



**Dr. Jude Capper**

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**Harper Adams  
University**



**All hot air?  
How do we  
demonstrate  
that ruminants  
aren't  
environmental  
villains?**

**Dr. Jude L. Capper**

***7<sup>th</sup> October 2021***

Source: Dr. Jude L. Capper, 2021

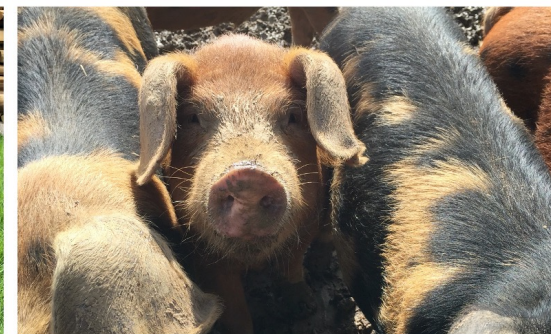
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There is no definitive sustainable protein system – but every system can be sustainable

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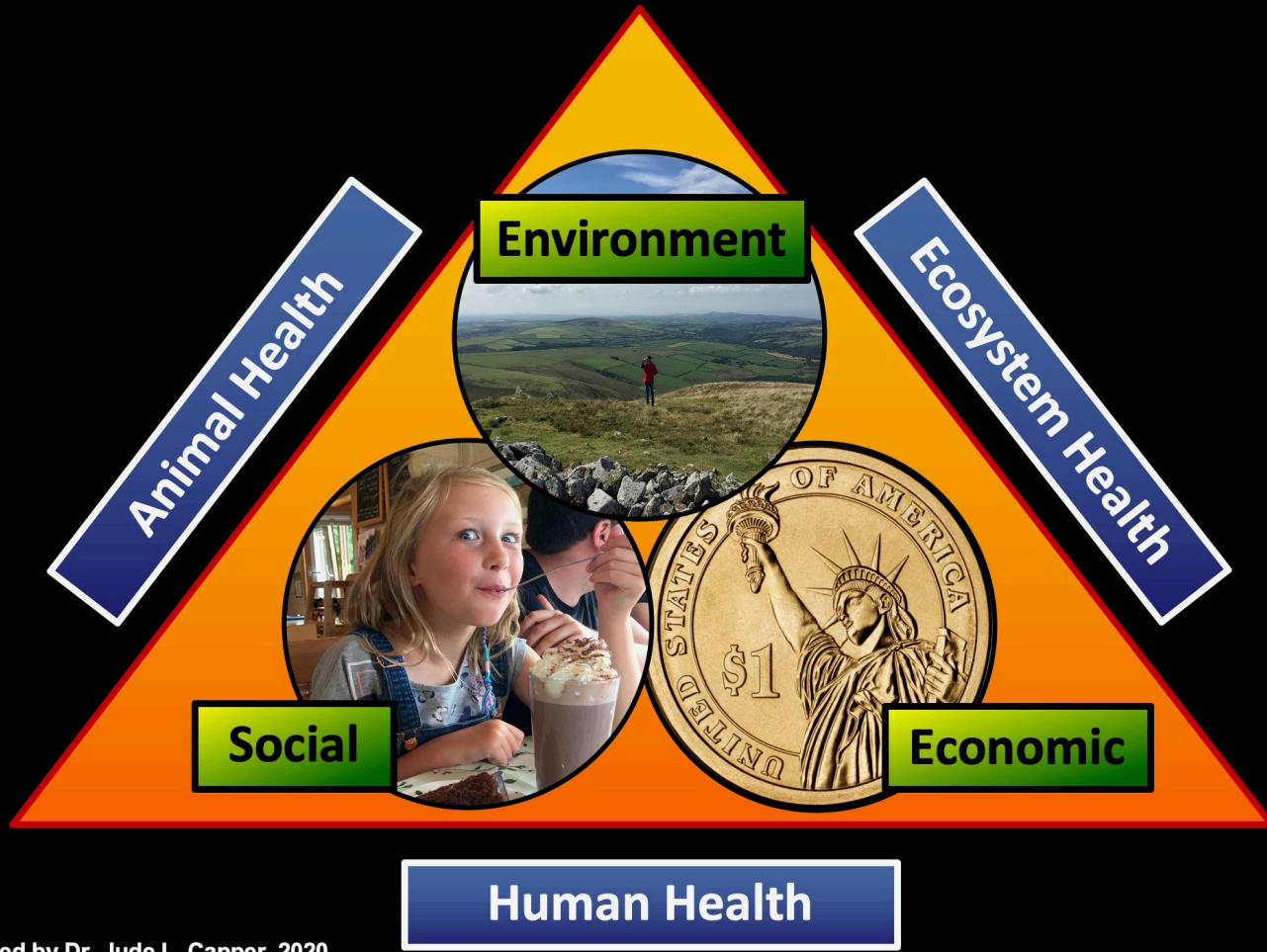


Source: Created and photos by Dr. Jude L. Capper, 2020

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



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

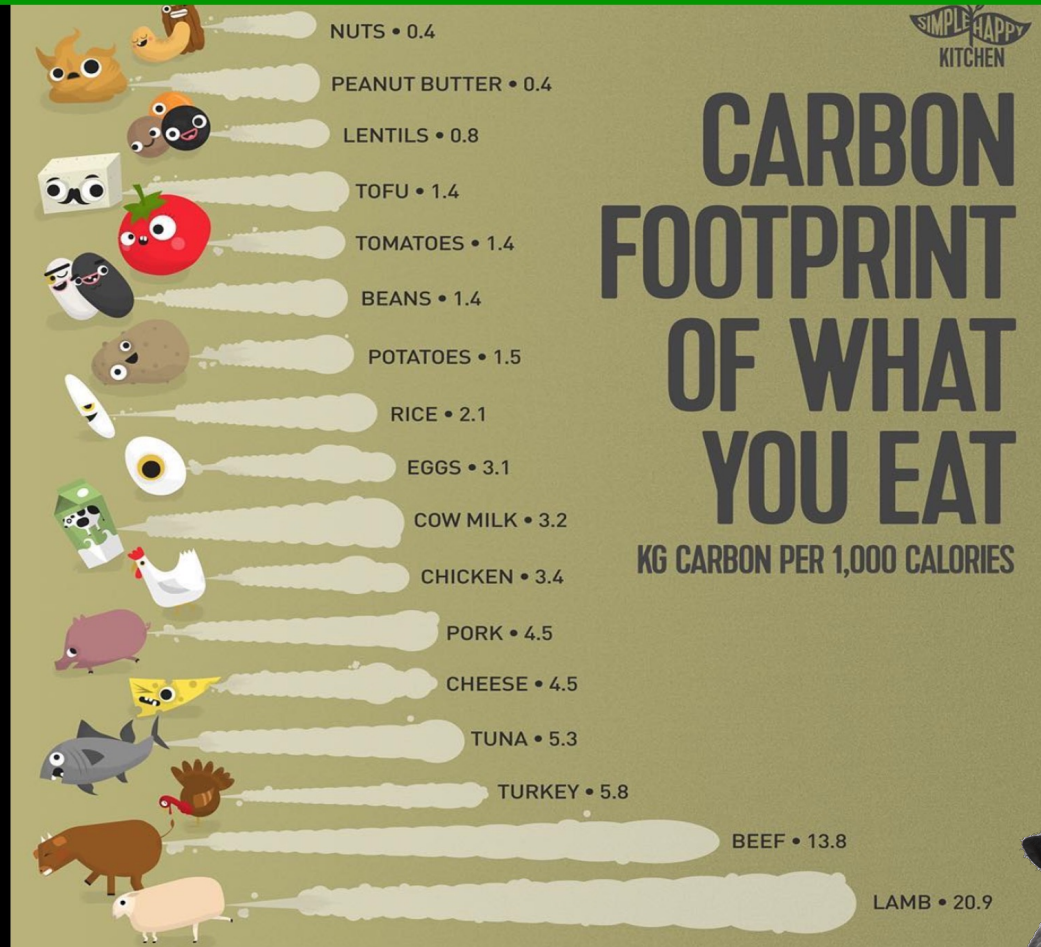
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# Global averages are meaningless

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

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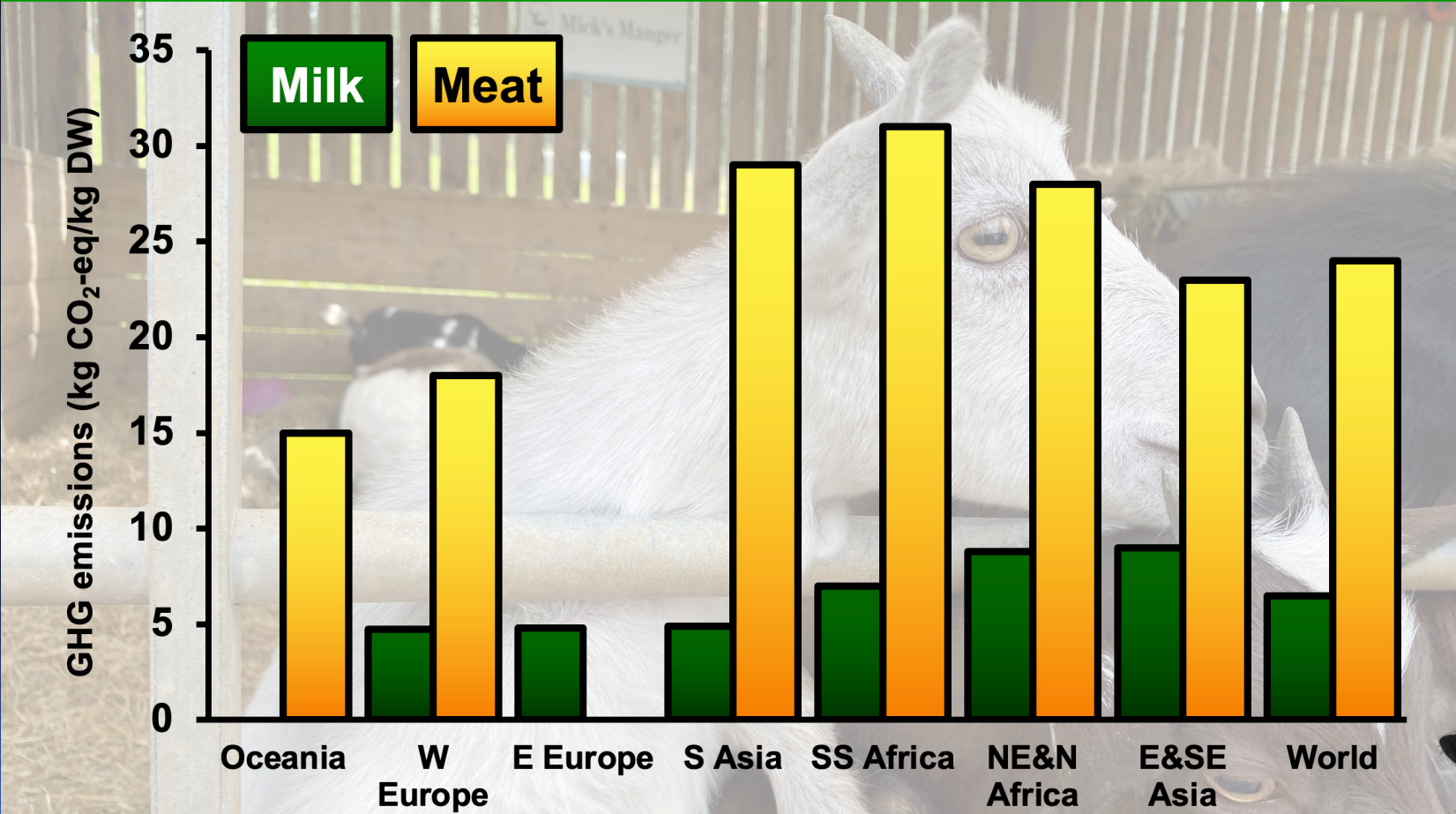


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# B The carbon footprint of small ruminant milk and meat production varies across the globe



Source: Created by Dr. Jude L. Capper, 2021; data from Opio et al. (2013). Greenhouse gas emissions from ruminant supply chains – A global life cycle assessment. Food and Agriculture Organization of the United Nations.

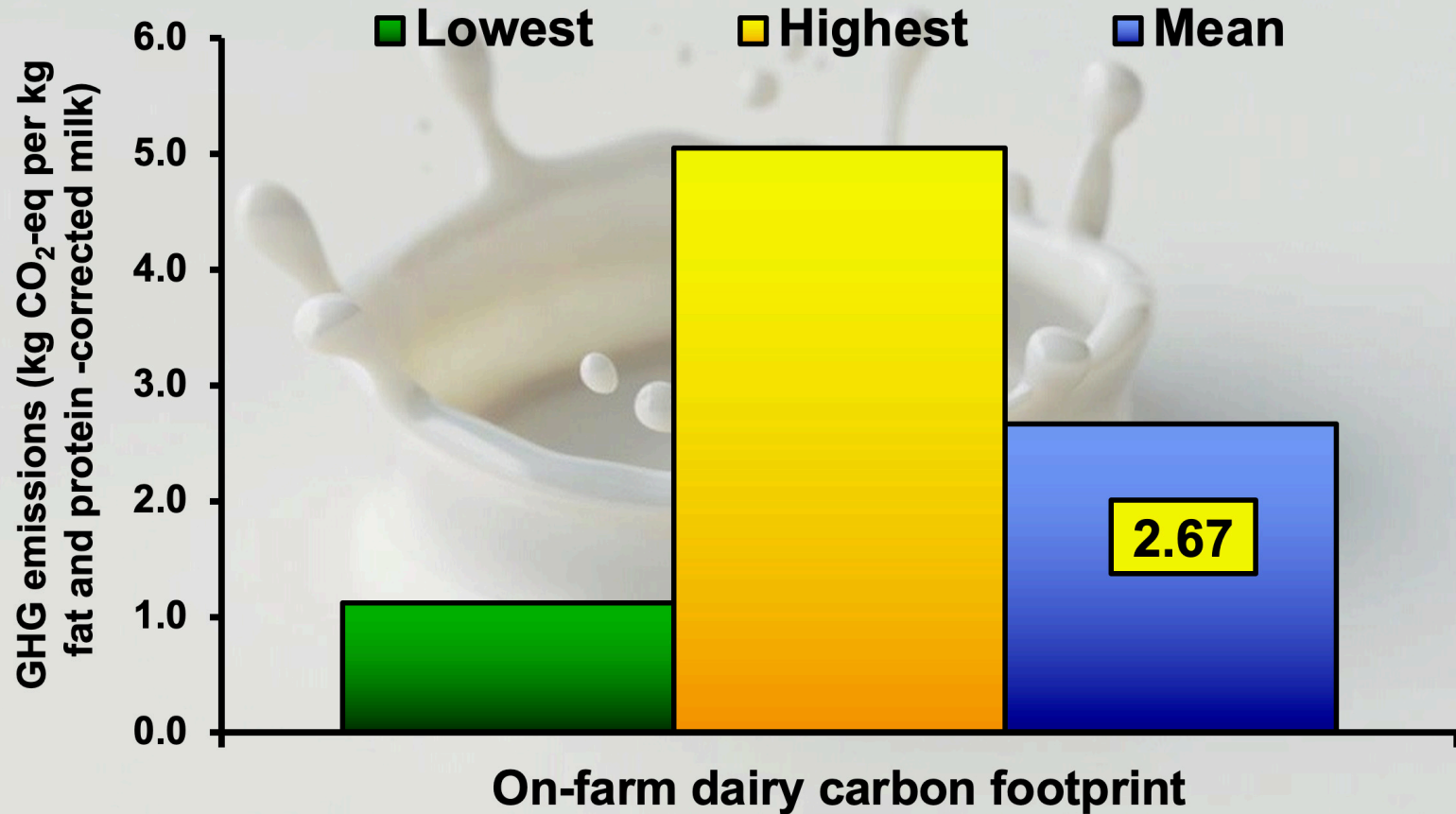
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DS

# GHG emissions from dairy goat systems vary, which offers mitigation opportunities



Source: Created by Dr. Jude L. Capper, 2021. Data from: Zucali et al. (2020) Management options to reduce the environmental impact of dairy goat milk production. *Livestock Sci.* <https://doi.org/10.1016/j.livsci.2019.103888>

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# Animals, manure and cropping are hotspots for dairy goat GHG emissions



Animals: 30%



Manure: 30%



Crop inputs: 22%



Feed: 15%



Energy: 2%



Other: 1%



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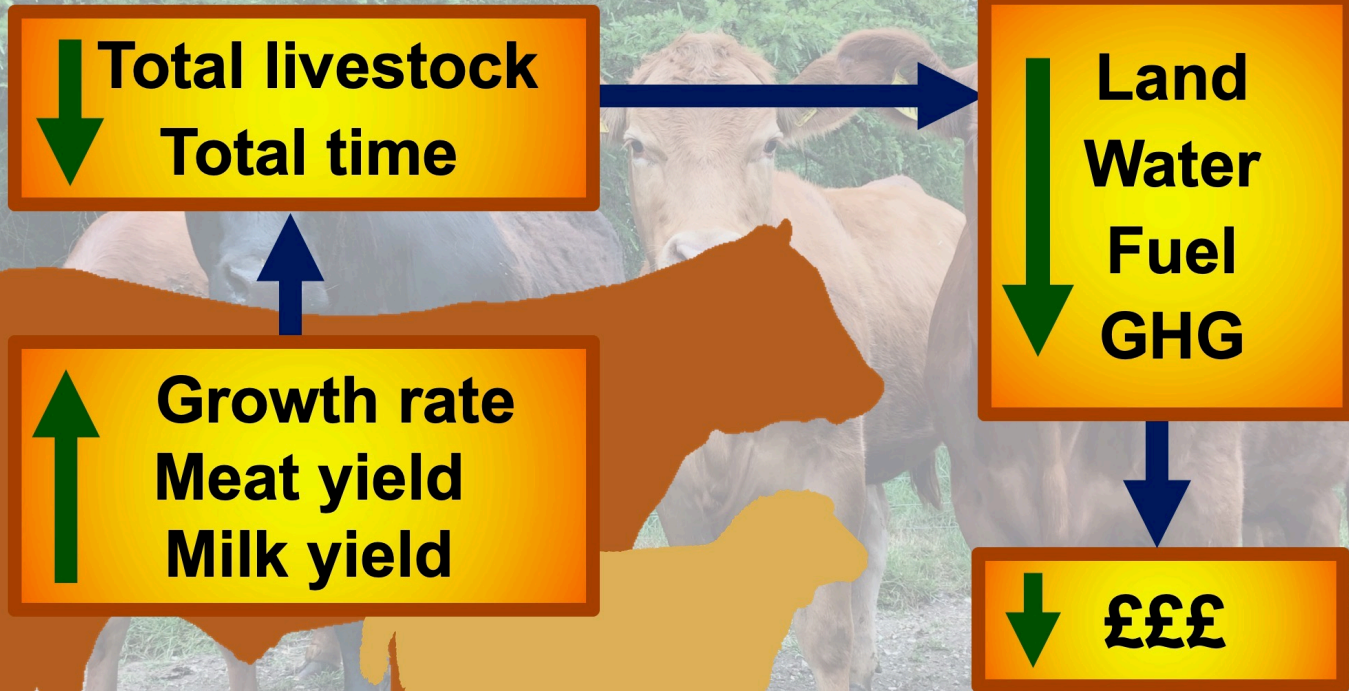
Source: Created by Dr. Jude L. Capper, 2021. Data from: Zucali et al. (2020) Management options to reduce the environmental impact of dairy goat milk production. *Livestock Sci.* <https://doi.org/10.1016/j.livsci.2019.103888>

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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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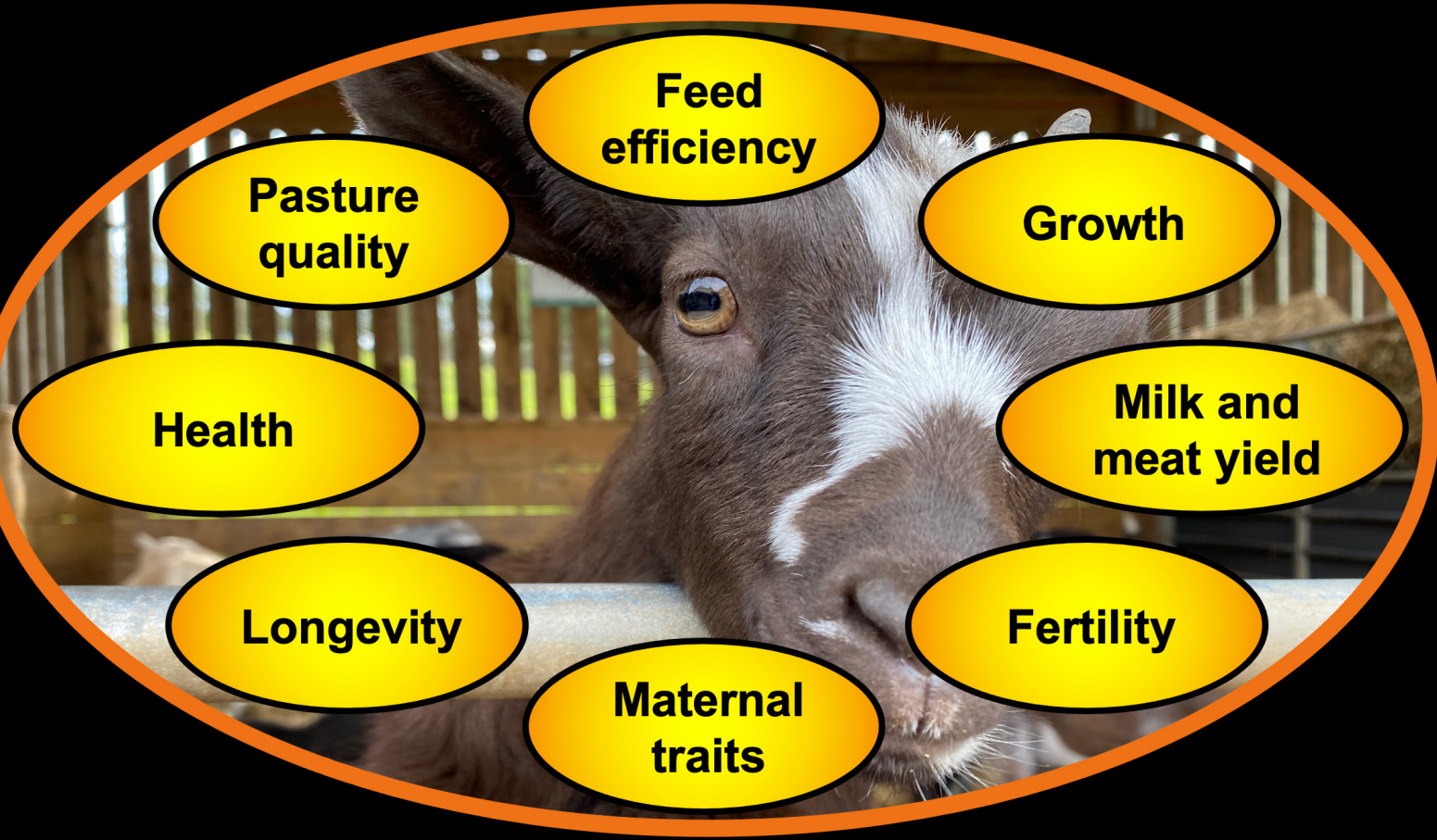
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# Improving key performance indicators reduces environmental impacts



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

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



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



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# All foods have an environmental impact



Source: Created by Dr. Jude L. Capper, 2013

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Livestock production is not the only contributor to the UK's carbon footprint

UK meat and dairy production accounts for ~6.9% of total UK GHG emissions (Dept. of Energy and Climate Change 2019).



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Source: Created by Dr. Jude L. Capper, 2020; Data calculated from national emissions inventory including CH<sub>4</sub> and N<sub>2</sub>O, plus 30% of cropping-associated emissions sourced from Department of Energy and Climate Change (2019) "Final UK greenhouse gas emissions national statistics: 1990-2017" <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017>



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**Livestock production is not the only contributor to the UK's carbon footprint**

**If everybody in the UK went meat and dairy-free every Monday, the national carbon footprint would decrease by less than 1.0%**



Source: Created by Dr. Jude L. Capper, 2020; Data calculated from national emissions inventory including CH<sub>4</sub> and N<sub>2</sub>O, plus 30% of cropping-associated emissions sourced from Department of Energy and Climate Change (2019) "Final UK greenhouse gas emissions national statistics: 1990-2017" <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017> Photo from: <https://images.britcdn.com/wp-content/uploads/2015/11/3/Shepherds-Pie-finished-4.jpg>

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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 Sheffield
- If all participants were UK-based they would comprise <1% of the UK population
- Average of 2,787 per participating country
- 62% of participants already vegan, vegetarian or pescatarian

Source: Created by Dr. Jude L. Capper, 2021. Information from: <https://veganuary.com/>

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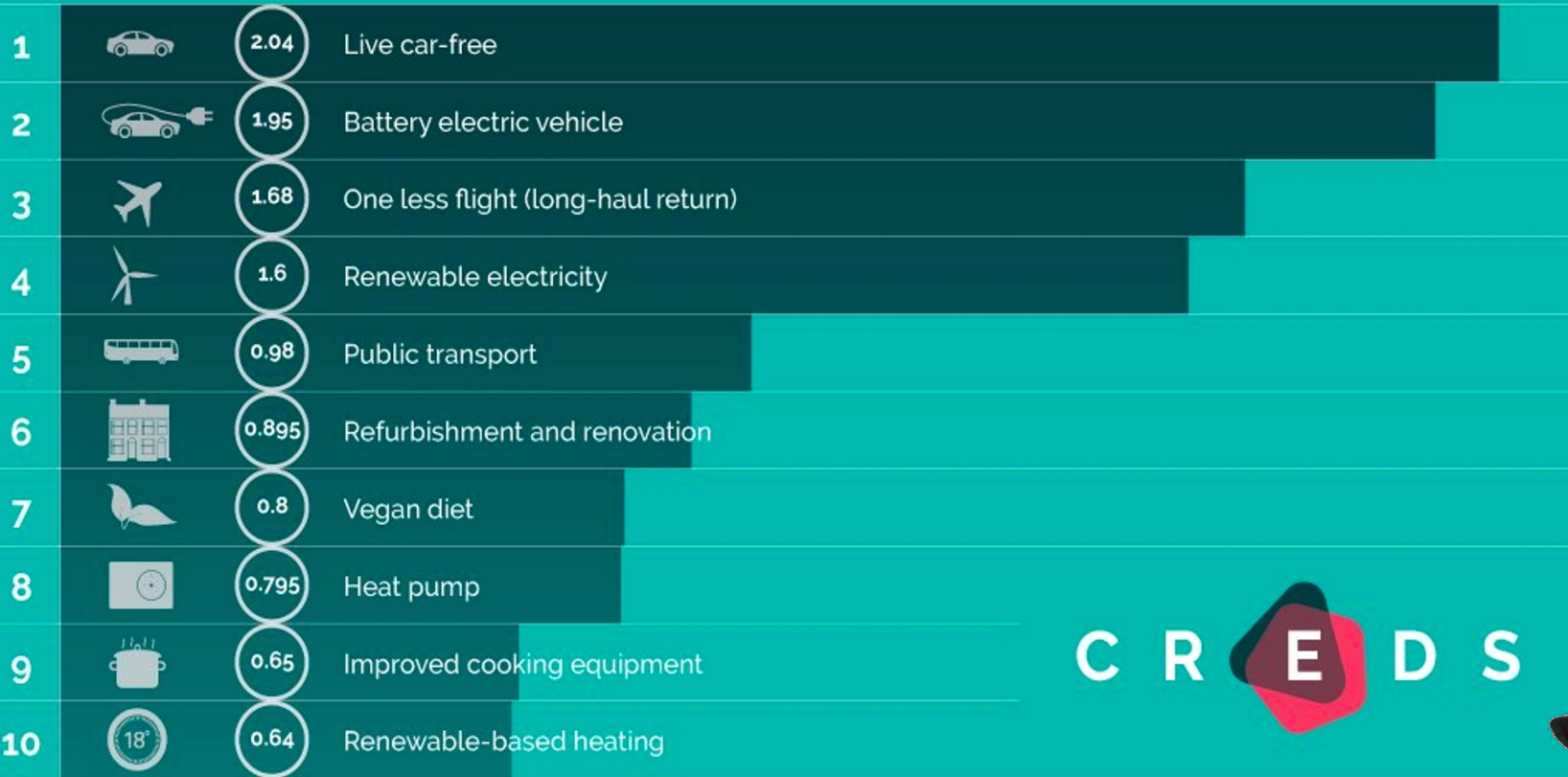
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# New CREDS report puts transport, energy and food choices into context

## Top 10 options for reducing your carbon footprint



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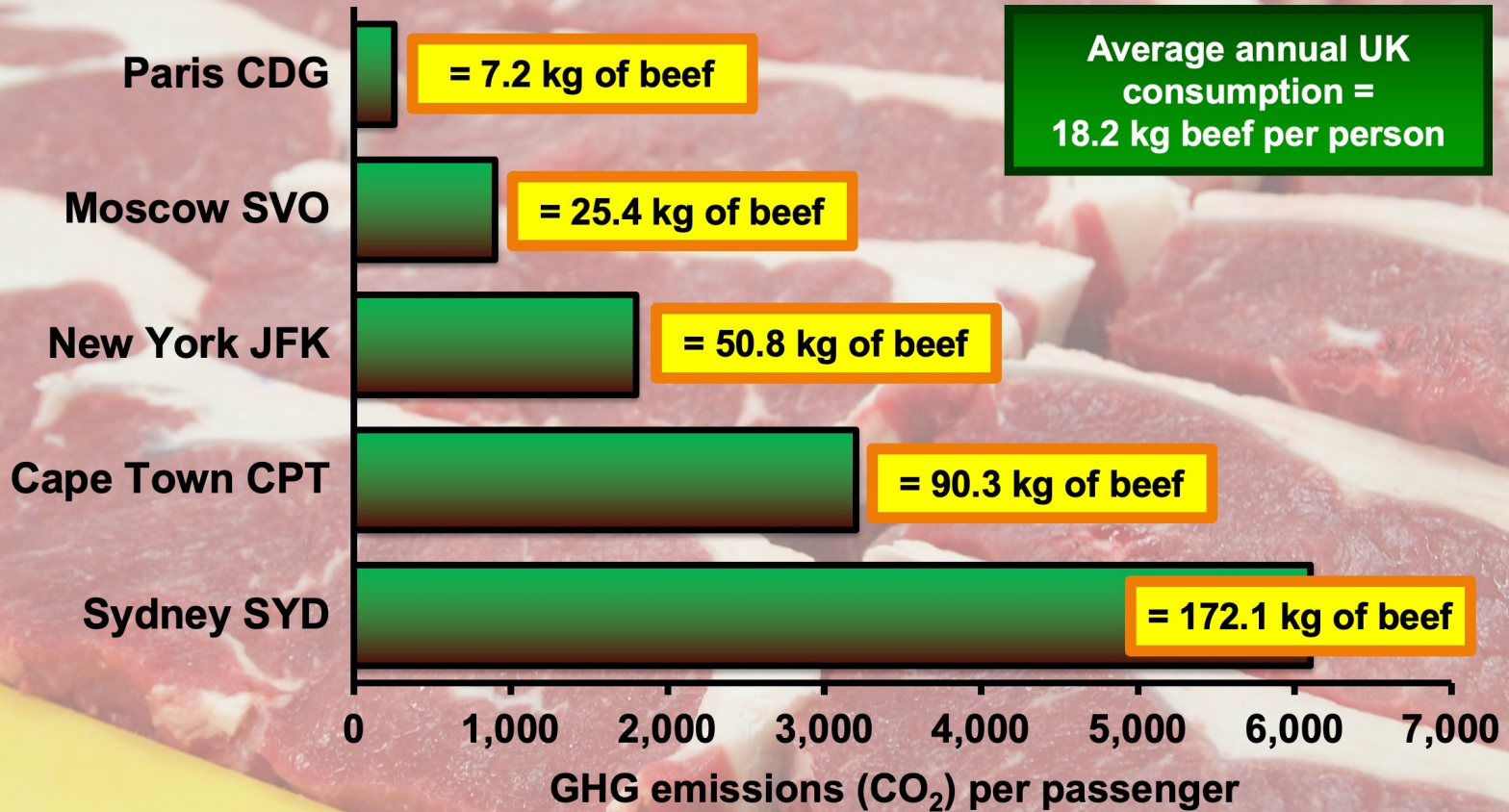
Source: Created by Dr. Jude L. Capper, 2020. . Infographic adapted from Centre for Research into Energy Demand Solutions (2020). Available at: [https://twitter.com/CREDS\\_UK/status/1262984570175176704?s=20](https://twitter.com/CREDS_UK/status/1262984570175176704?s=20)





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



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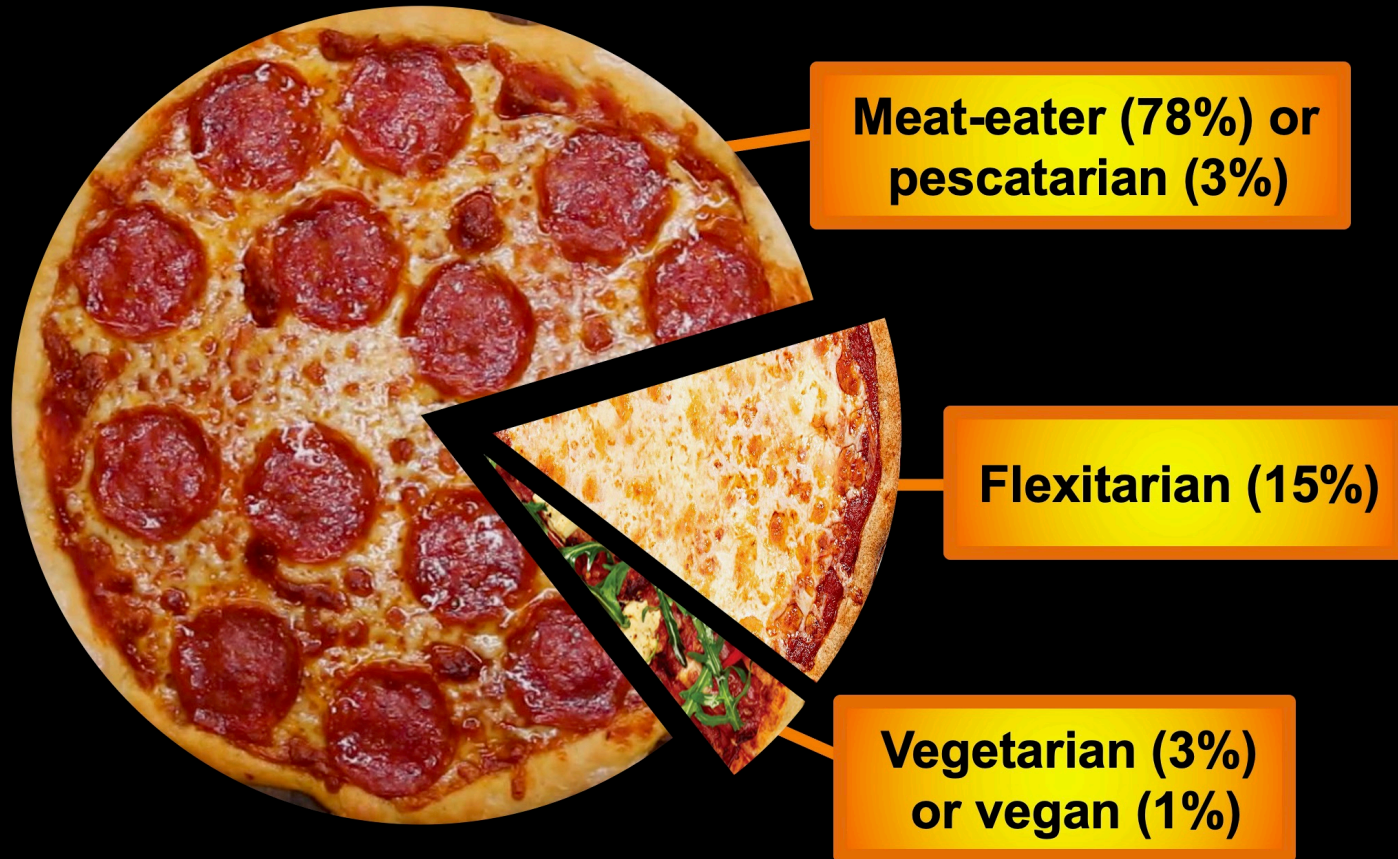
Source: Created by Dr. Jude L. Capper, 2020. Calculations based on GHG emissions flight data from: [https://co2.myclimate.org/en/flight\\_calculators/new](https://co2.myclimate.org/en/flight_calculators/new), and on a carbon footprint per kg of boneless beef of 35.5 kg CO<sub>2</sub>-eq (under GWP100) from AHDB: [http://beefandlamb.ahdb.org.uk/wp-content/uploads/2013/05/p\\_cp\\_down\\_to\\_earth300112.pdf](http://beefandlamb.ahdb.org.uk/wp-content/uploads/2013/05/p_cp_down_to_earth300112.pdf)

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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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# 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>

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Bad news bias: some on-farm practices cannot be justified

**VICE**

## Thousands of Baby Goats Are Dying So You Can Eat Goat Cheese Salad

Being of no use to goat milk farmers, 40,000 male goats are slaughtered at birth in the UK every year. But thanks to a growing appetite for goat meat dishes, this could be set to change.

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

Source: Created by Dr. Jude L. Capper, 2021. Article from: [https://www.vice.com/en\\_uk/article/8gekik/thousands-of-baby-goats-are-dying-so-you-can-eat-goat-cheese-salad](https://www.vice.com/en_uk/article/8gekik/thousands-of-baby-goats-are-dying-so-you-can-eat-goat-cheese-salad)

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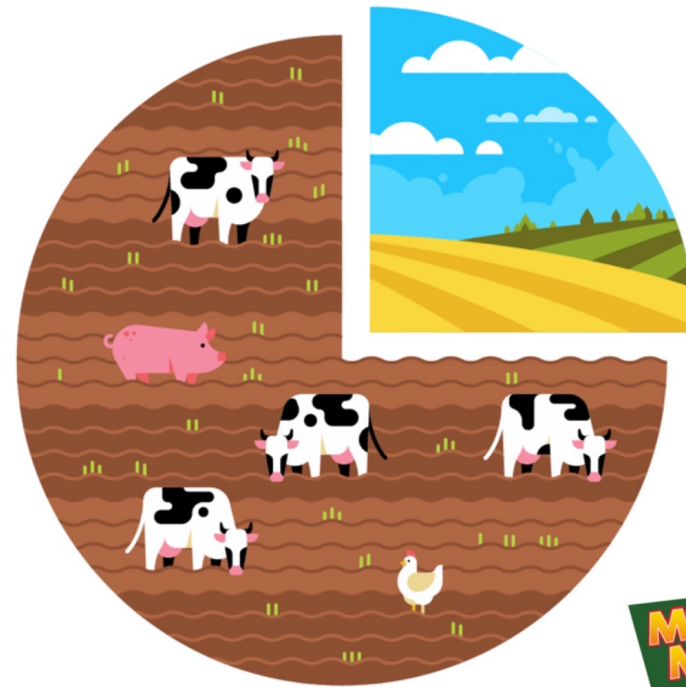


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Bad news bias – need five positive stories to cancel out each negative

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.



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



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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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# What do these industries have in common? They all provide by-products fed to animals



Source: Created by Dr. Jude L. Capper, 2013

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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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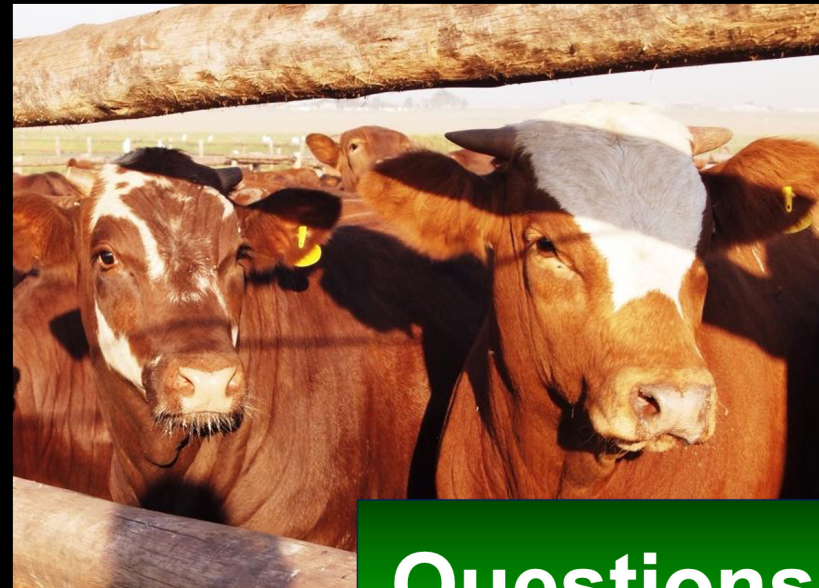
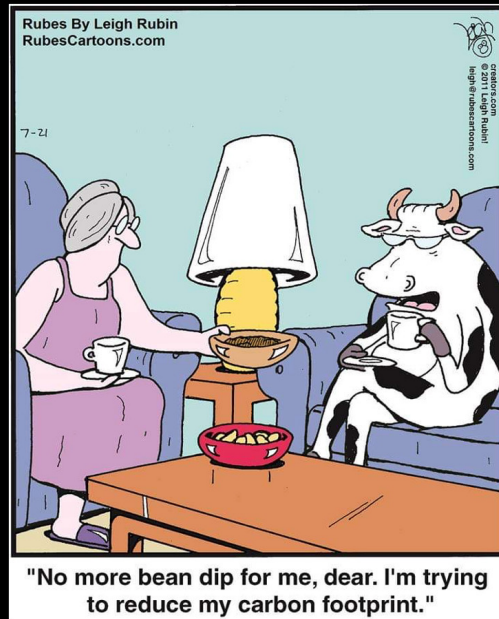


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# Thank you!

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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>