



**Dr. Jude Capper**

**@bovidiva**



**Does size  
matter?  
Improving  
efficiency and  
sustainability  
without being  
prescriptive**

**Prof. Jude L. Capper**

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

Source: Dr. Jude L. Capper, 2021



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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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To the consumer, small is beautiful



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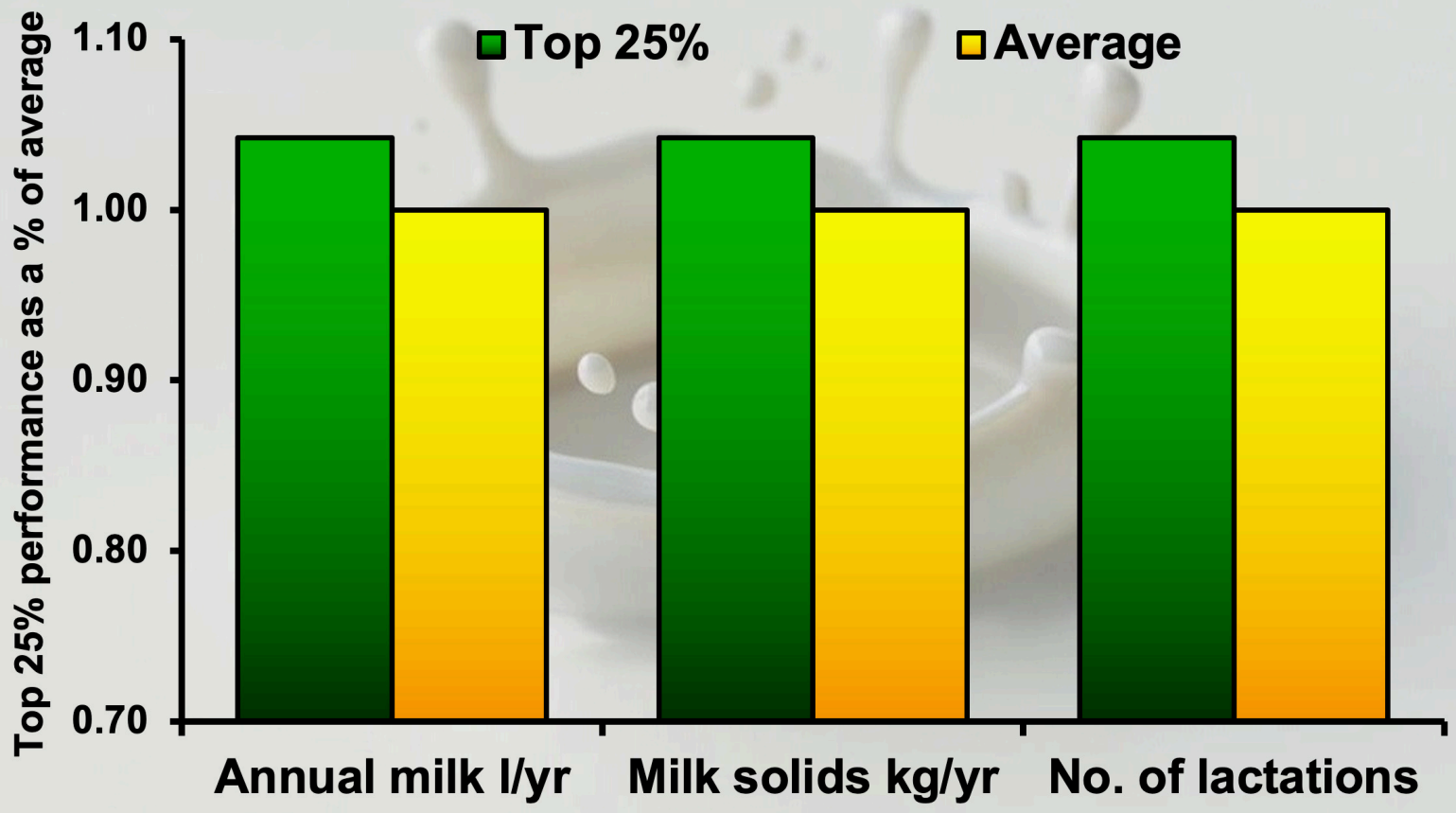
Source: Created by Dr. Jude L. Capper, 2021

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# Top 25% of dairy farms have higher yields, higher milk solids and lower cow turnover



Source: Created by Dr. Jude L. Capper, 2021. Data from: AHDB (2020) Dairy performance results 2018/19.  
[https://projectblue.blob.core.windows.net/media/Default/Dairy/Publications/DairyPerformResults3265\\_200317\\_WEB.pdf](https://projectblue.blob.core.windows.net/media/Default/Dairy/Publications/DairyPerformResults3265_200317_WEB.pdf)

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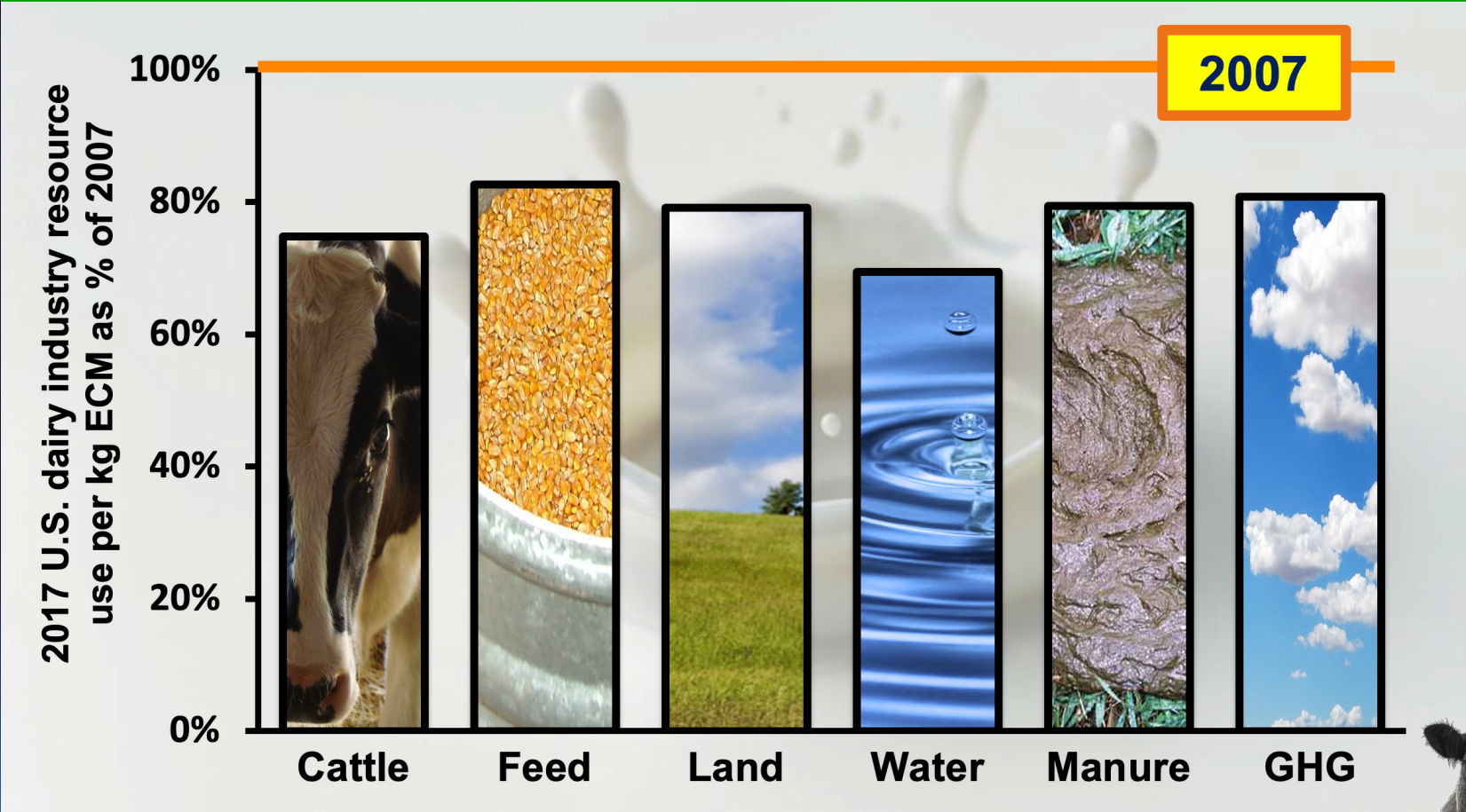


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# U.S. dairy producers cut greenhouse gas emissions by 19% between 2007-2017



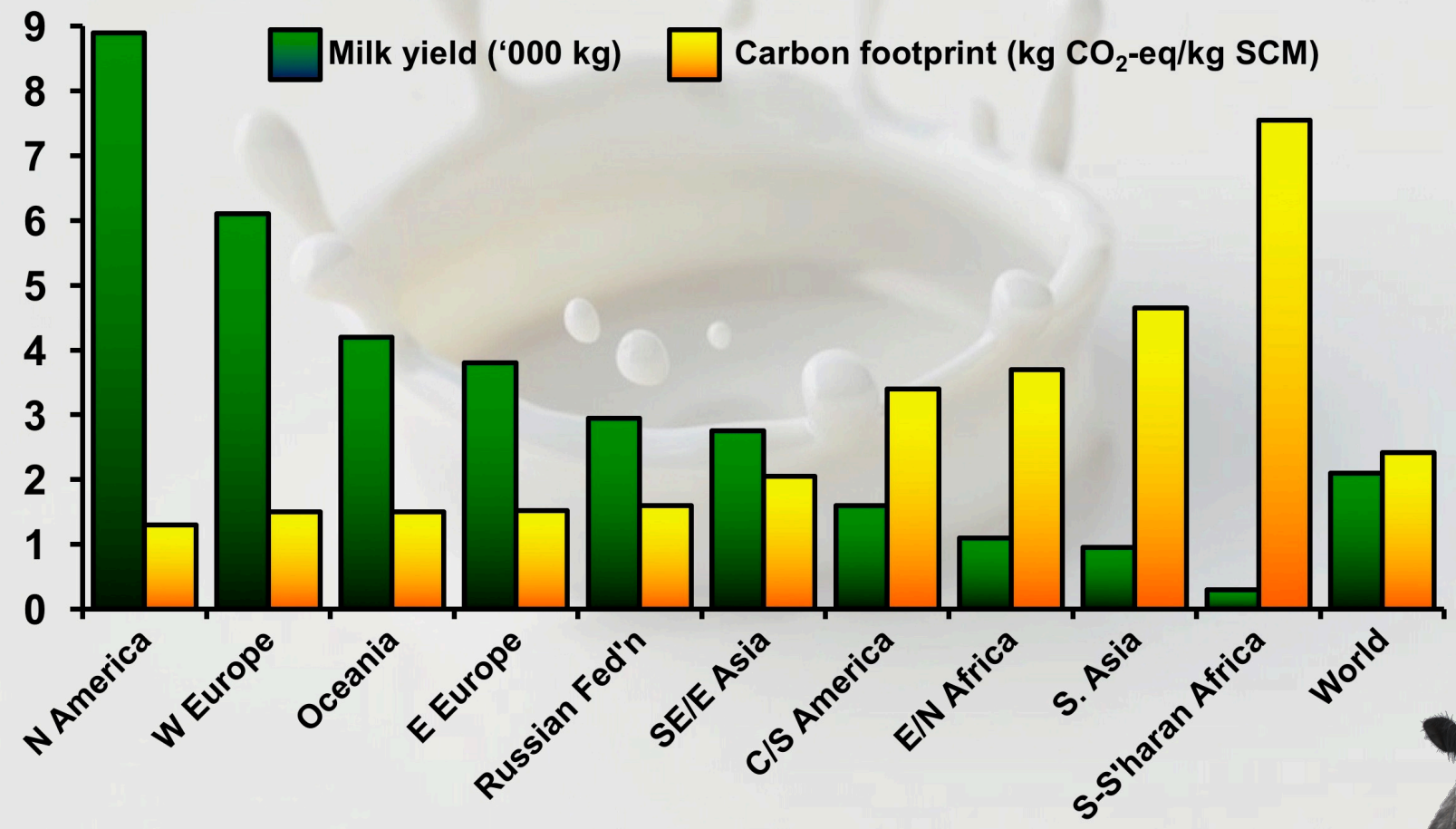
Source: Created by Dr. Jude L. Capper, 2021. Data from: Capper, J. L. and Cady, R. A. 2019. The effects of improved performance in the U.S. dairy cattle industry on environmental impacts between 2007 and 2017. *Journal of Animal Science*. <https://doi.org/10.1093/jas/skz291>



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# 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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# What about smallholders?



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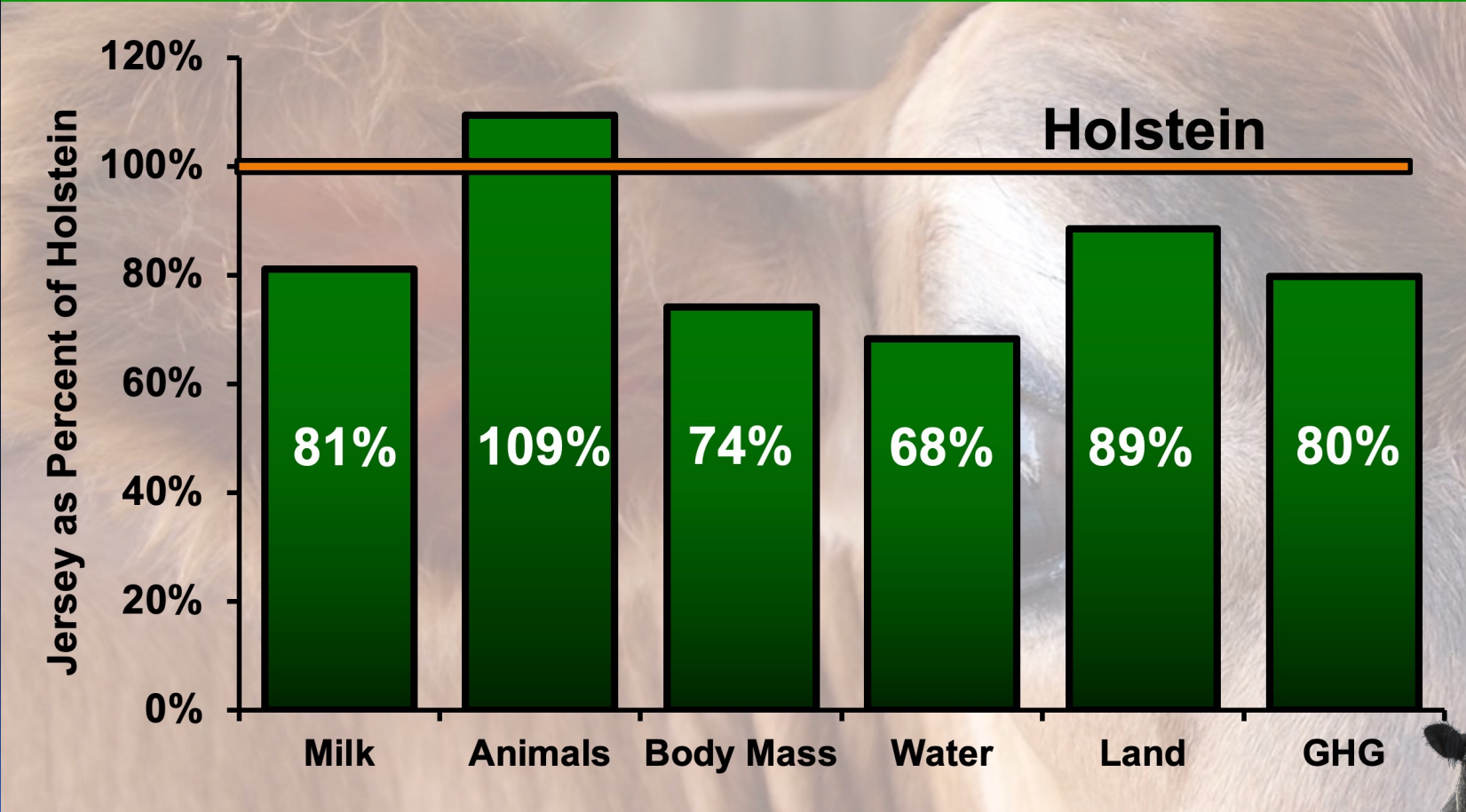


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# D Jersey vs. Holstein: smaller cows have environmental advantage for cheese production



Source: Created by Dr. Jude L. Capper, 2020. Data from: Capper and Cady (2012) A comparison of the environmental impact of Jersey vs. Holstein milk for cheese production. *J. Dairy Sci.*

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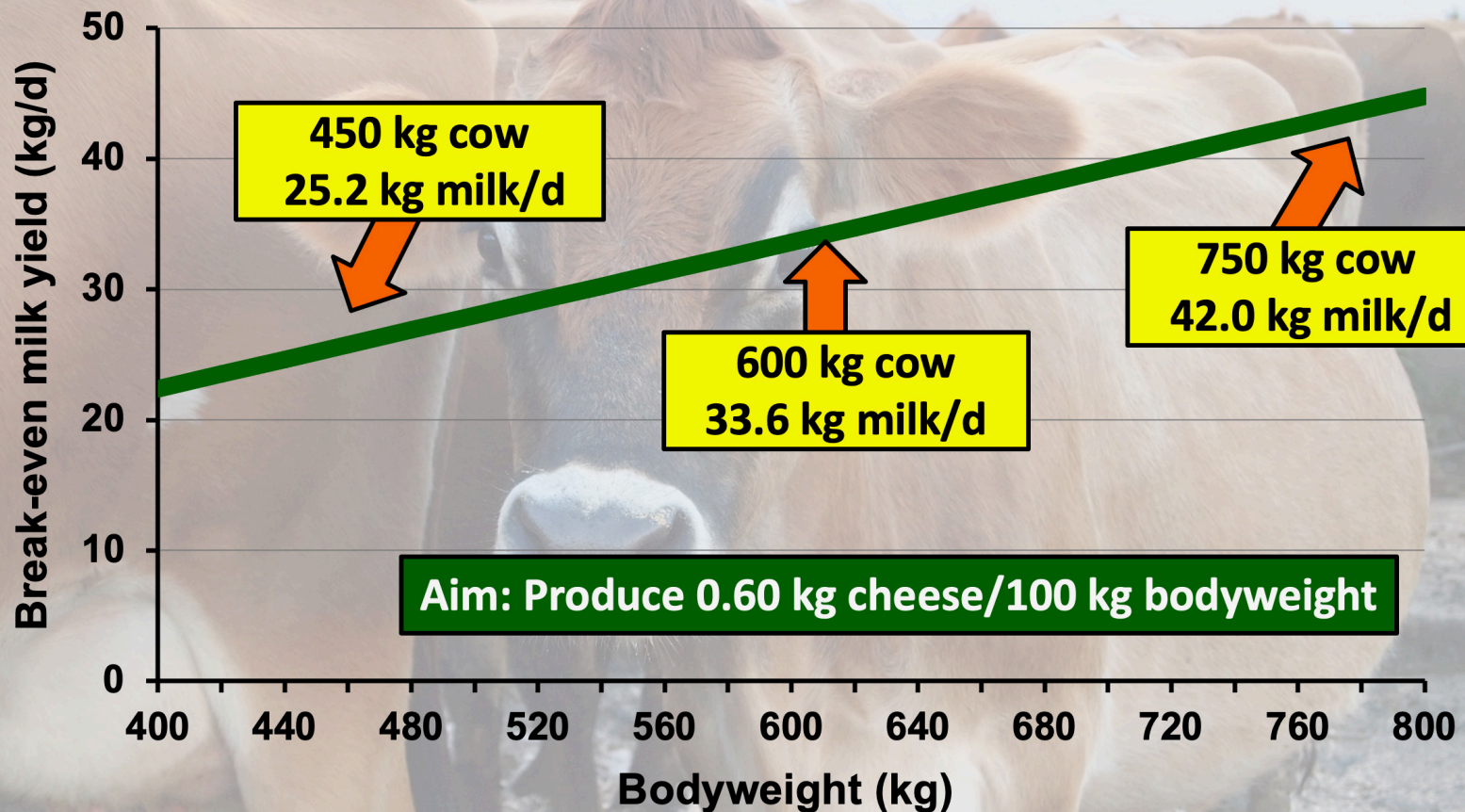


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Output per kg bodyweight: smaller cow yielding less = big cow yielding more



Source: Created by Dr. Jude L. Capper, 2021. Adapted from Capper, J. L. and R. A. Cady (2012). A comparison of the environmental impact of Jersey vs. Holstein milk for cheese production. *J. Dairy Sci*

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# Increasing beef yield benefits burgers more than steaks



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

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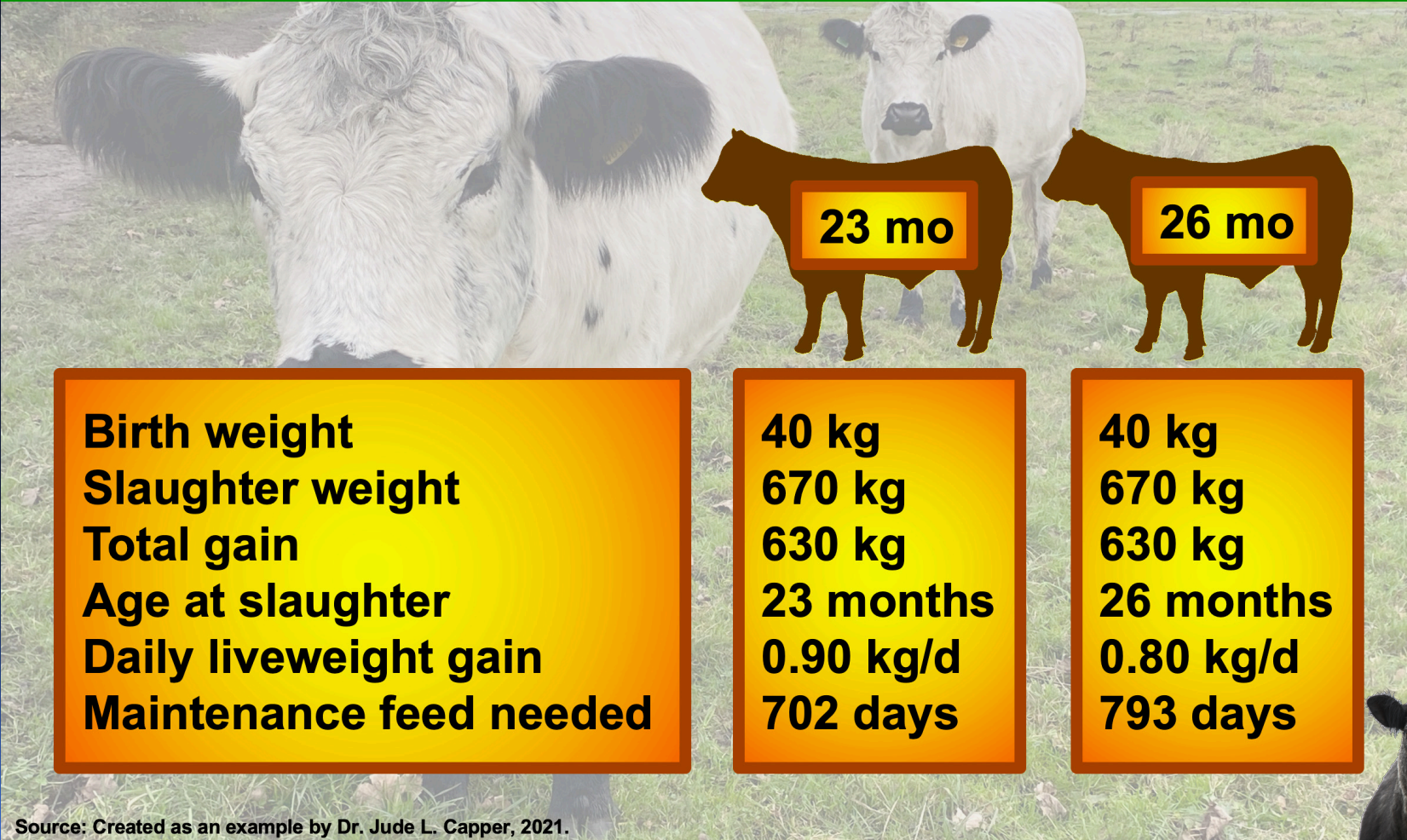
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# Reducing age at slaughter has both economic and environmental benefits



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

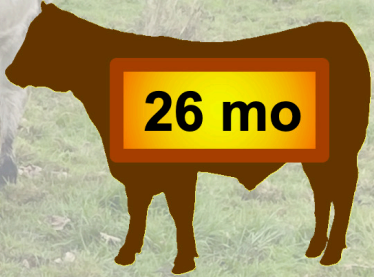
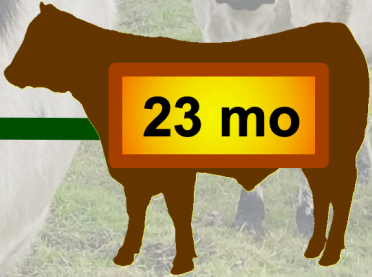
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# Reducing age at slaughter has both economic and environmental benefits

91 fewer days of feed, land and greenhouse gases. Opportunity cost?



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

40 kg
670 kg
630 kg
23 months
0.90 kg/d
702 days

40 kg
670 kg
630 kg
26 months
0.80 kg/d
793 days

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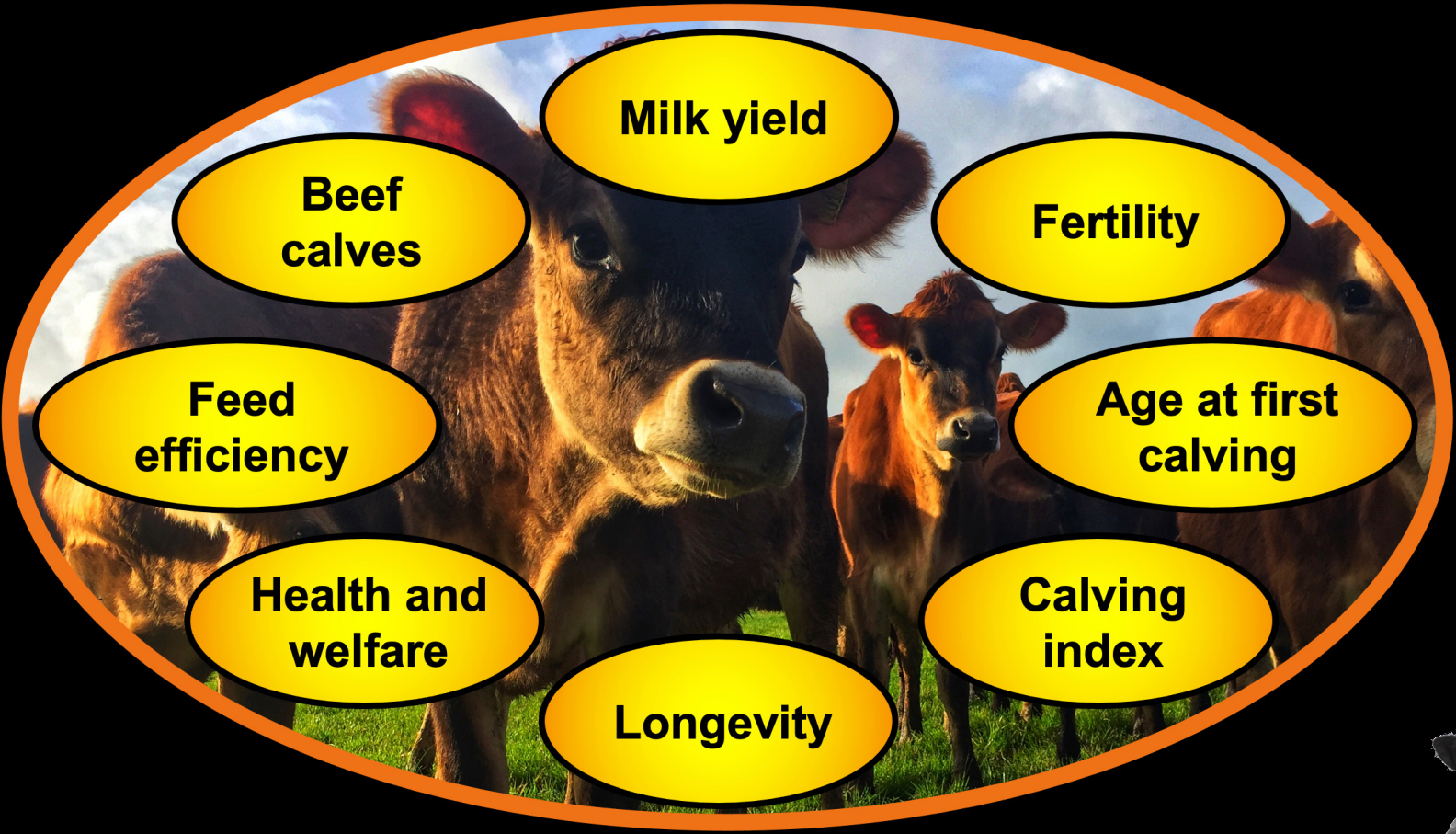
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Source: Created as an example by Dr. Jude L. Capper, 2021.



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# Improving performance indicators reduces GHG emissions...but how do they compare?



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Source: Created by 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>

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

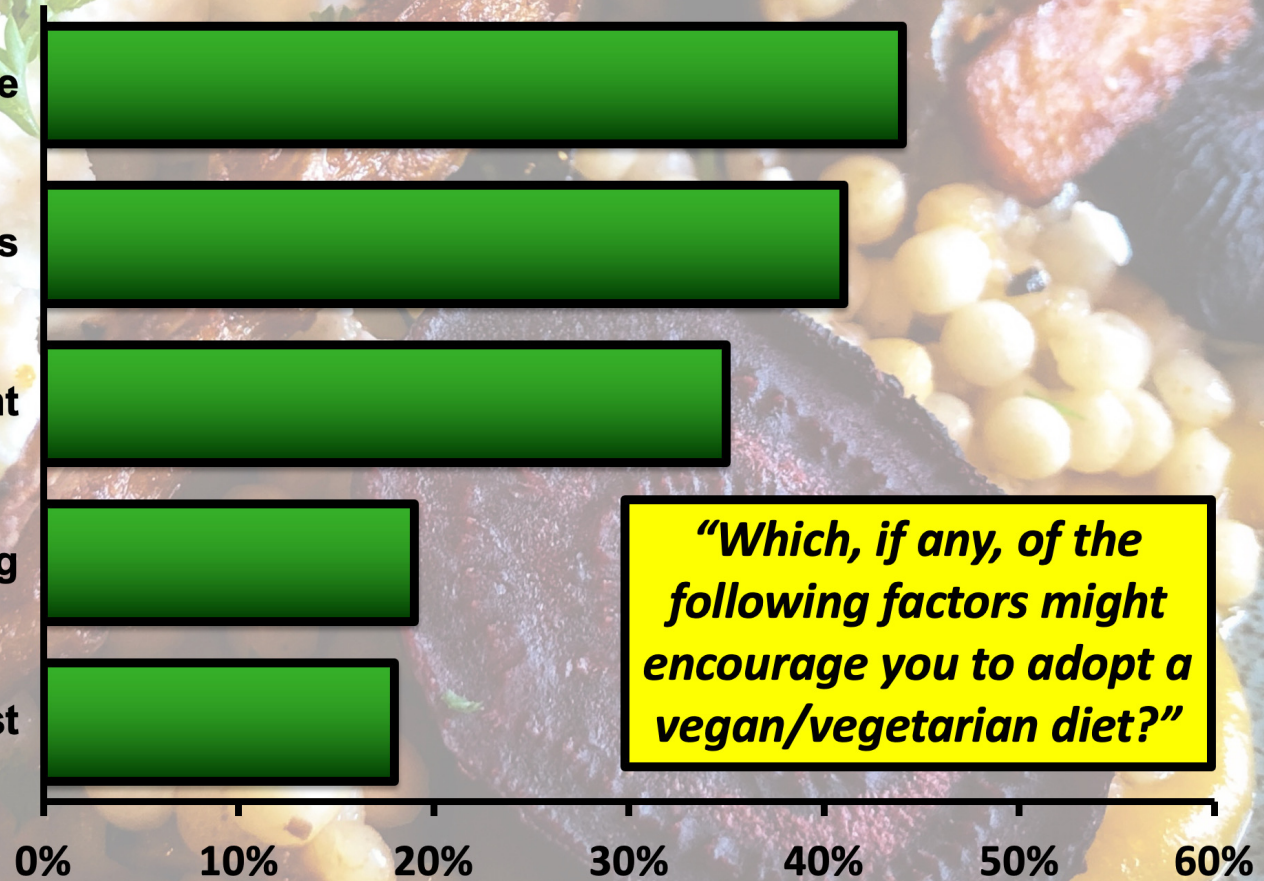
Animal welfare

Healthiness

Environment

Labelling

Economic cost



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

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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# Does big = bad? Are welfare and GHG emissions linked?

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Source: Created by Dr. Jude L. Capper, 2021. Photo credit: Neil Baker, Bakers of Haselbury Plucknett.



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)

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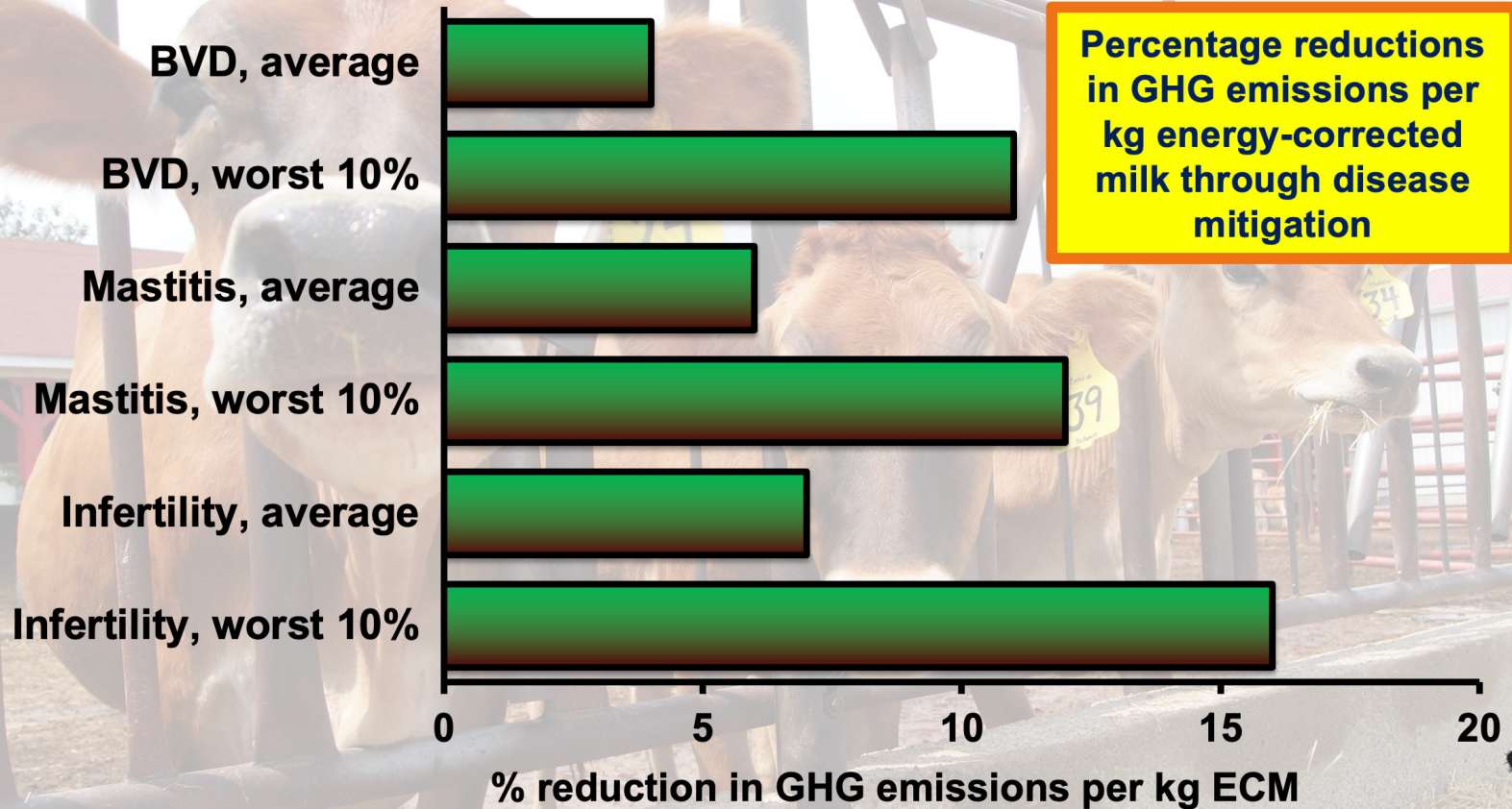


Source: Created by Dr. Jude L. Capper, 2020. Data from: World Organization for Animal Health. 2008. <http://www.oie.int/for-the-media/editorials/detail/article/feeding-the-world-better-by-controlling-animal-diseases>



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# 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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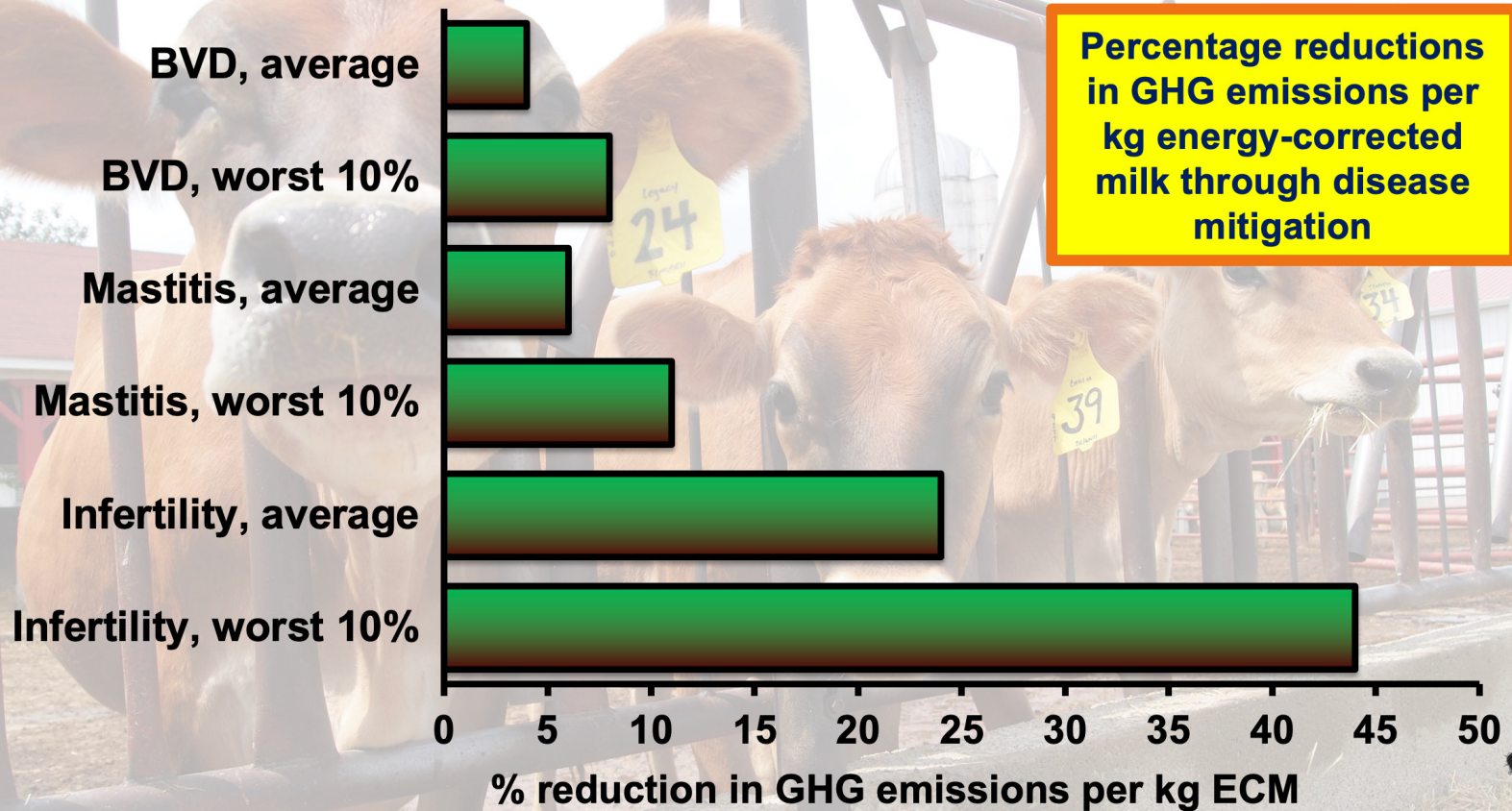


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# GHG emissions could be cut significantly by mitigating dairy diseases - Kenya



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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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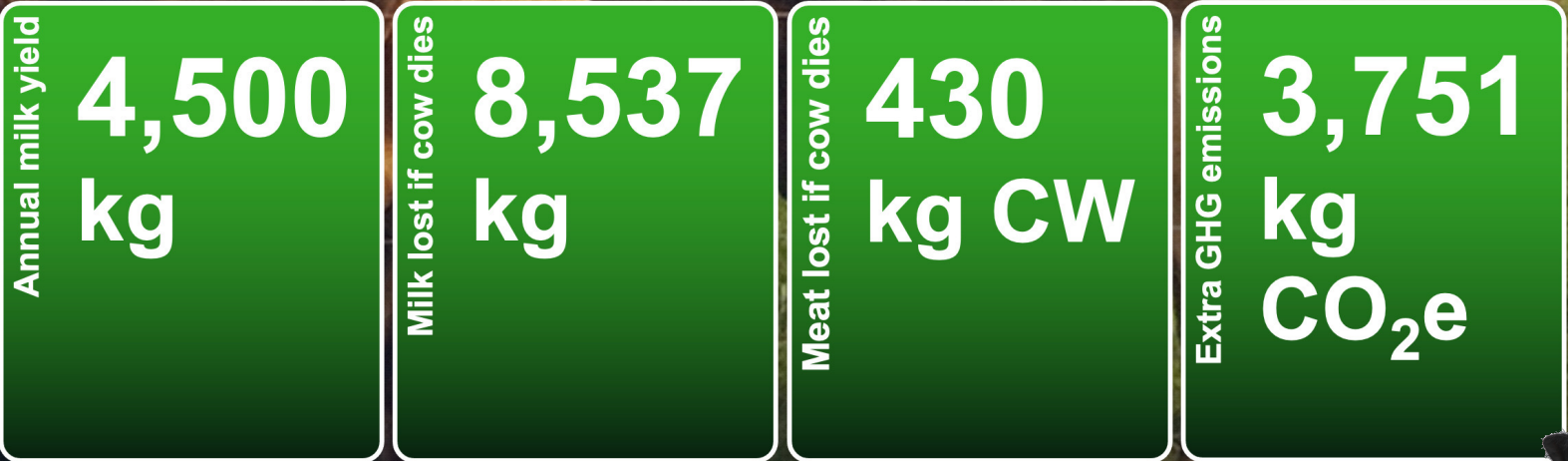
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What are the milk, meat and greenhouse gas implications of global dairy cow mortality?



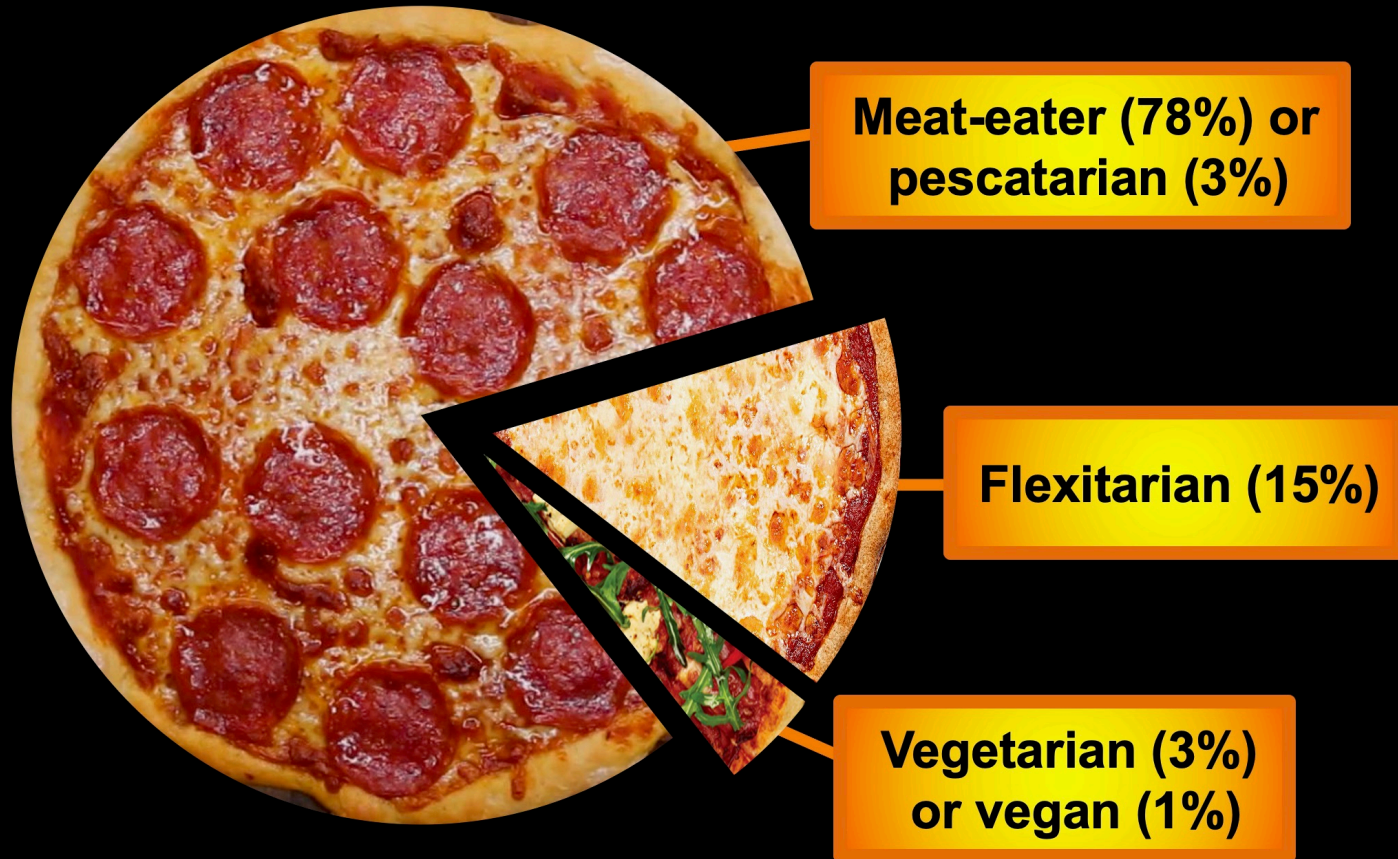
Source: Created by Dr. Jude L. Capper, 2021. Calculated as an example based on a 4,500 kg annual milk yield, 26 mo age at first calving, 14 mo calving interval, 248 kg carcass weight, 0.69 live calves born/yr, 0.50 calves reared for beef, and average of 1,731 kg CO<sub>2</sub>e GHG emissions per heifer/yr.



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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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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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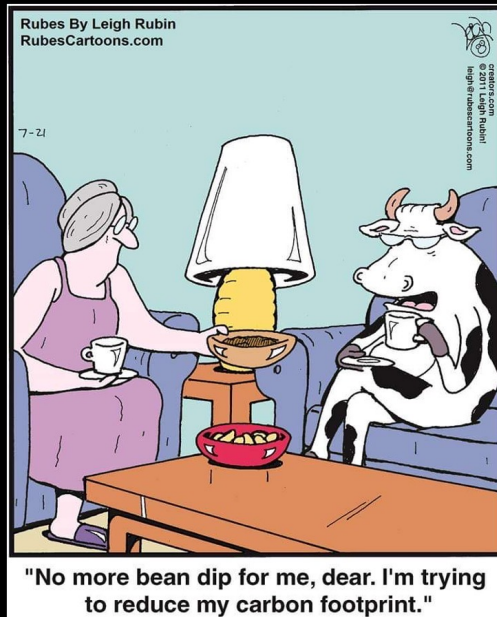
# Thank you!

[jude@livestocksustainability.com](mailto:jude@livestocksustainability.com)

<http://bovidiva.com/presentationlinks>

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## Questions?



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