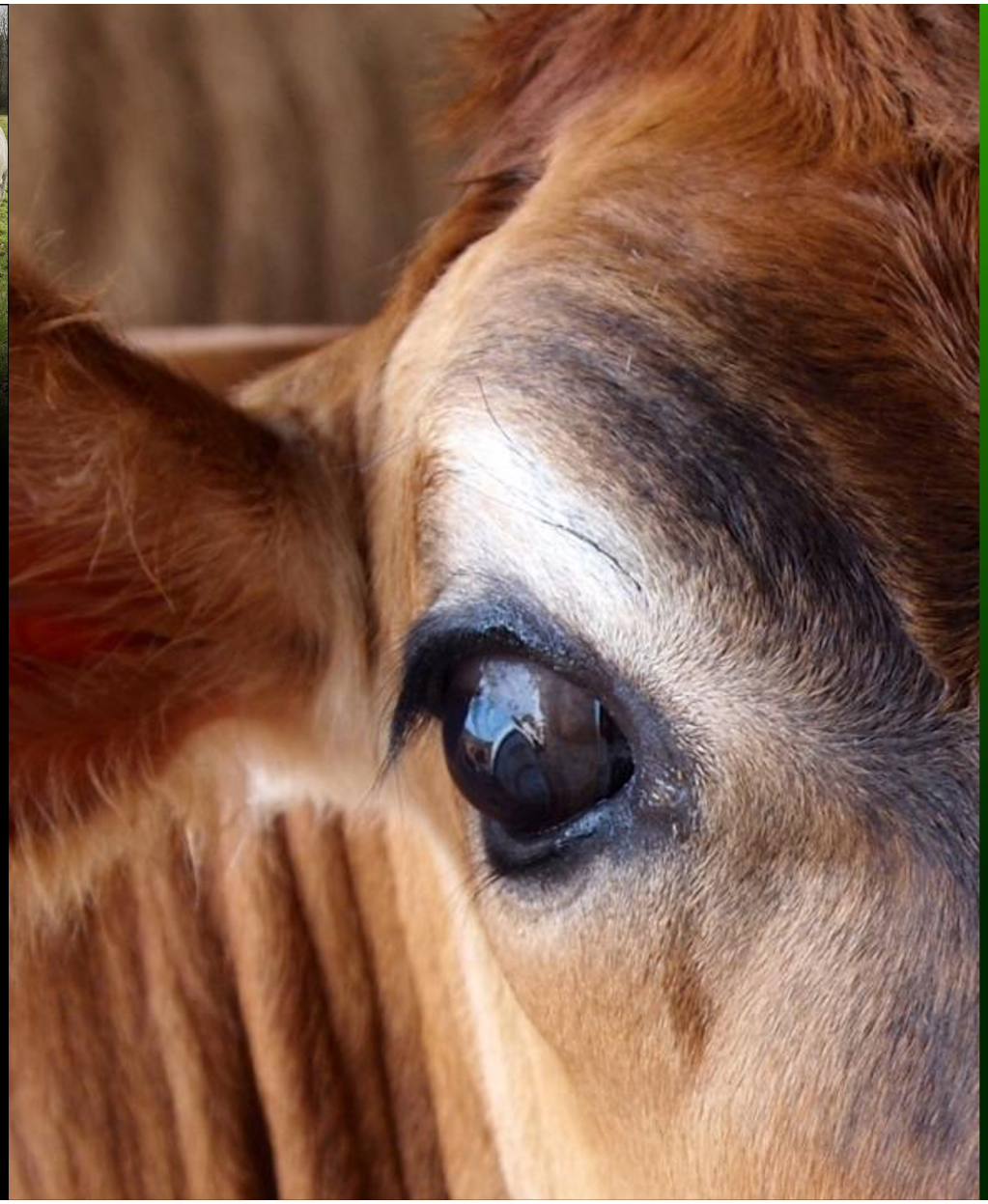

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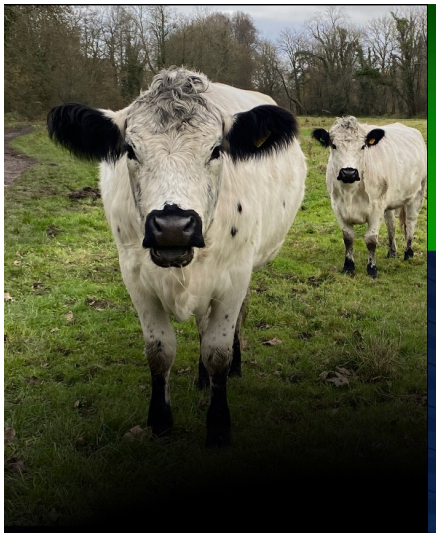
Food production *vs.* environmental provision - are we in danger of consuming rather than conserving the planet?

21st November 2023

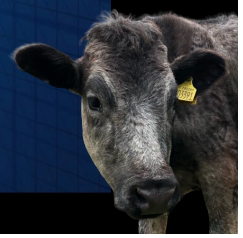
21st EAAP Webinar

Source: Jude L. Capper, 2023



TF

What's special about this circle?



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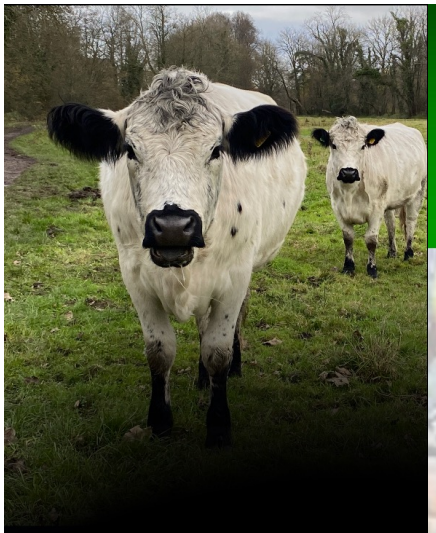
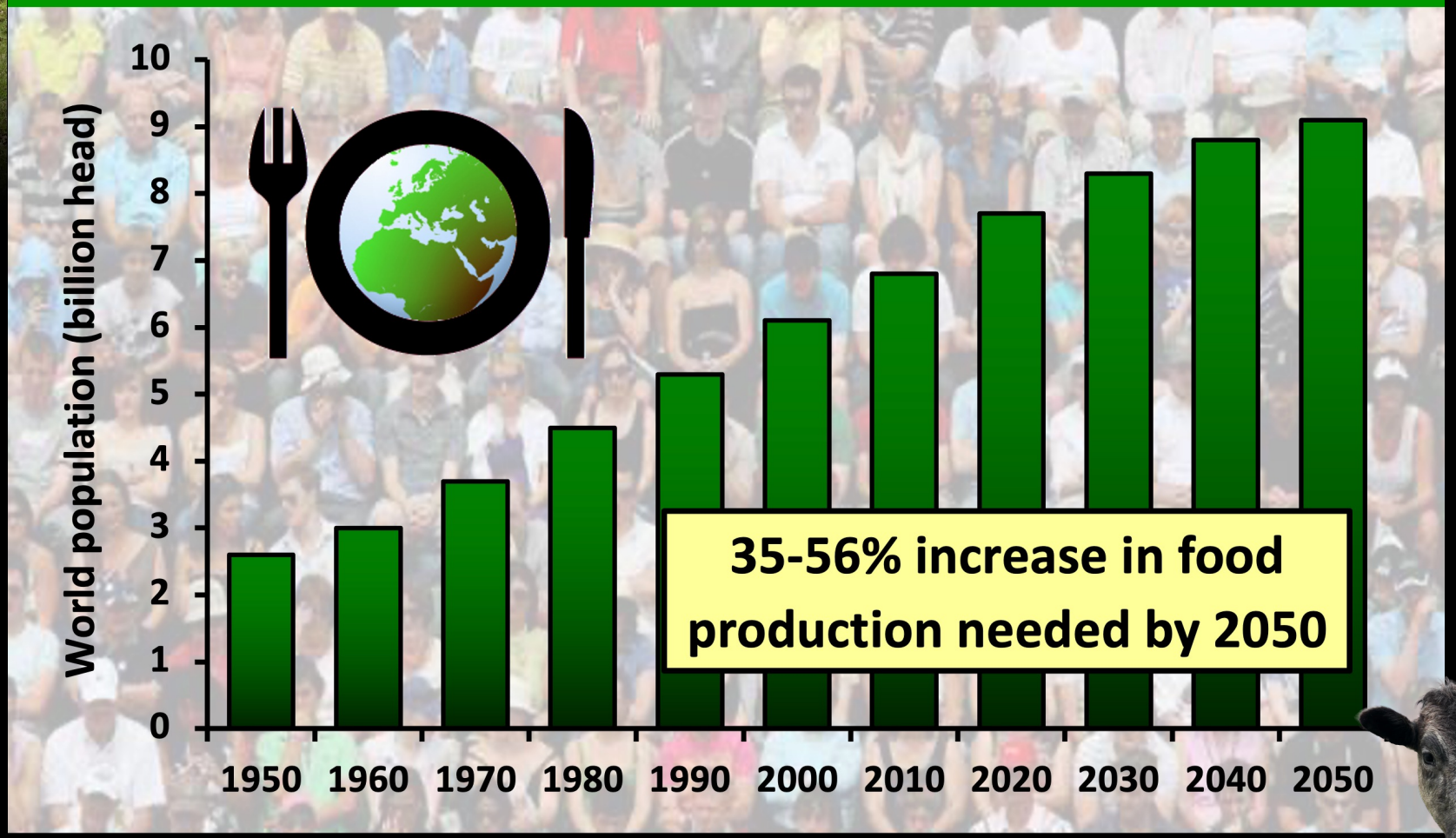
Source: Created by Jude L. Capper, 2023. Map from: http://www.psdgraphics.com/file/world-map-background.jpg



s

More people means we need to produce more food with fewer resources



Source: Created by Jude L. Capper, 2023. Data from: van Dijk et al. (2021) https://doi.org/10.1038/s43016-021-00322-9

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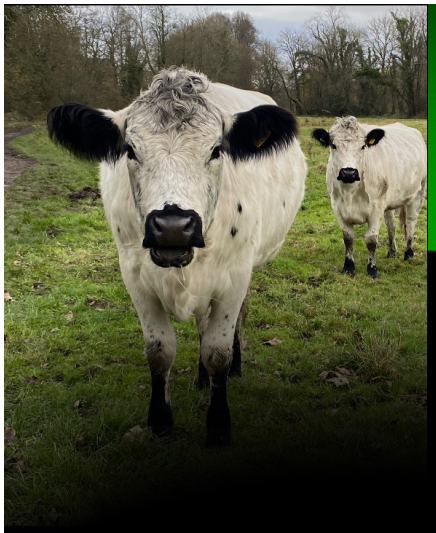
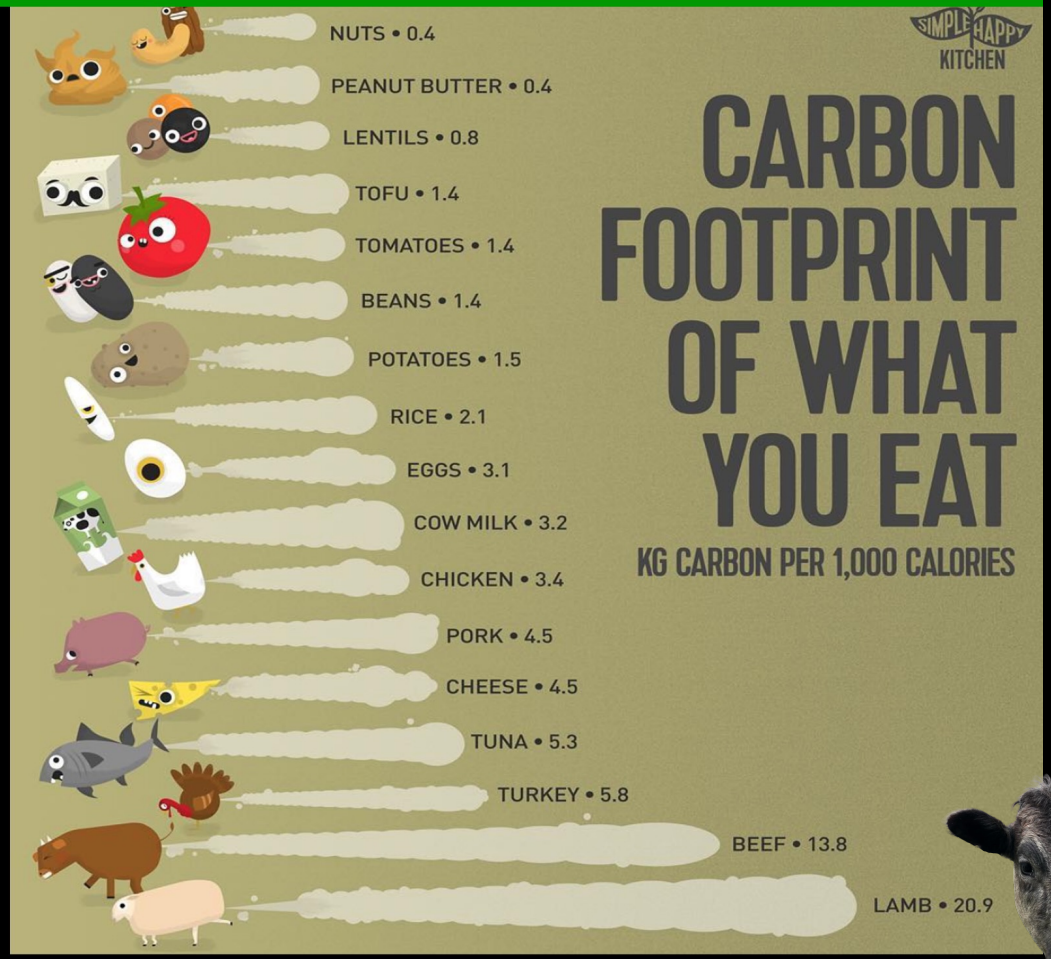


B

Global averages are meaningless

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



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

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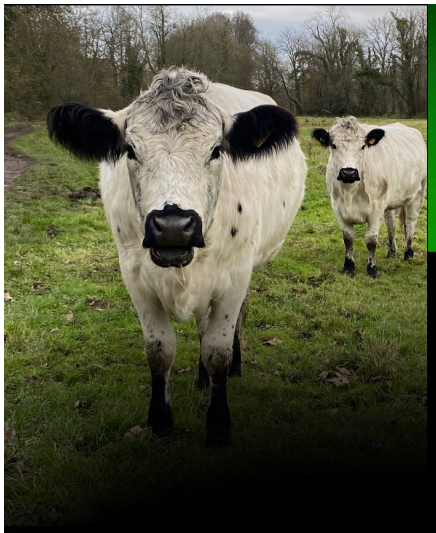
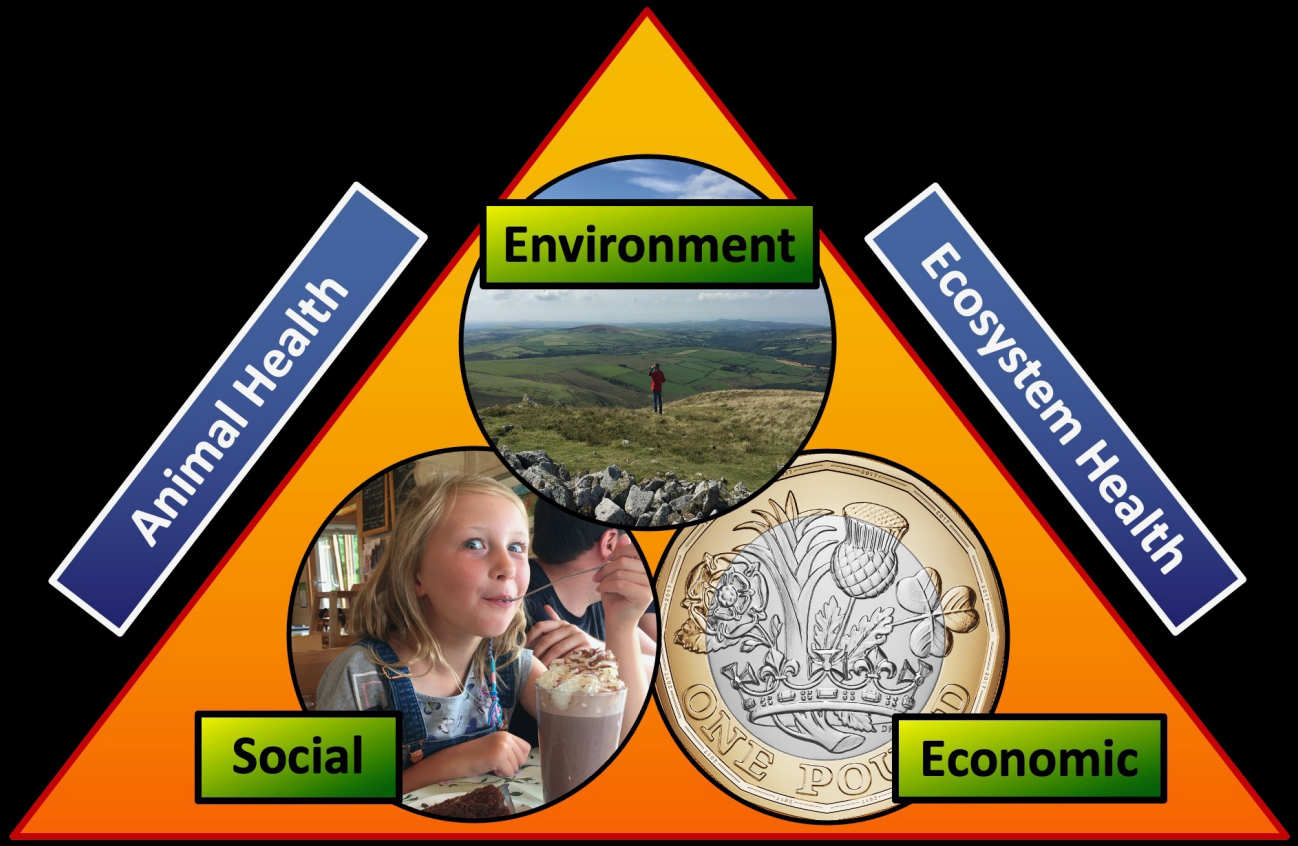


S

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



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

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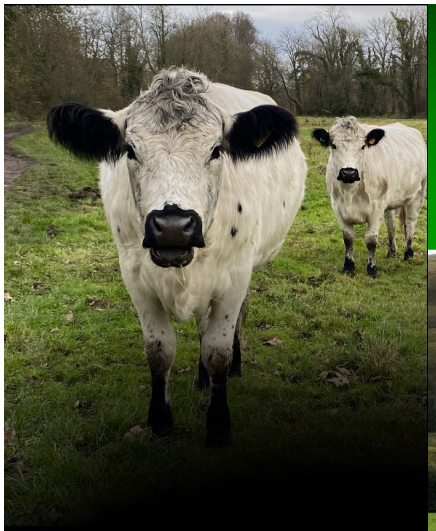
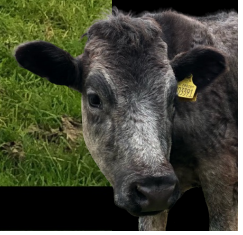


B

Every production system can be sustainable



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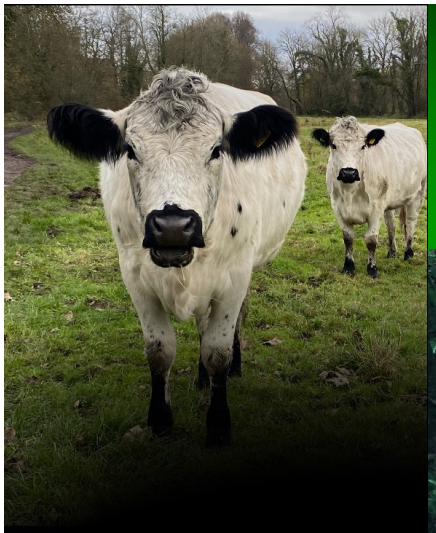
Source: Created by Jude L. Capper, 2023.



B

Every production system can be sustainable

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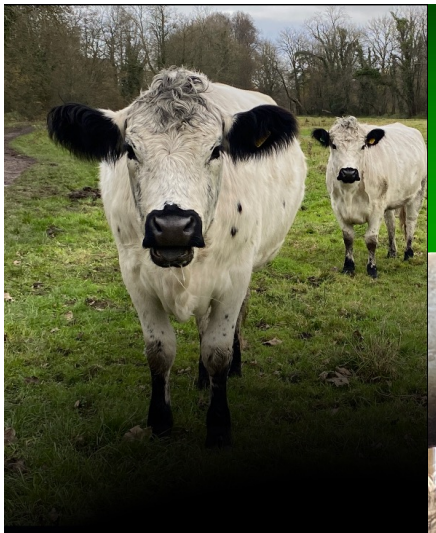

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Every production system can be sustainable

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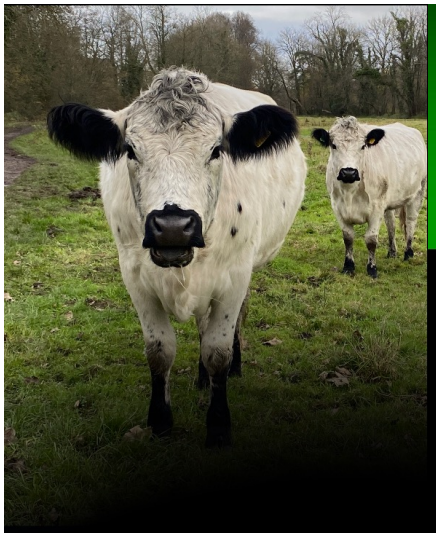
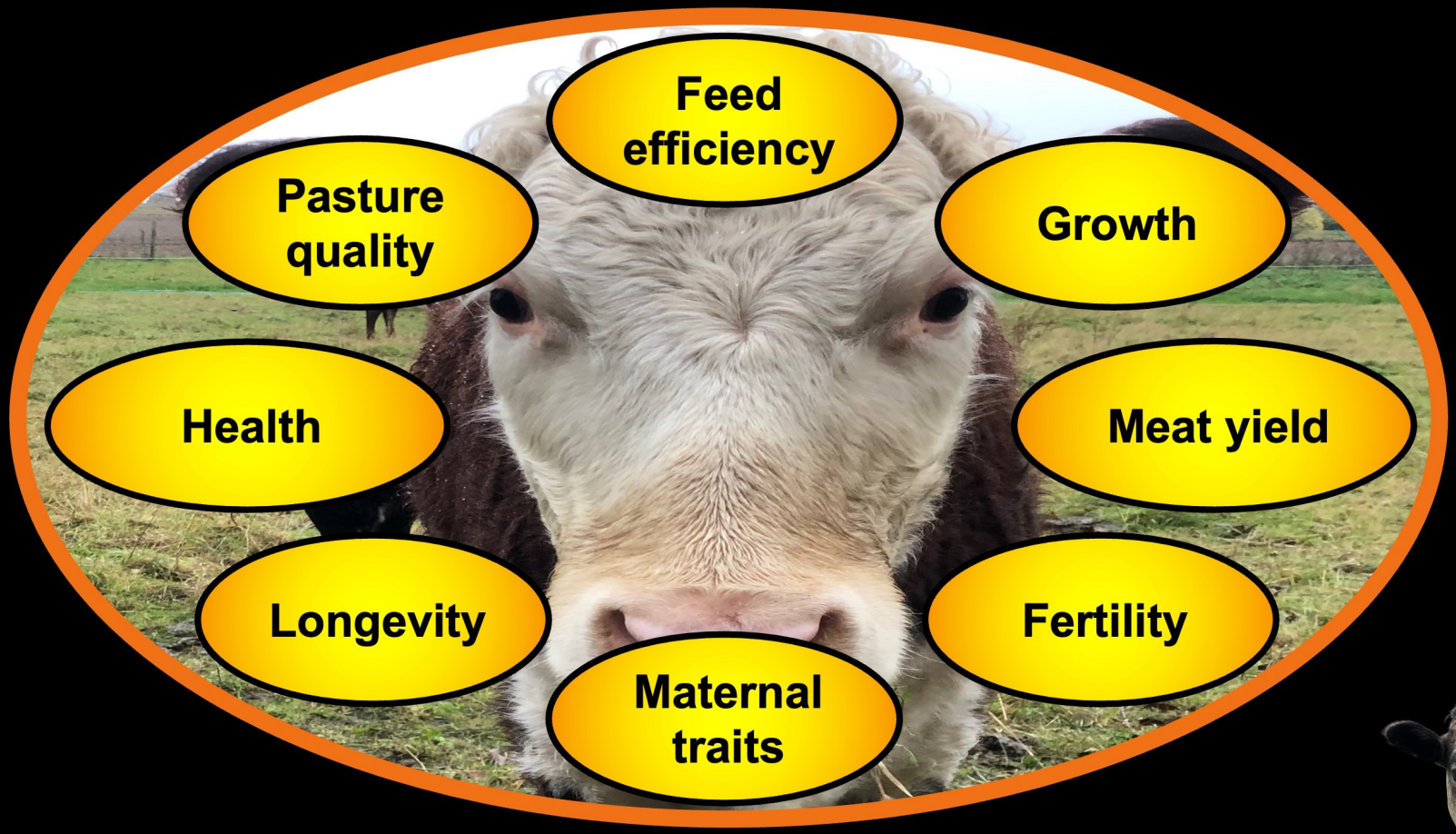


B

Improving key performance indicators reduces environmental impacts



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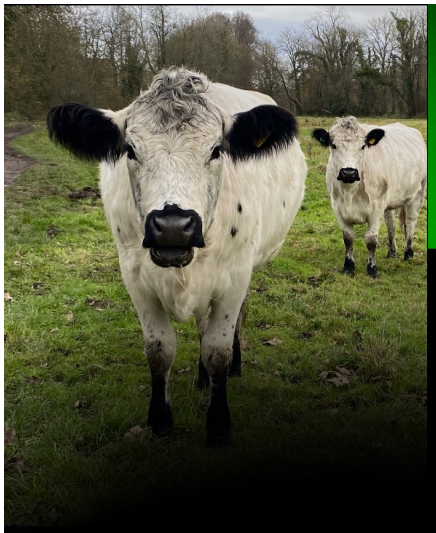
Source: Created by Jude L. Capper, 2023



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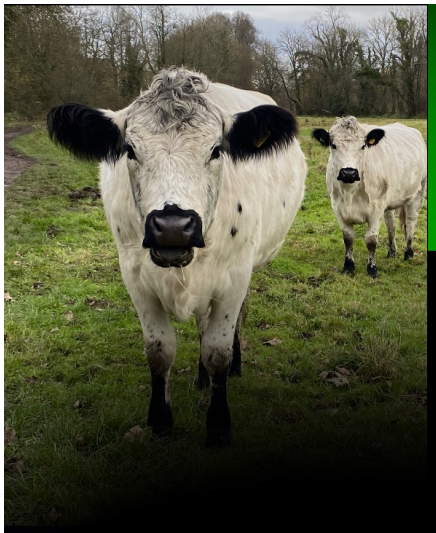
Source: Created by Jude L. Capper, 2023. Data from: Capper et al. 2023. Helping farmers navigate the green economy: A data-driven blueprint for net zero beef. British Society of Animal Science Annual Meeting. https://doi.org/10.1016/j.anscip.2023.01.515



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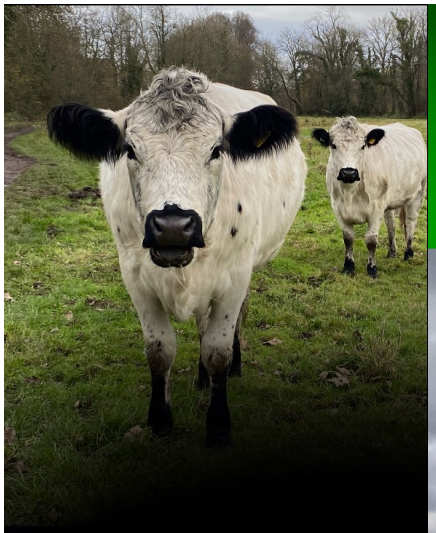
Source: Created by Jude L. Capper, 2023. Economic data from Mason-D’Croz et al. (2020) https://doi.org/10.1038/s43016-020-0057-2. Other data – J. Capper – *submitted*.



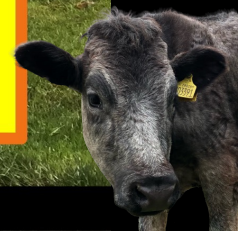
D

What could global dairying look like if we improved health, nutrition and genetics?

Global average yield	UK average yield	Dairy cows
2,577 kg	8,140 kg	-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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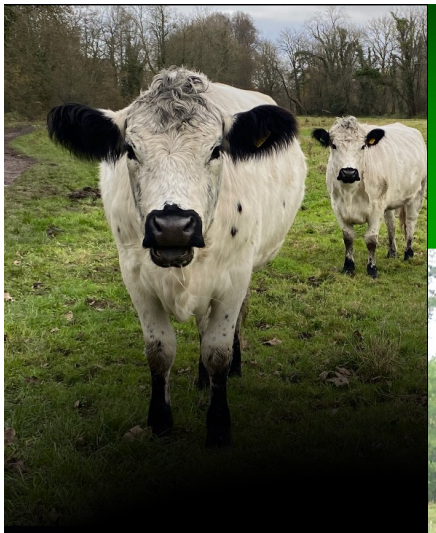
Source: Created by Jude L. Capper, 2023. Data from FAOSTAT (2020) http://www.fao.org/faostat/en/



D

What about smallholders?

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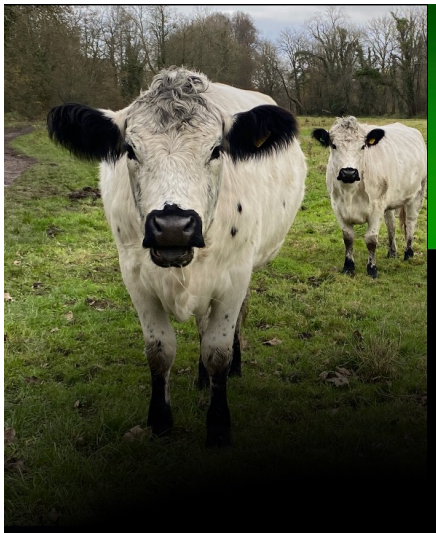

S

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

- Nutrition
- Income
- Fertiliser
- Draught power
- Cultural status
- Education
- Female emancipation

Source: Created by Jude L. Capper, 2023.

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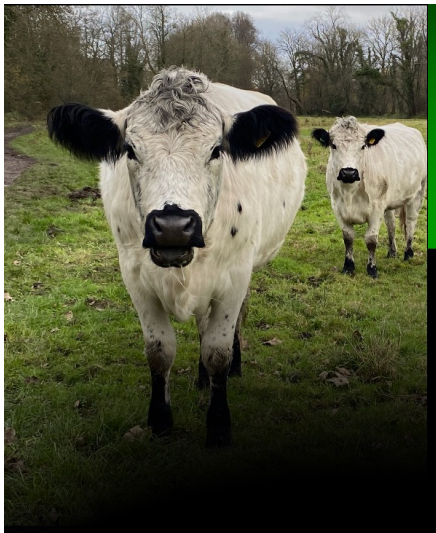

B

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 CO_2**

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

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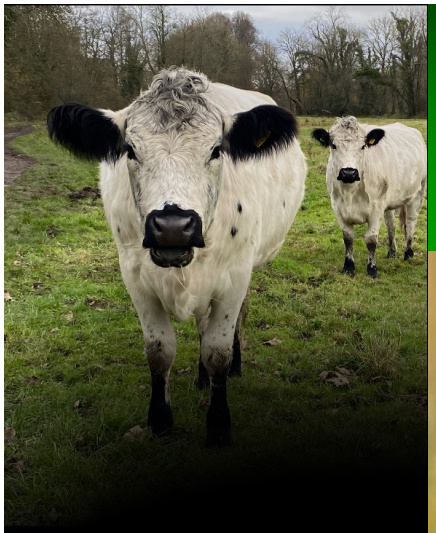
Source: Created by Jude L. Capper, 2023. Calculation based on feed and water requirements of one Angus cow weighing 544 kg producing 7.8 kg of milk per day, with calf weaned at 207 days of age.



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

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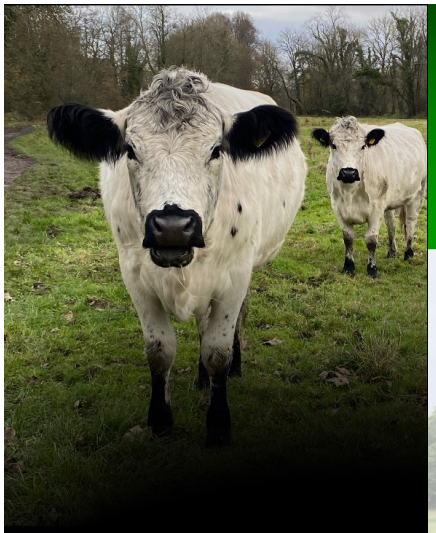
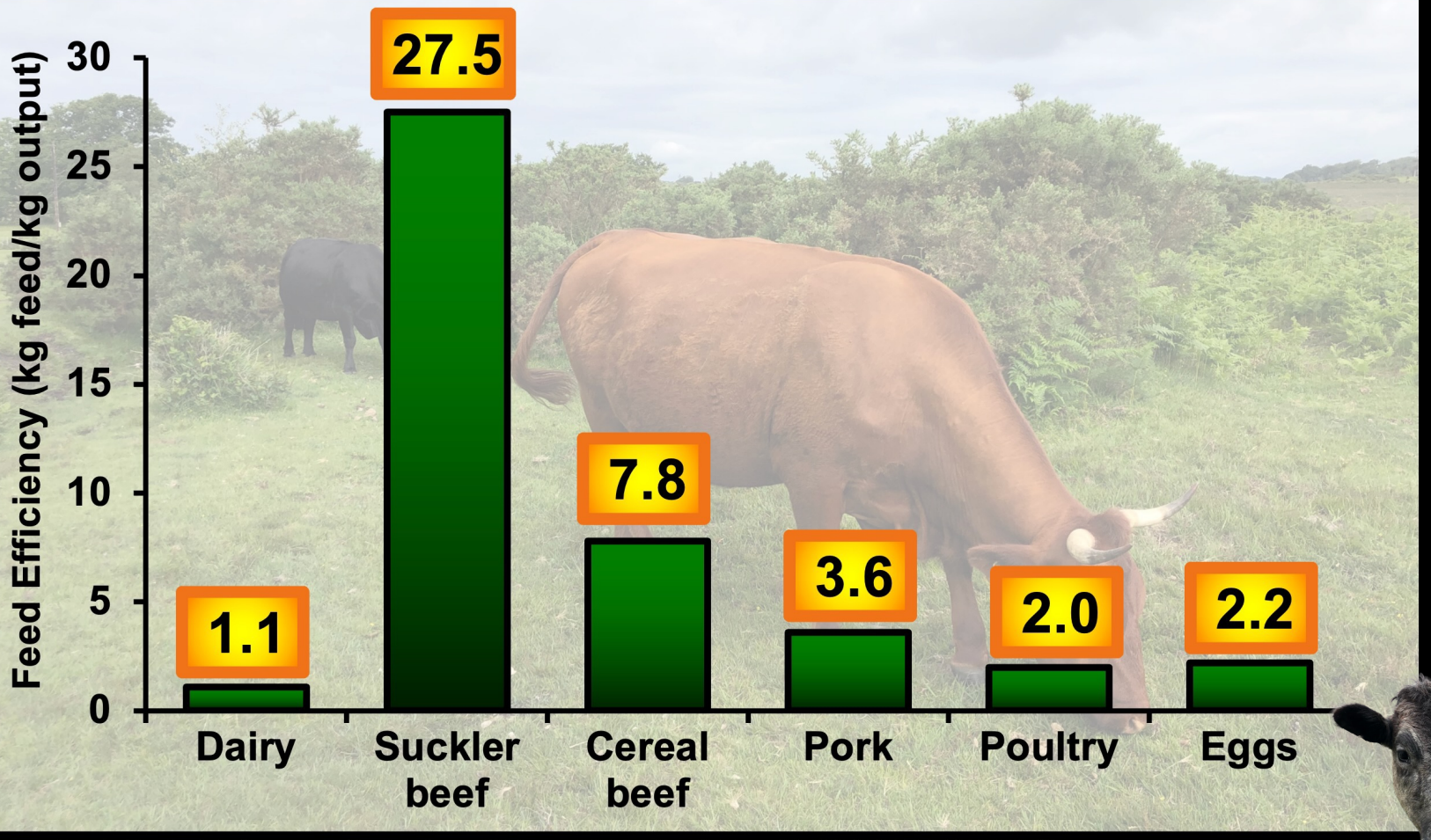
Source: Created by Jude L. Capper, 2023. Infographic from https://www.onegreenplanet.org/animalsandnature/eat-for-the-planet-meat-and-the-environment/



S

Feed efficiency ratios vary between systems and species



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

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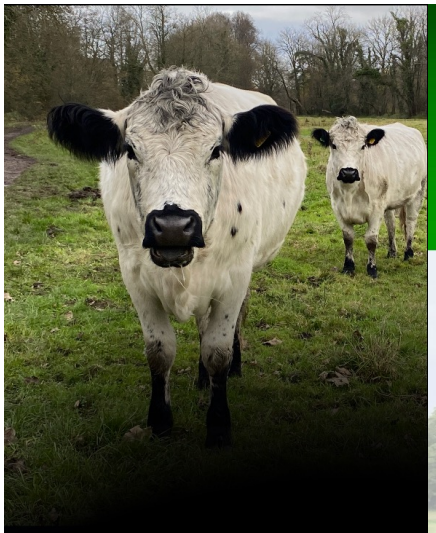
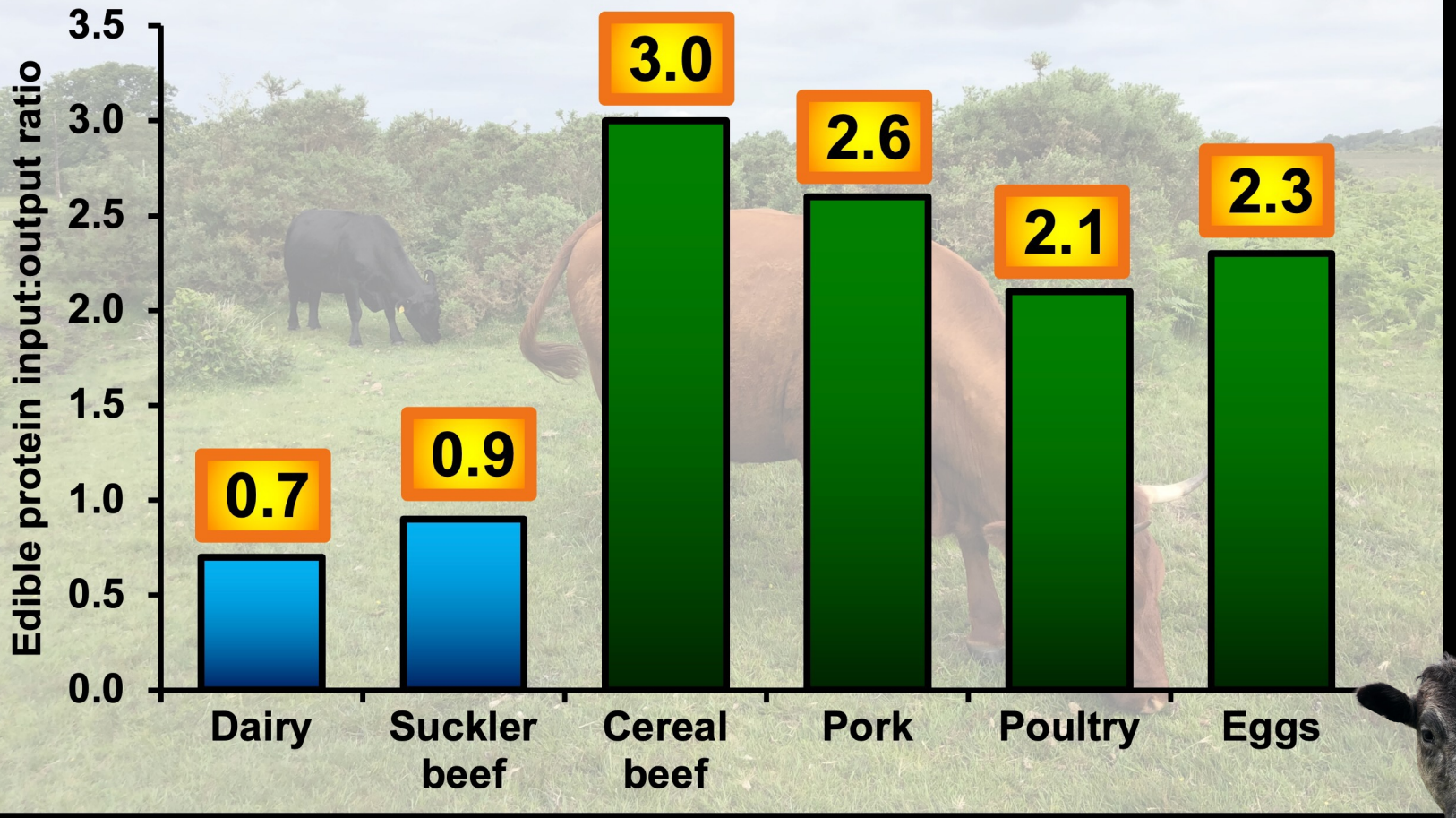


S

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



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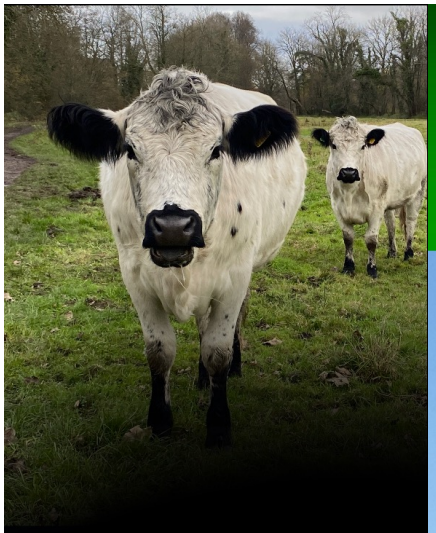

S

Can we grow human food crops everywhere?

Source: Created by Jude L. Capper, 2023.

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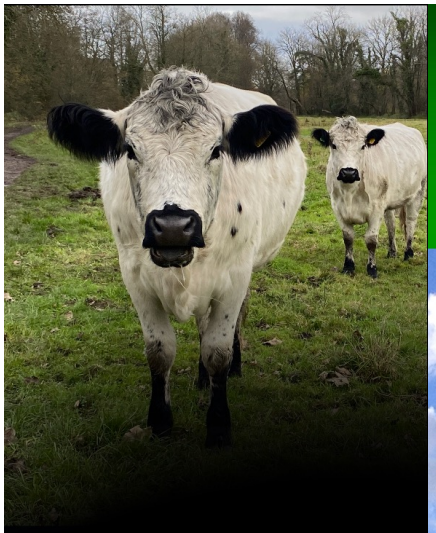

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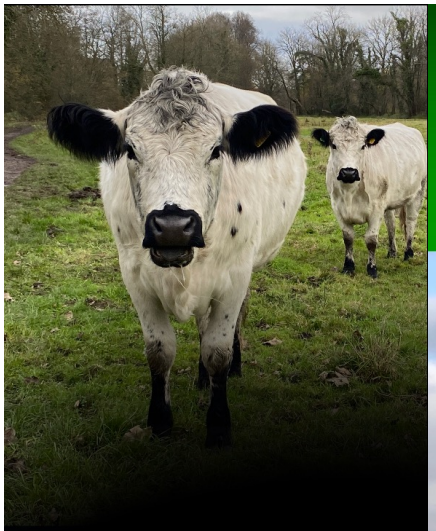

S

Can we grow human food crops everywhere?

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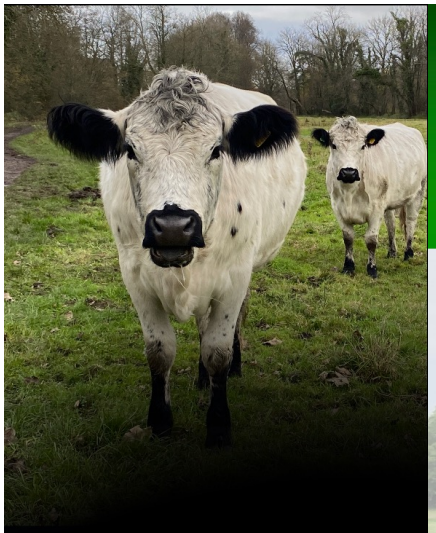
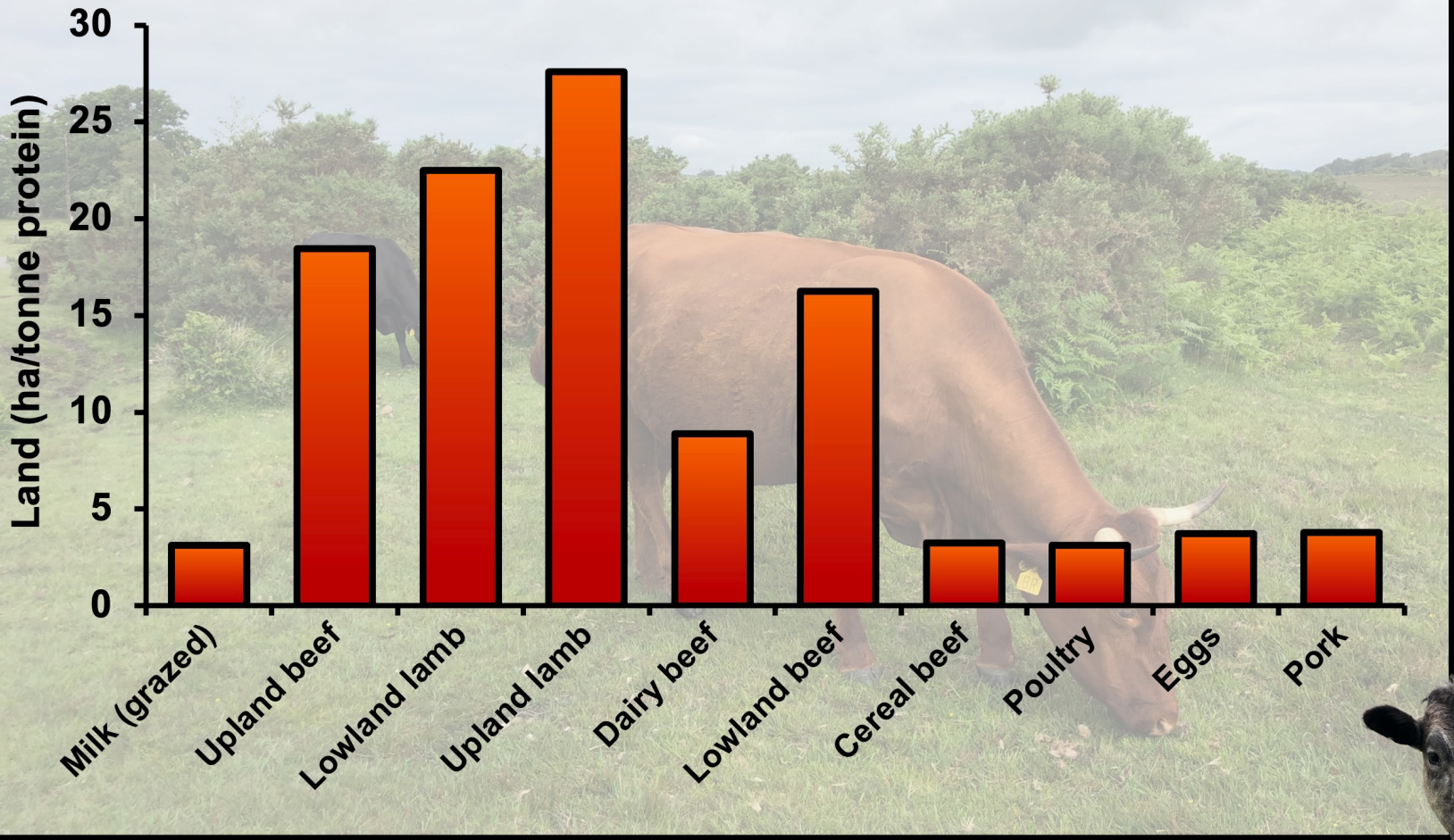


S

Livestock systems vary widely in 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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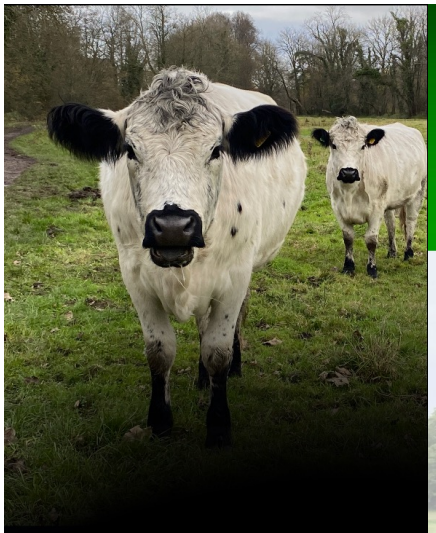
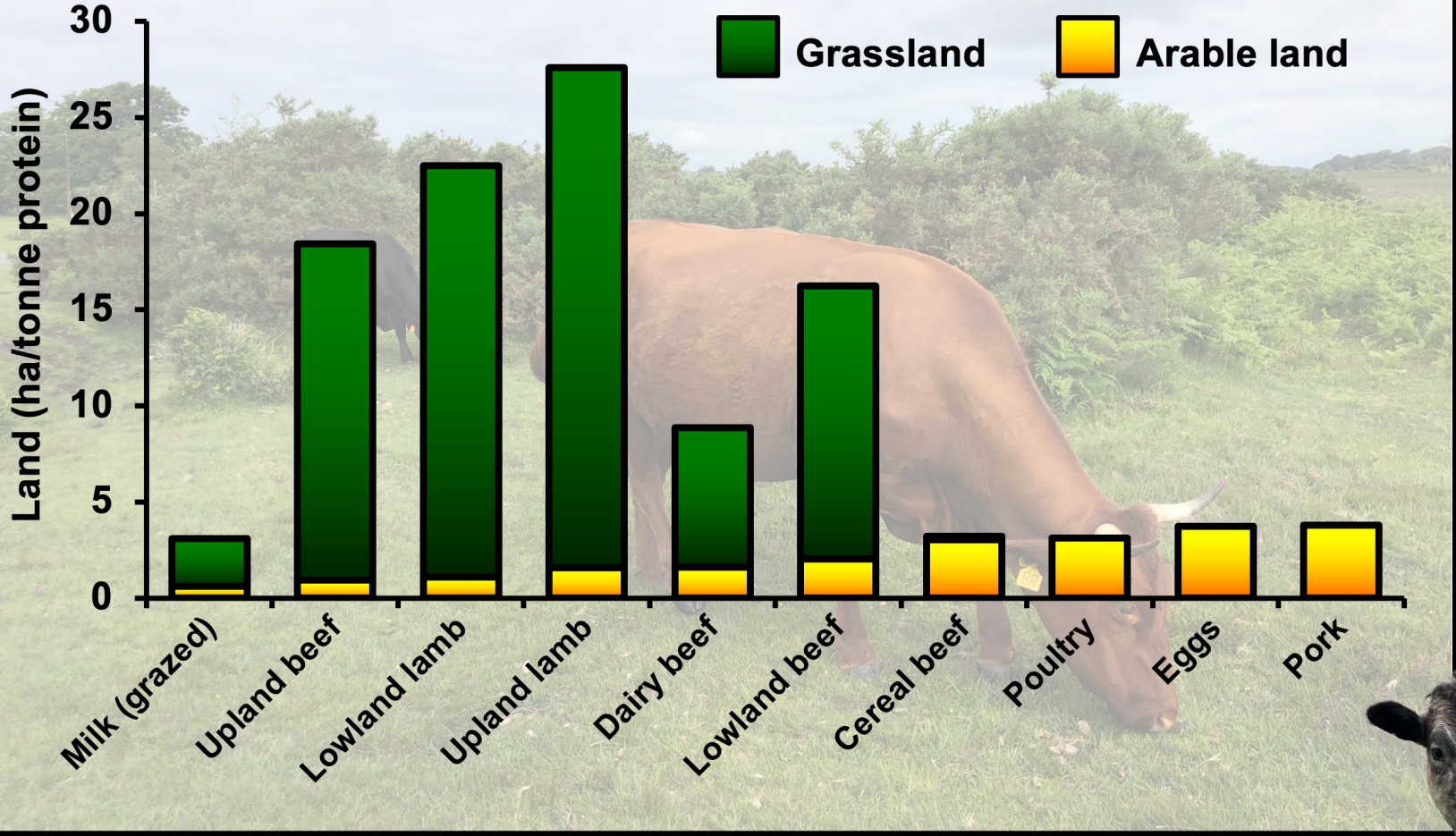


S

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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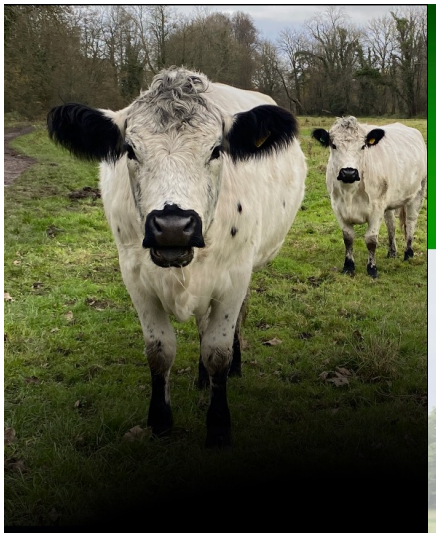
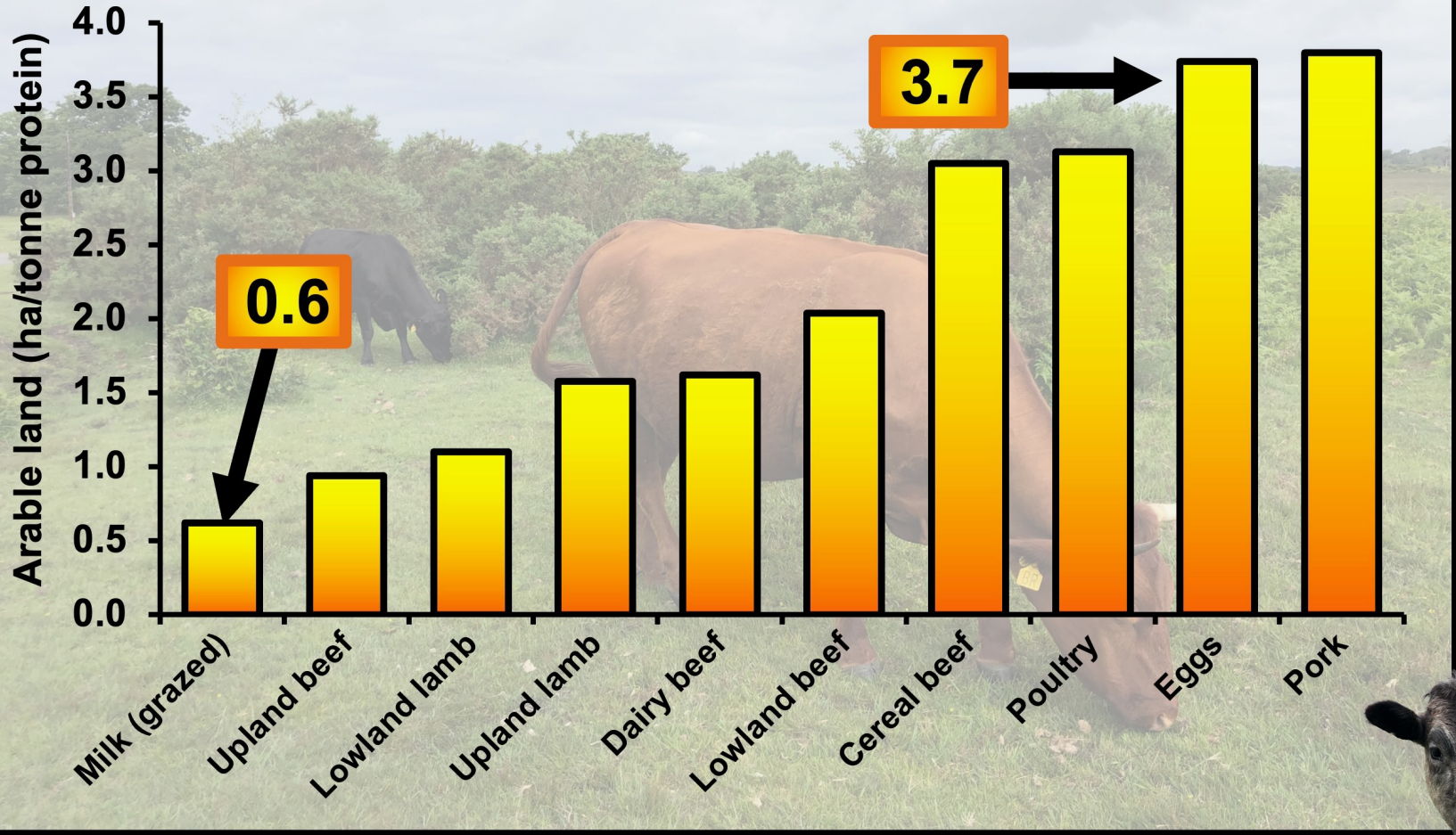


S

Livestock systems vary widely in arable land use



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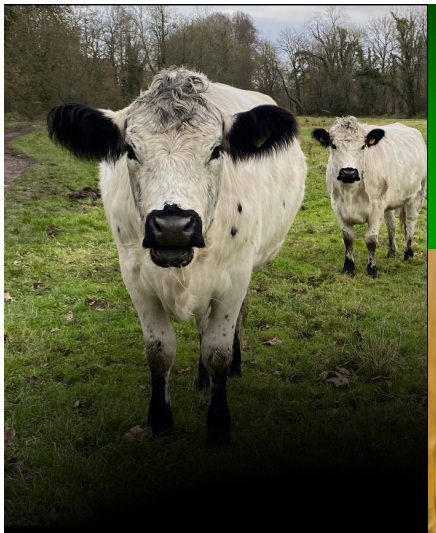

S

Removing cattle from pasture disadvantages ground-nesting birds

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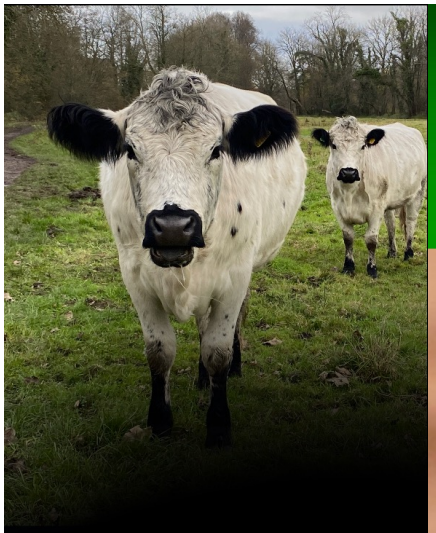
Source: Created by Jude L. Capper, 2023. Photo from Odd Falch https://www.pexels.com/photo/brown-bird-on-brown-grass-12084162/



S

Dung beetles have myriad ecosystem benefits

Source: Created by Jude L. Capper, 2023.

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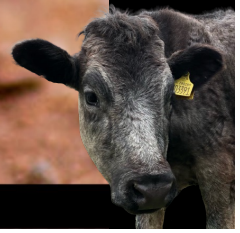

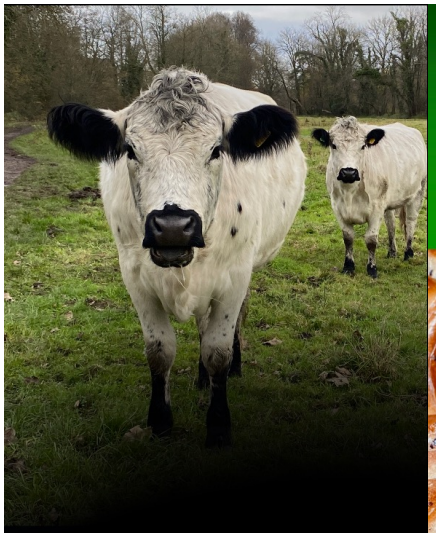

S

(Almost) all of our food comes from the soil








Source: Created by Jude L. Capper, 2023.

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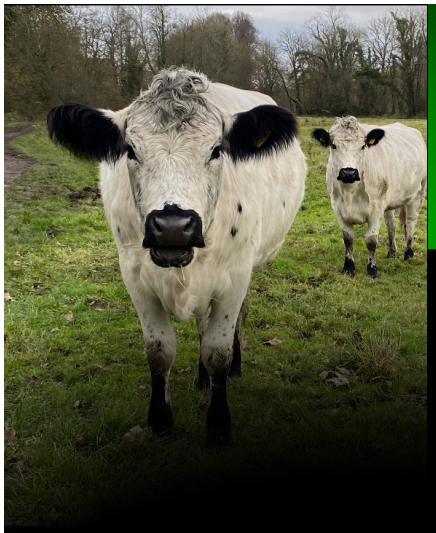

B

Thank you!

JCapper@Harper-Adams.ac.uk

Questions?

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