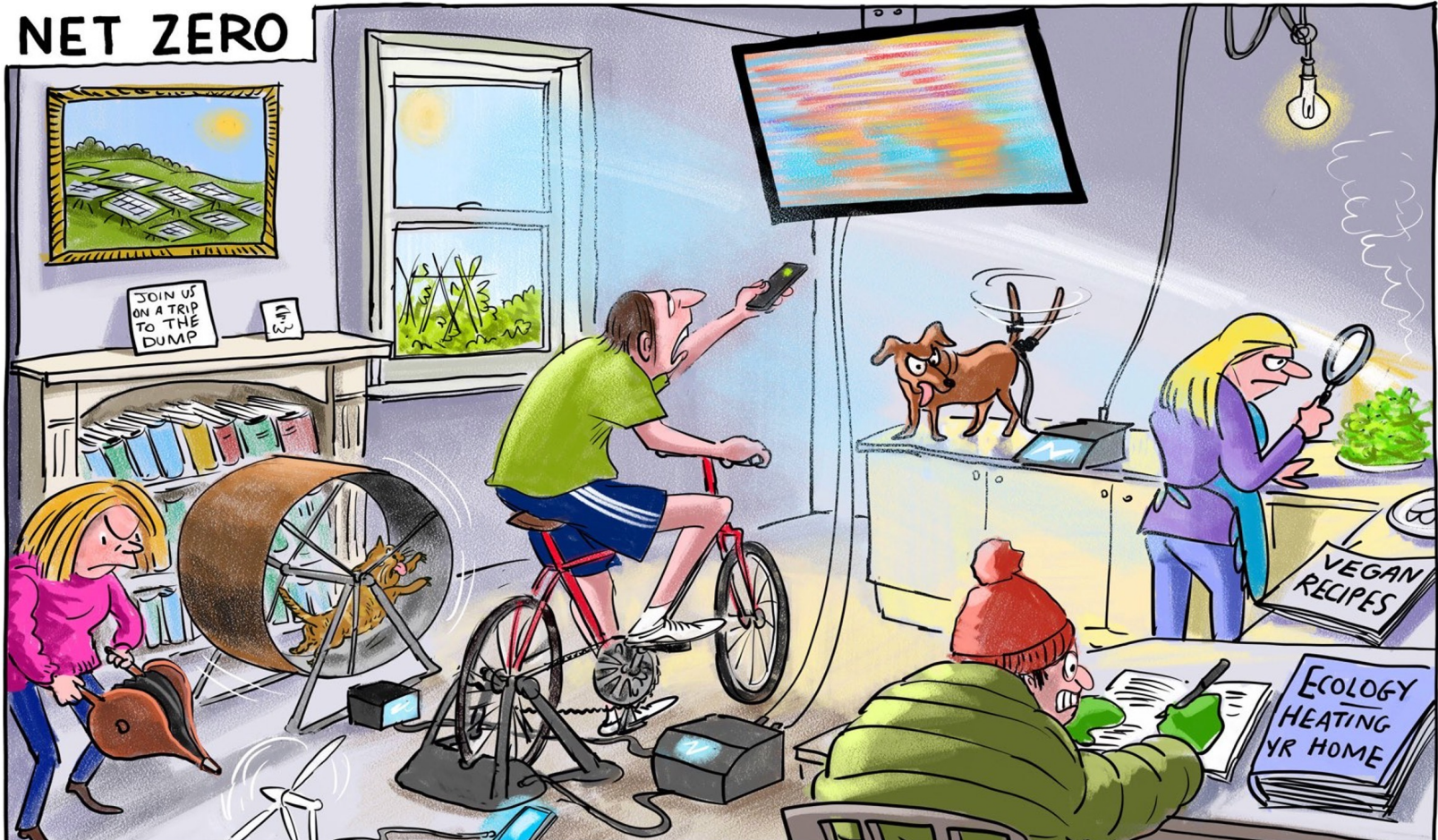
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Source: Created and photos by Dr. Jude L. Capper, 2020

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# Net Zero is a clear priority



Source: Created by Dr. Jude L. Capper, 2021. Cartoon from: <https://twitter.com/Cartoon4sale/status/1384537729460056067?s=20>

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

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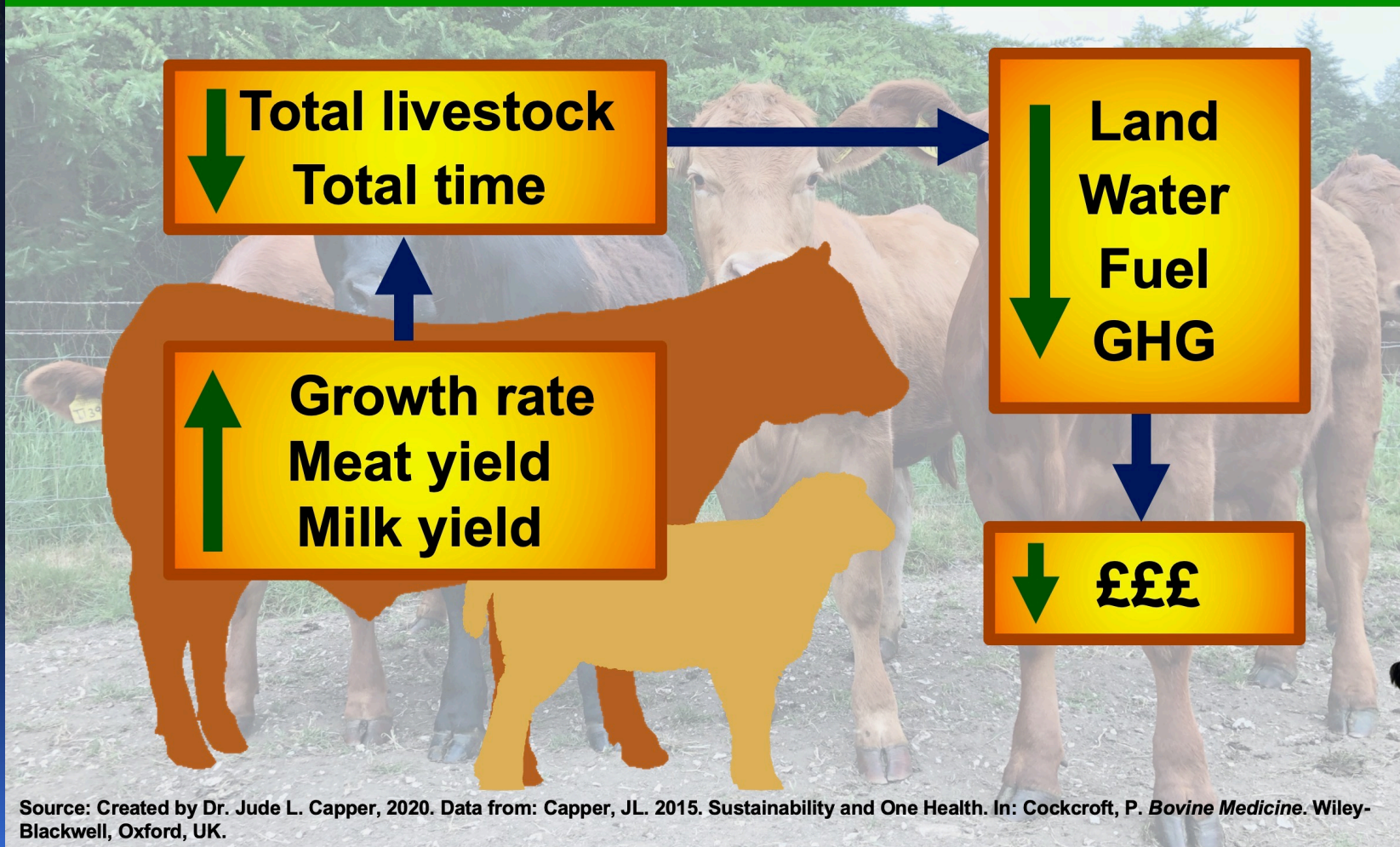
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# Improving animal productivity reduces the environmental impact of milk and meat



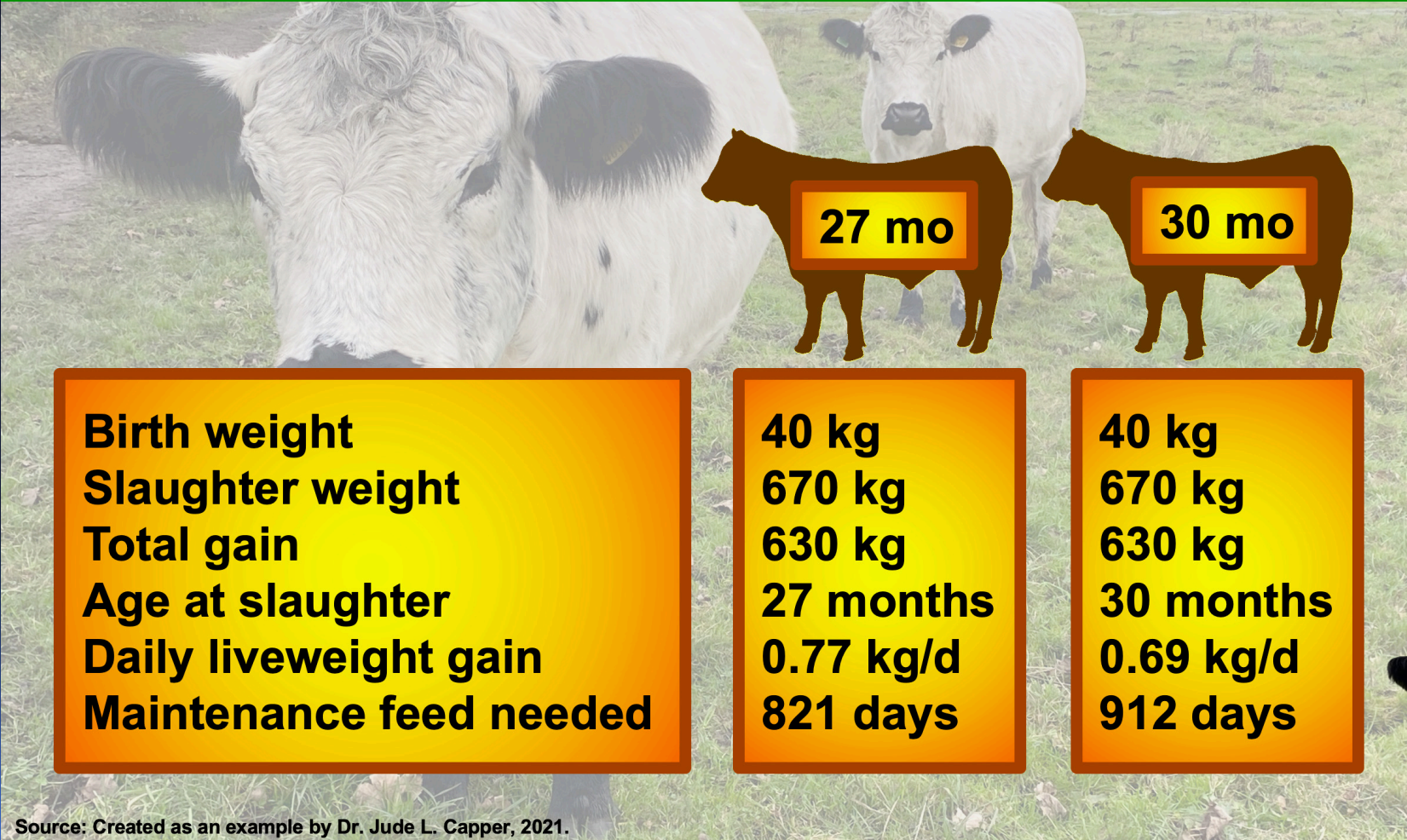
Source: Created by Dr. Jude L. Capper, 2020. Data from: Capper, JL. 2015. Sustainability and One Health. In: Cockcroft, P. *Bovine Medicine*. Wiley-Blackwell, Oxford, UK.

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# Reducing age at slaughter has both economic and environmental benefits



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

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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?

27 mo

30 mo

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

40 kg  
670 kg  
630 kg  
27 months  
0.77 kg/d  
821 days

40 kg  
670 kg  
630 kg  
30 months  
0.69 kg/d  
912 days

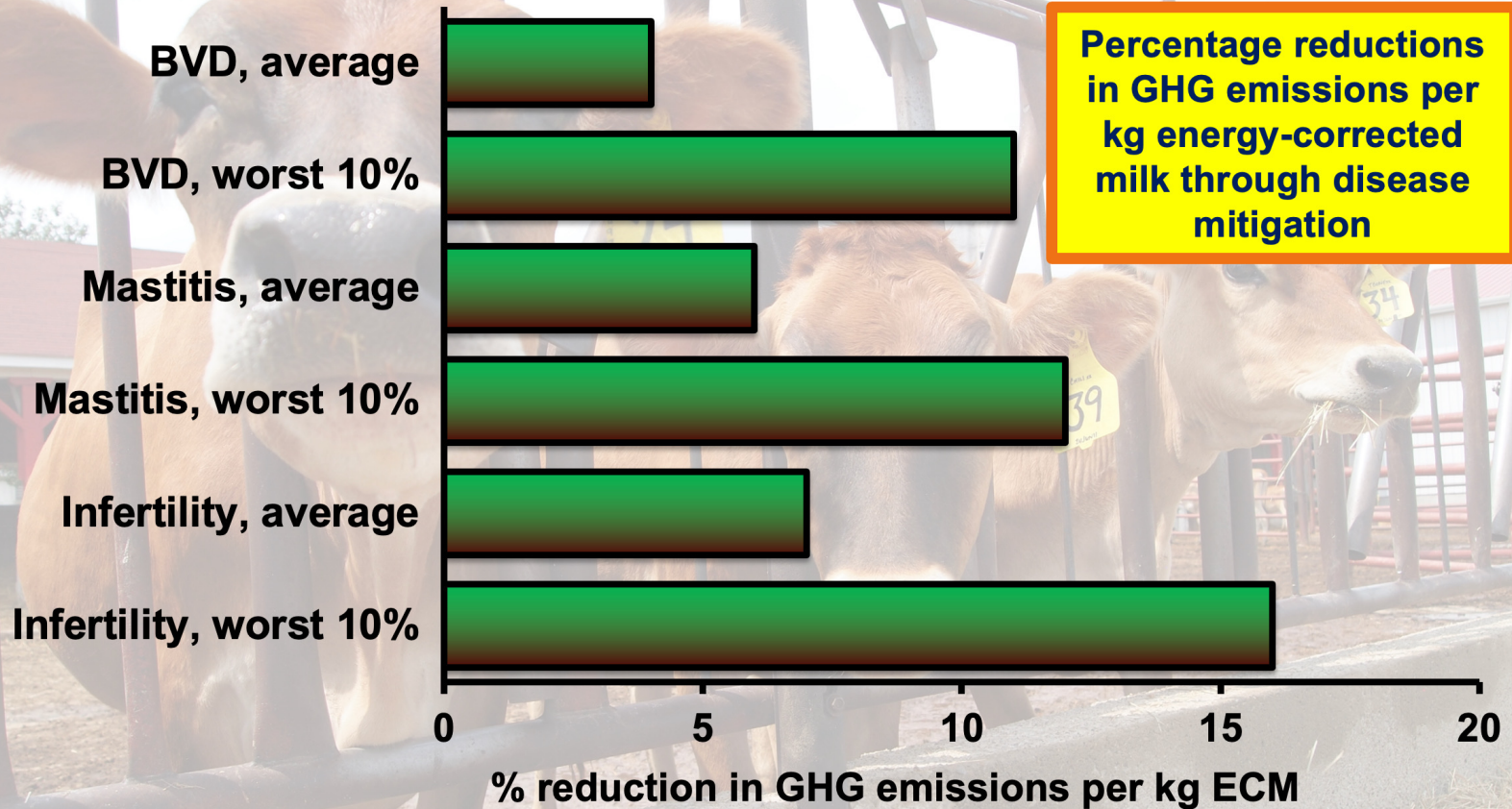
Source: Created as an example by Dr. Jude L. Capper, 2021.

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# 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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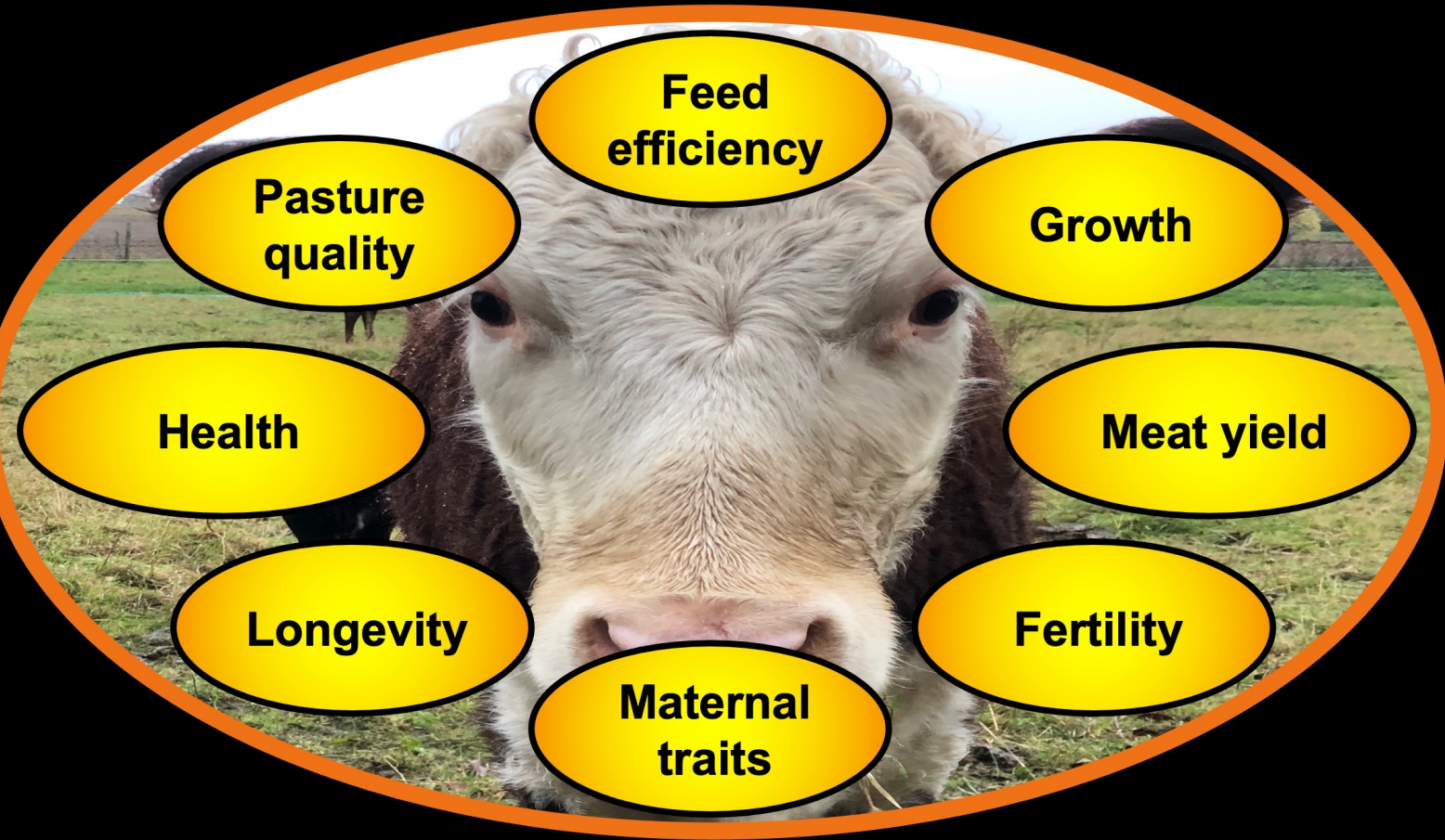
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Doing everything better on-farm improves economic and environmental sustainability



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

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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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What about smallholders?



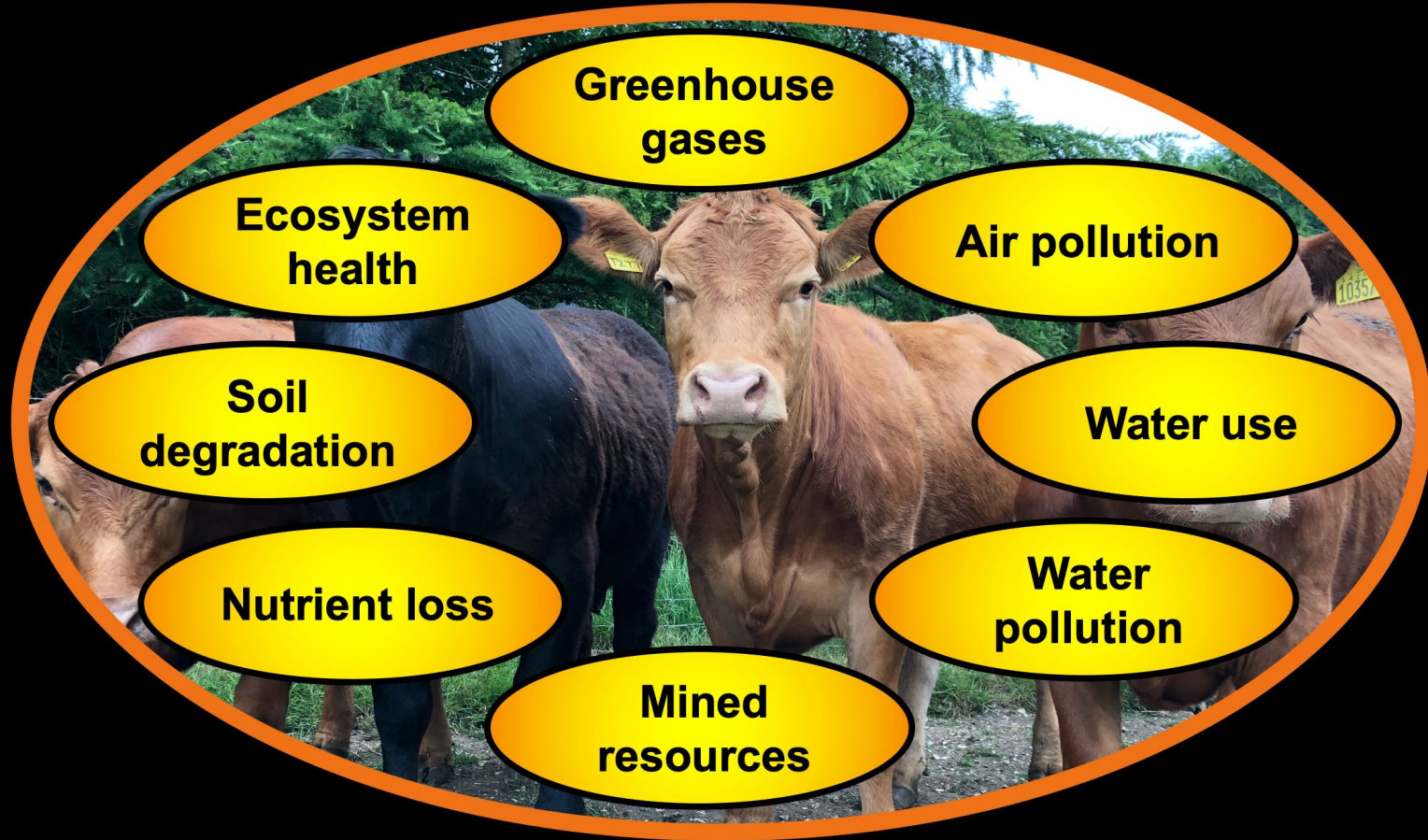
Source: Created by Dr. Jude L. Capper, 2021. Photo attribution: Mullookkaaran, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

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# Environmental impacts are not limited to greenhouse gas emissions



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

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**B**

## 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 CO<sub>2</sub>

**Need to justify these impacts vs. beef from dairy.**

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



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

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65% of UK land is not suitable for growing arable crops



Source: Created by Dr. Jude L. Capper, 2020. Grazing land includes temporary grass on arable land (6% of total), land used for outdoor pigs or non-agricultural purposes not shown (1.7% of total). Data from DEFRA. 2019. Farming statistics - provisional crop areas, yields and livestock populations at 1 June 2019 – United Kingdom.

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/837834/structure-jun2019prov-UK-10oct19.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/837834/structure-jun2019prov-UK-10oct19.pdf)

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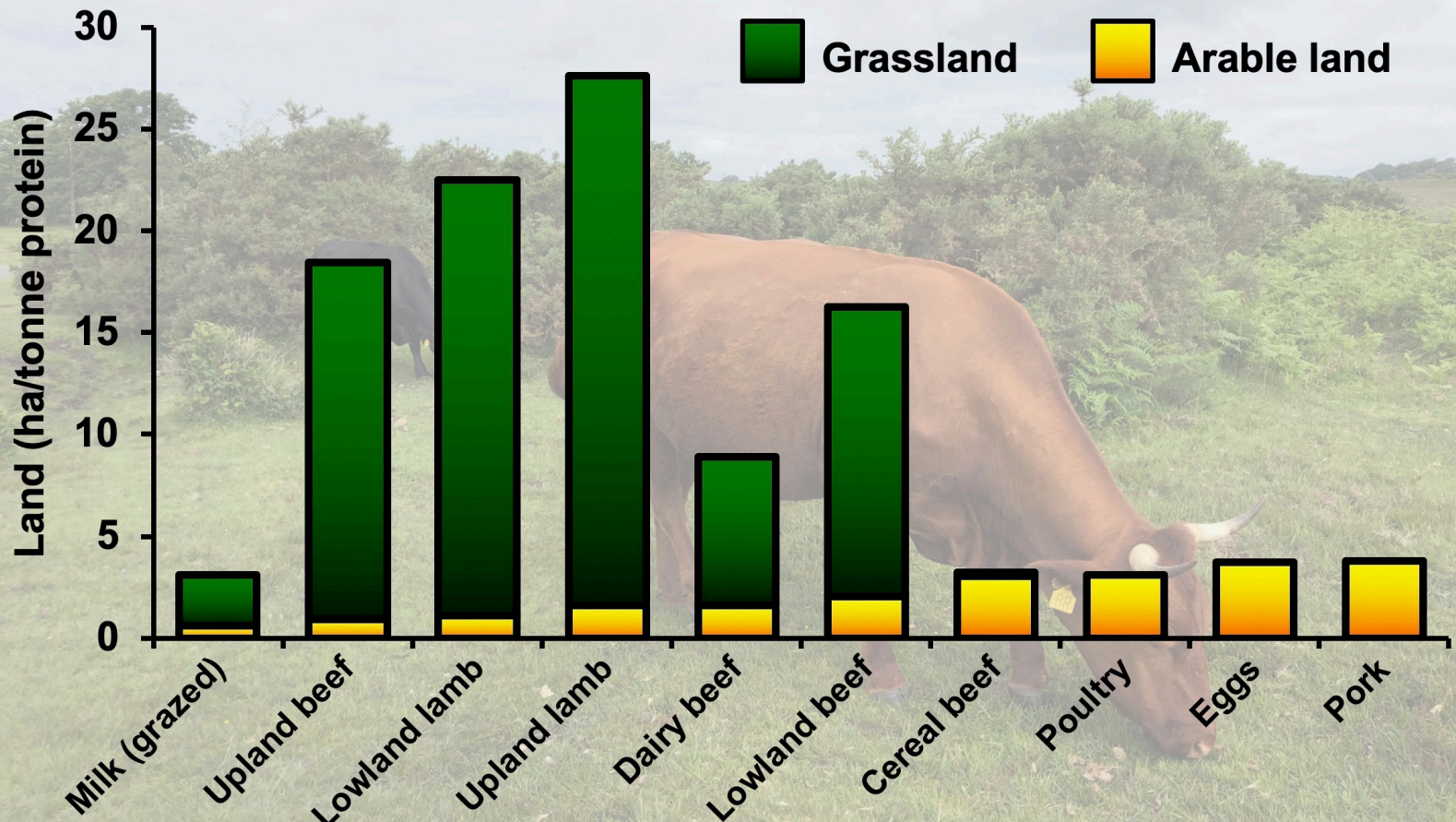
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# Livestock systems vary widely in arable and grassland use



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*.

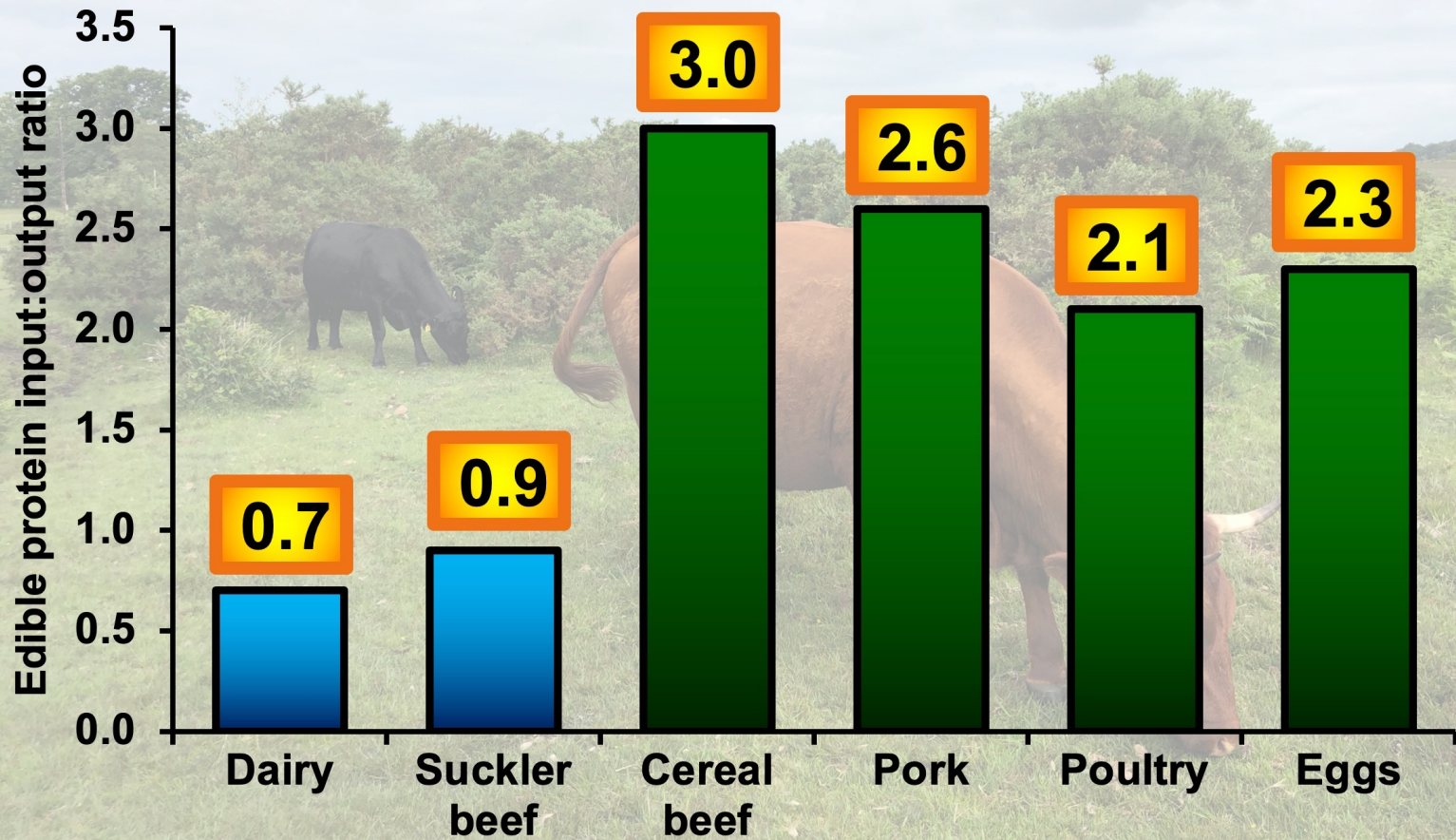
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# Grazing cattle systems produce more human-edible protein than they consume



Source: Created by Dr. Jude L. Capper, 2020; data from Wilkinson (2011) Re-defining efficiency of feed use by livestock. *Animal*.

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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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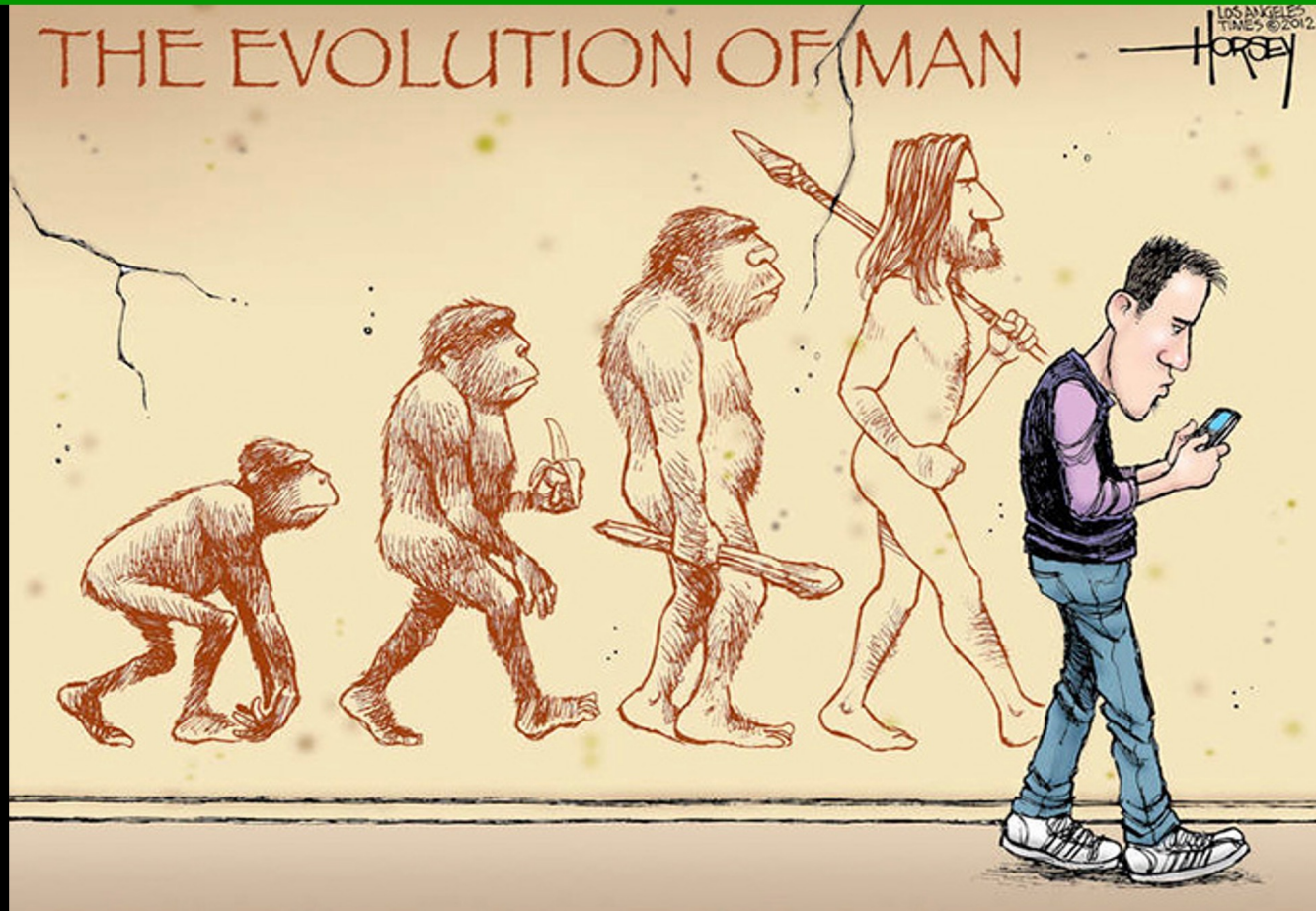


Source: Created by Dr. Jude L. Capper, 2020.

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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 Dr. Jude L. Capper, 2021. Cartoon from: [https://static.boredpanda.com/blog/wp-content/uploads/2016/02/funny-satirical-evolution-charles-darwin-day-251\\_700.jpg](https://static.boredpanda.com/blog/wp-content/uploads/2016/02/funny-satirical-evolution-charles-darwin-day-251_700.jpg)

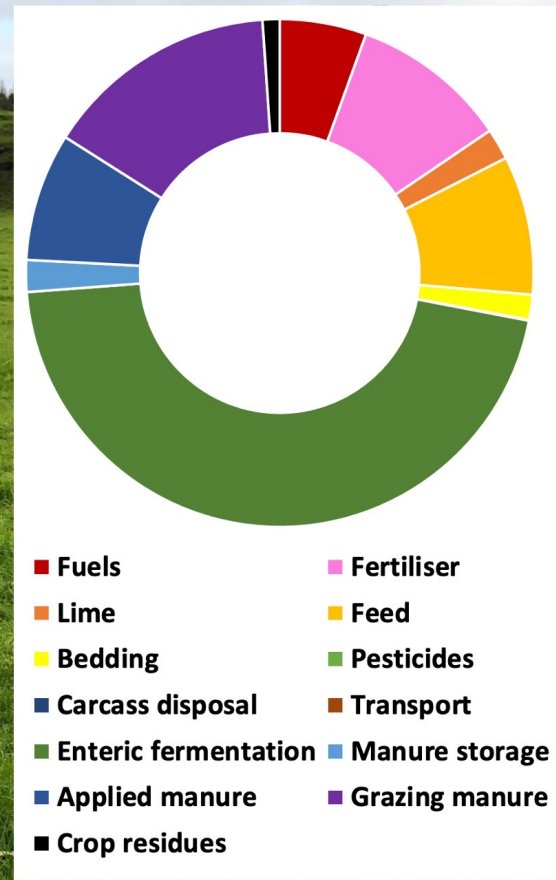
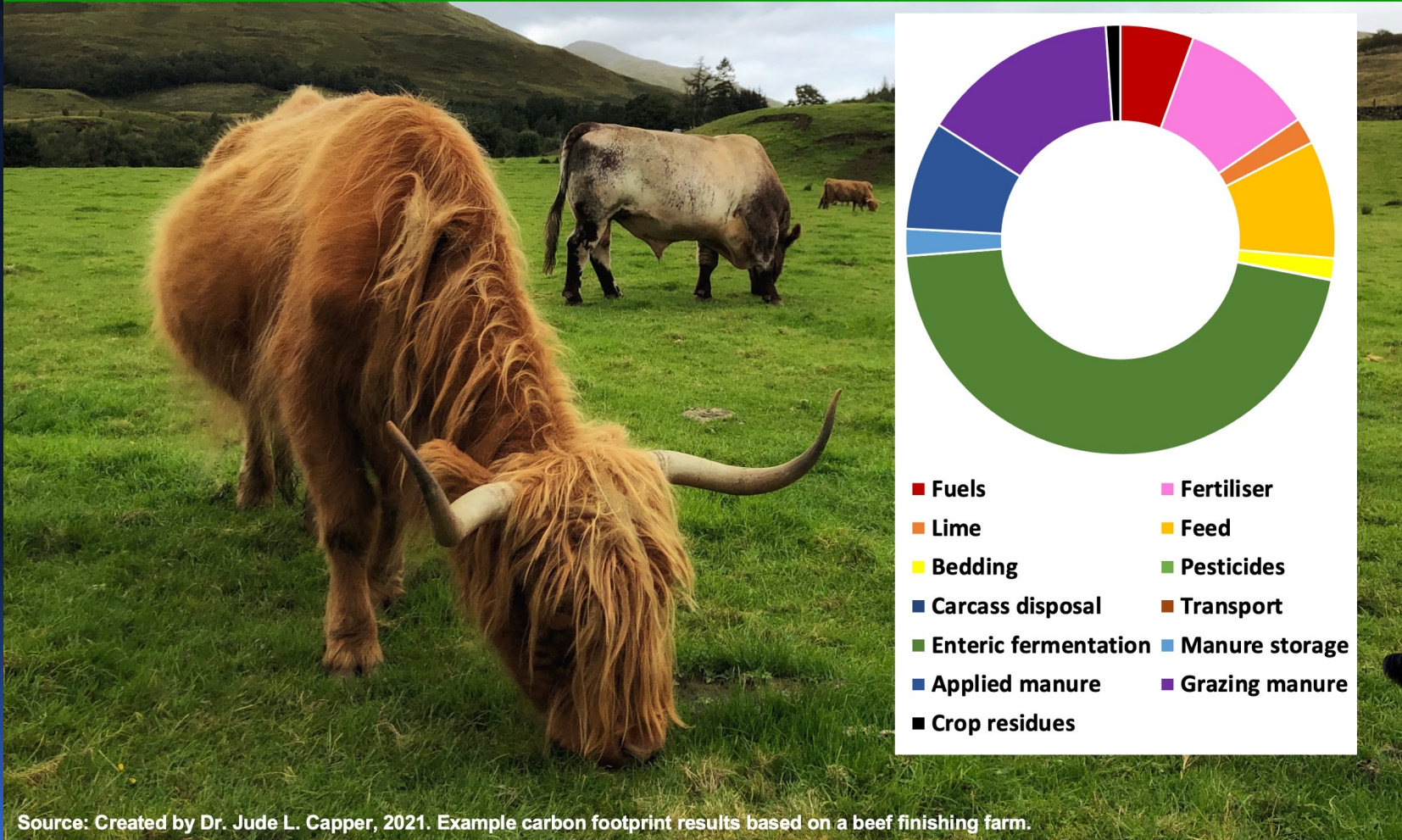
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# Standard footprinting tool urgently needed across the industry

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Source: Created by Dr. Jude L. Capper, 2021. Example carbon footprint results based on a beef finishing farm.

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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 Dr. Jude L. Capper, 2021.

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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 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?](https://yougov.co.uk/topics/resources/articles-reports/2019/03/18/future-food-flexitarian)

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# Animal welfare and human health are major concerns for people giving up animal products

Animal welfare

Healthiness

Environment

Labelling

Economic cost

0% 10% 20% 30% 40% 50% 60%

*“Which, if any, of the following factors might encourage you to adopt a vegan/vegetarian diet?”*

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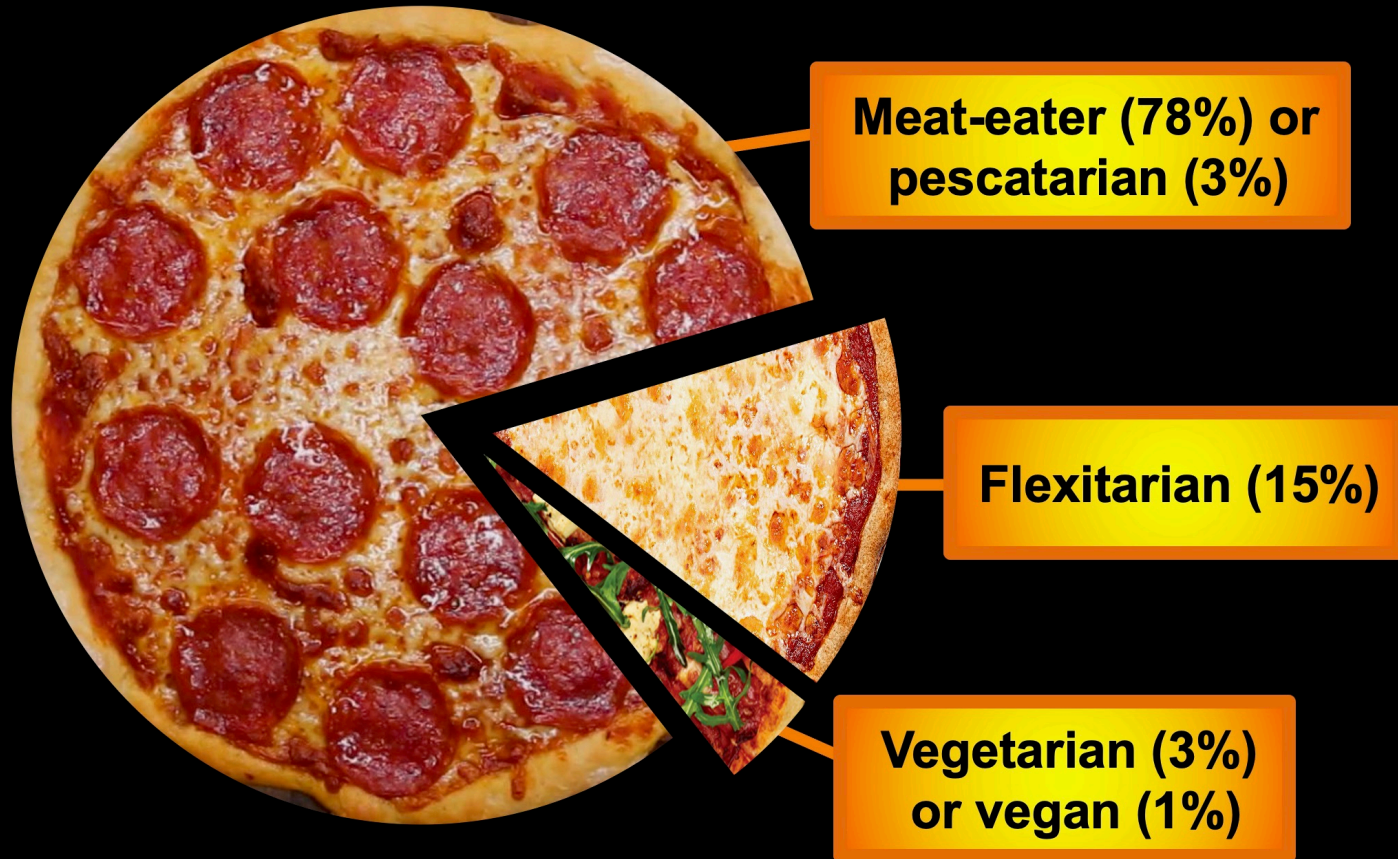
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Source: Created by Dr. Jude L. Capper, 2020. Information from: YouGov (2019) Is the future of food flexitarian?  
<https://yougov.co.uk/topics/resources/articles-reports/2019/03/18/future-food-flexitarian>

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



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

## How do we make meat sexy?



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# How do we make meat sexy?



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# How do we make meat sexy?



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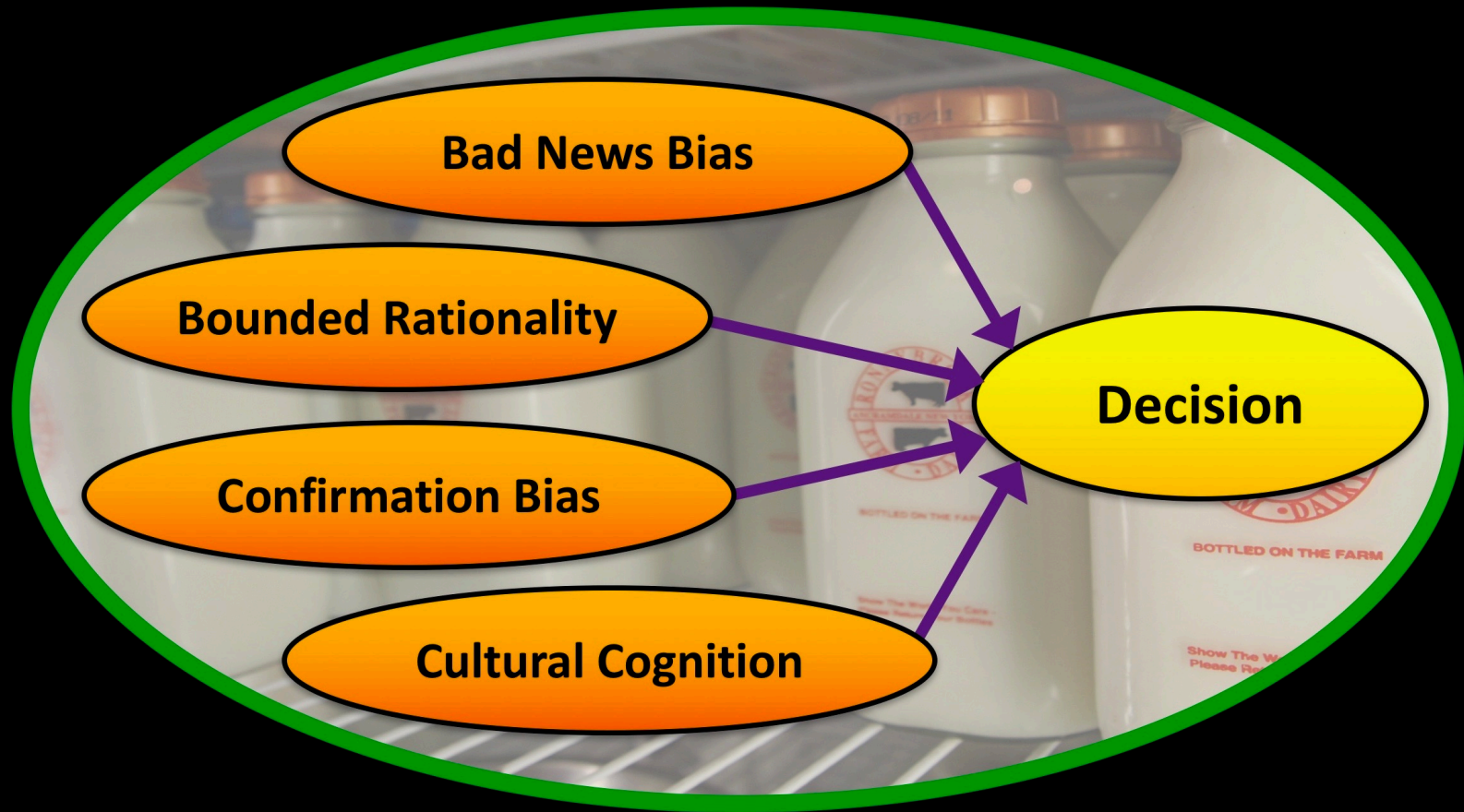
Source: Created by Dr. Jude L. Capper, 2022.

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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 – we need five positive news items to overcome each negative article

MailOnline

## Viewers' outrage over harrowing scenes of day-old calves being lined up and shot DEAD just because they're male

- Three Jersey calves were filmed being killed on the Channel 4 programme featuring farmer Jimmy Doherty
- Nearly 60 people complained about the graphic scenes aired at 9.30pm on Tuesday

By PAUL REVOIR FOR MAILONLINE

PUBLISHED: 23:29, 30 May 2012 | UPDATED: 10:55, 31 May 2012



1.1k  
View comments

Harrowing scenes of newly-born dairy calves being lined up and shot dead simply because they are male have left television viewers sickened.

The images of three Jersey calves being killed were filmed to highlight the grim reality of the dairy industry.

When talking to consumers, it's impossible to justify killing male dairy calves on the basis of economic cost.

Source: Created by Dr. Jude L. Capper, 2019. Article from: <http://www.dailymail.co.uk/news/article-2152402/Viewers-outrage-harrowing-scenes-day-old-calves-shot.html>



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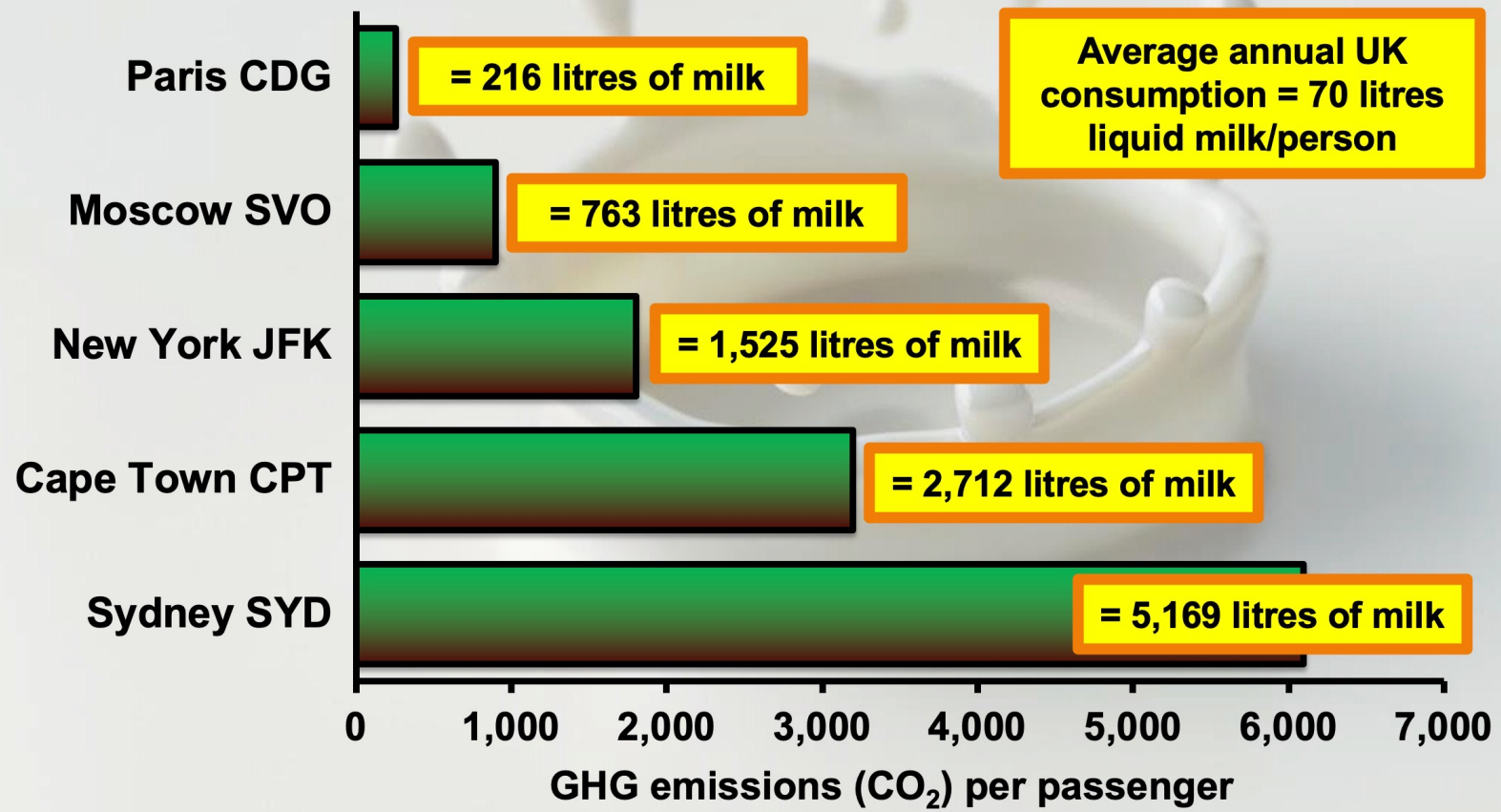
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Source: Created by Dr. Jude L. Capper, 2020. Infographic from HCC (2020): <https://meatpromotion.wales/en/news-industry-info/download>

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# International flights emit considerable quantities of carbon compared to dairy 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](https://co2.myclimate.org/en/flight_calculators/new), and on a carbon footprint per litre of milk of 1.18 kg CO<sub>2</sub>-eq (under GWP100) from AHDB: [https://dairy.ahdb.org.uk/non\\_umbraco/download.aspx?media=17338](https://dairy.ahdb.org.uk/non_umbraco/download.aspx?media=17338)

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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

HOME | NEWS

# Sport | Rugby Union

Rugby Union | Fixtures | Results | Tables | Lions | Aviva Premiership | Brian Moore

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

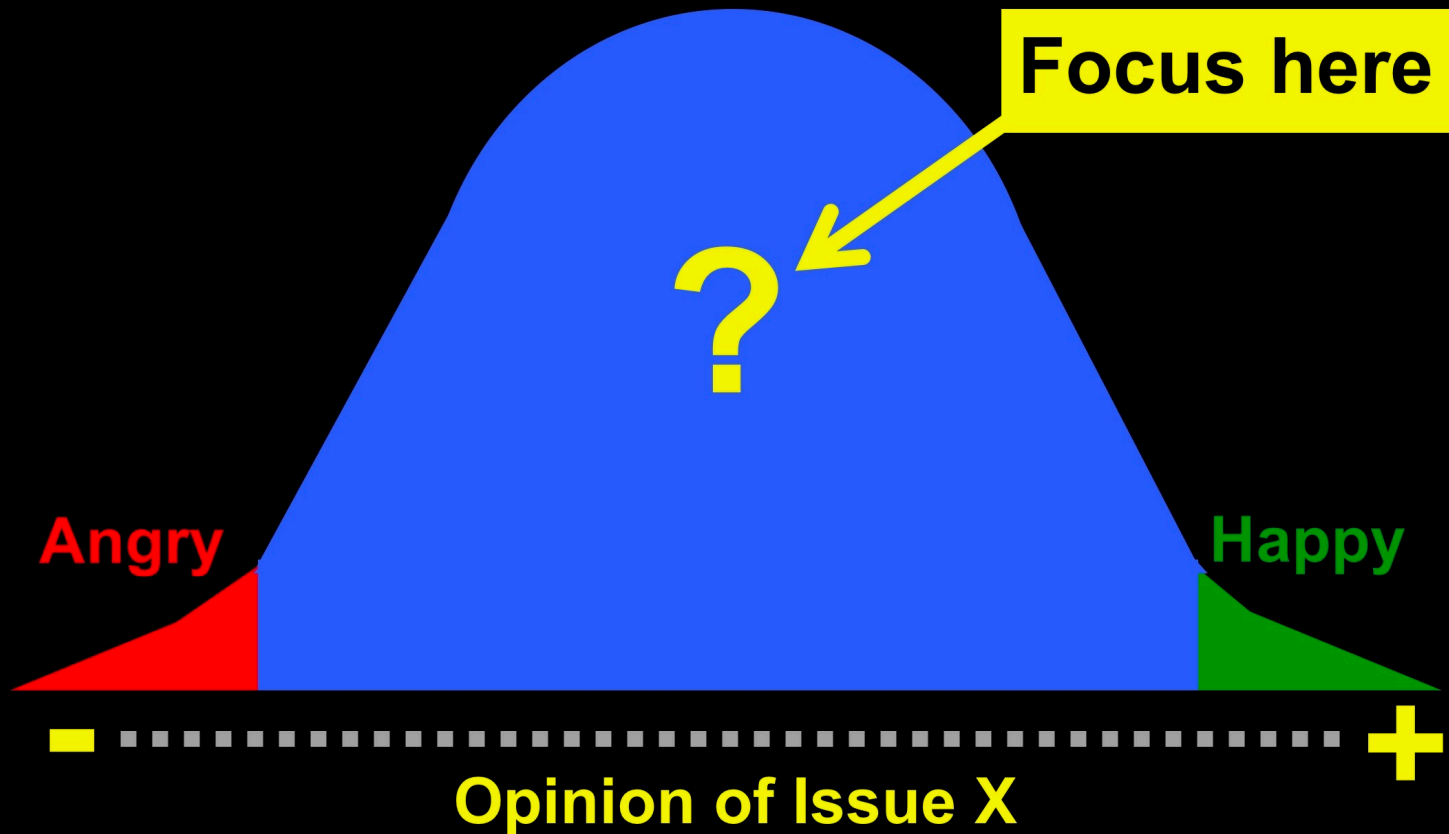


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We need to communicate with consumers who don't yet have fixed opinions of agriculture



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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*.

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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 Dr. Jude L. Capper, 2021.

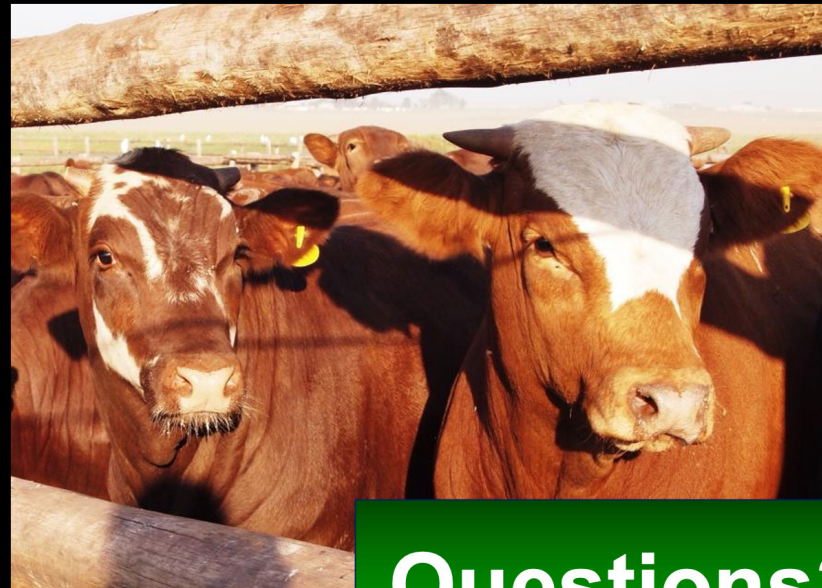


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# Thank you!

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<http://bovidiva.com/presentationlinks>

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## Questions?



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