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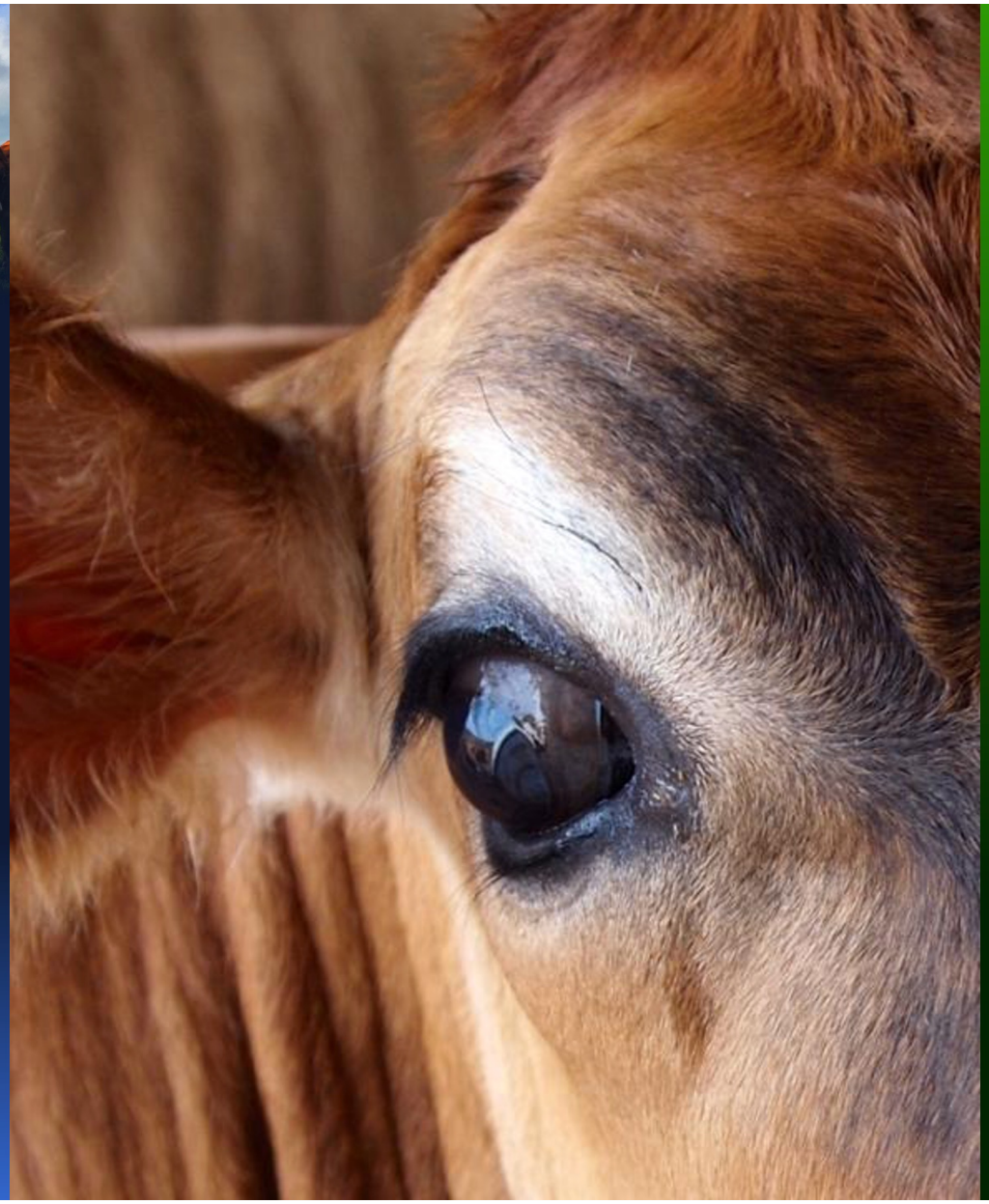

Cows of the future – challenges and opportunities for sustainable cattle systems

7th September 2022

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Source: Dr. Jude L. Capper, 2022

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s

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









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

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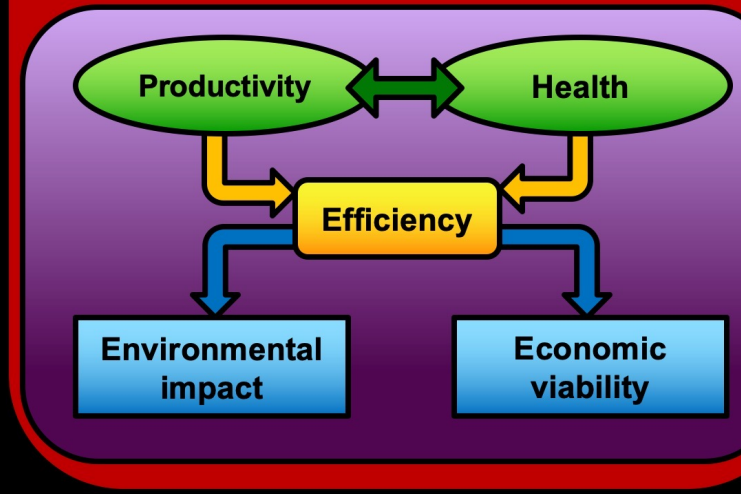
Social acceptability and consumer trust are vital for sustainable livestock production

Social Acceptability



Sustainability

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

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Guilt is a primary motivator for people considering going vegetarian or vegan

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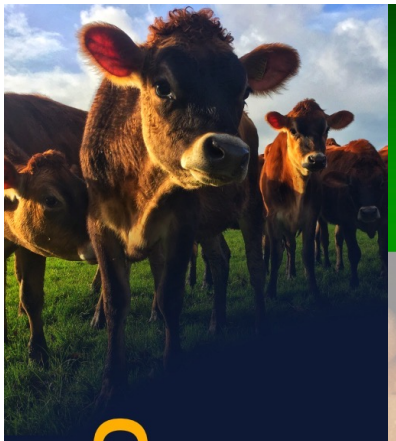
"I sometimes feel guilty when consuming meat and dairy products"

66% of meat-eaters and flexitarians thinking of giving up meat said "yes" compared to 25% of national population

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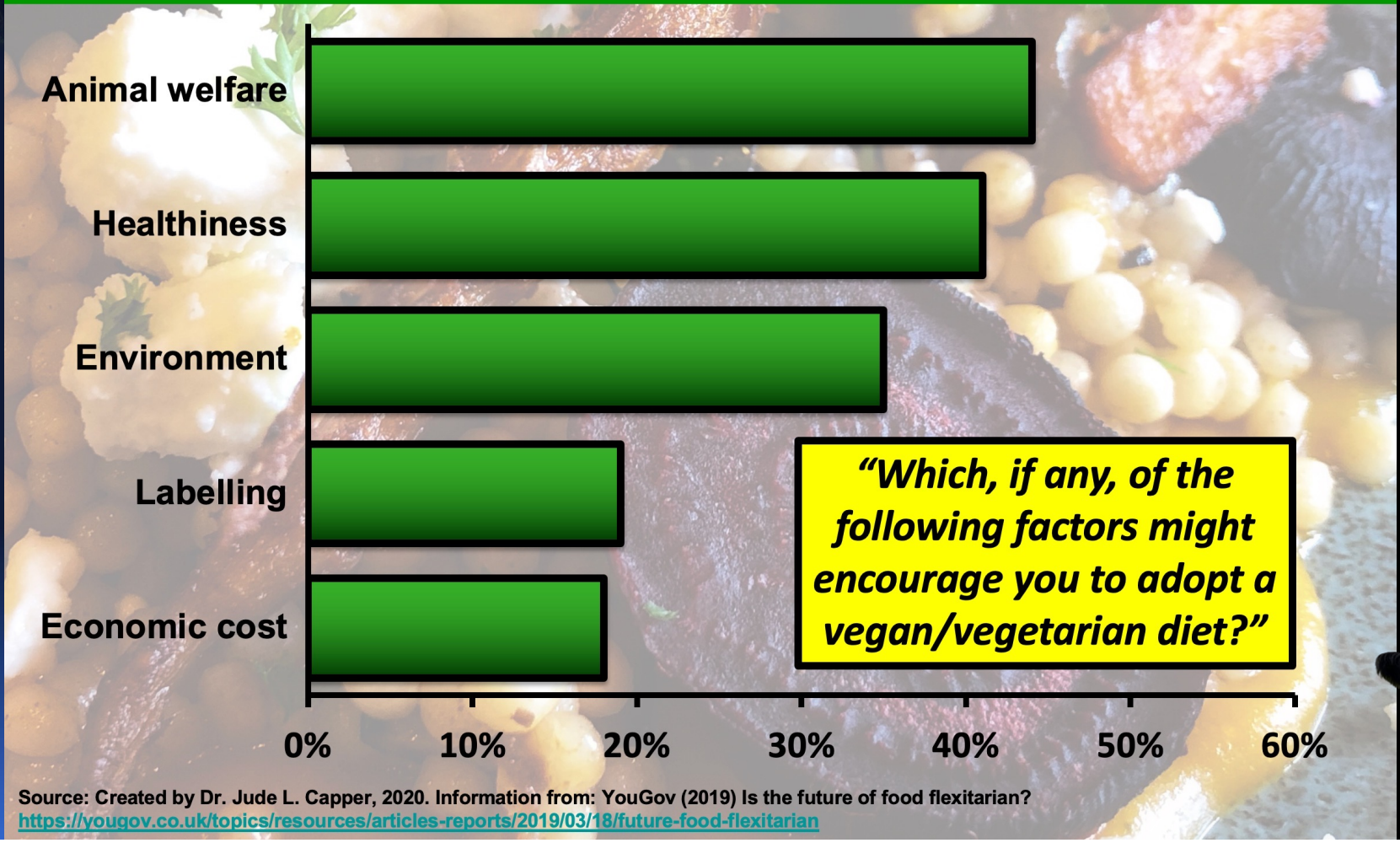
Animal welfare and human health are major concerns for people giving up animal products



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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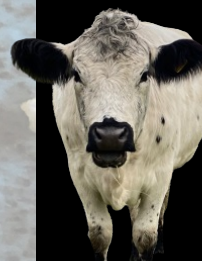

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Attractively presented misinformation can be difficult to counter

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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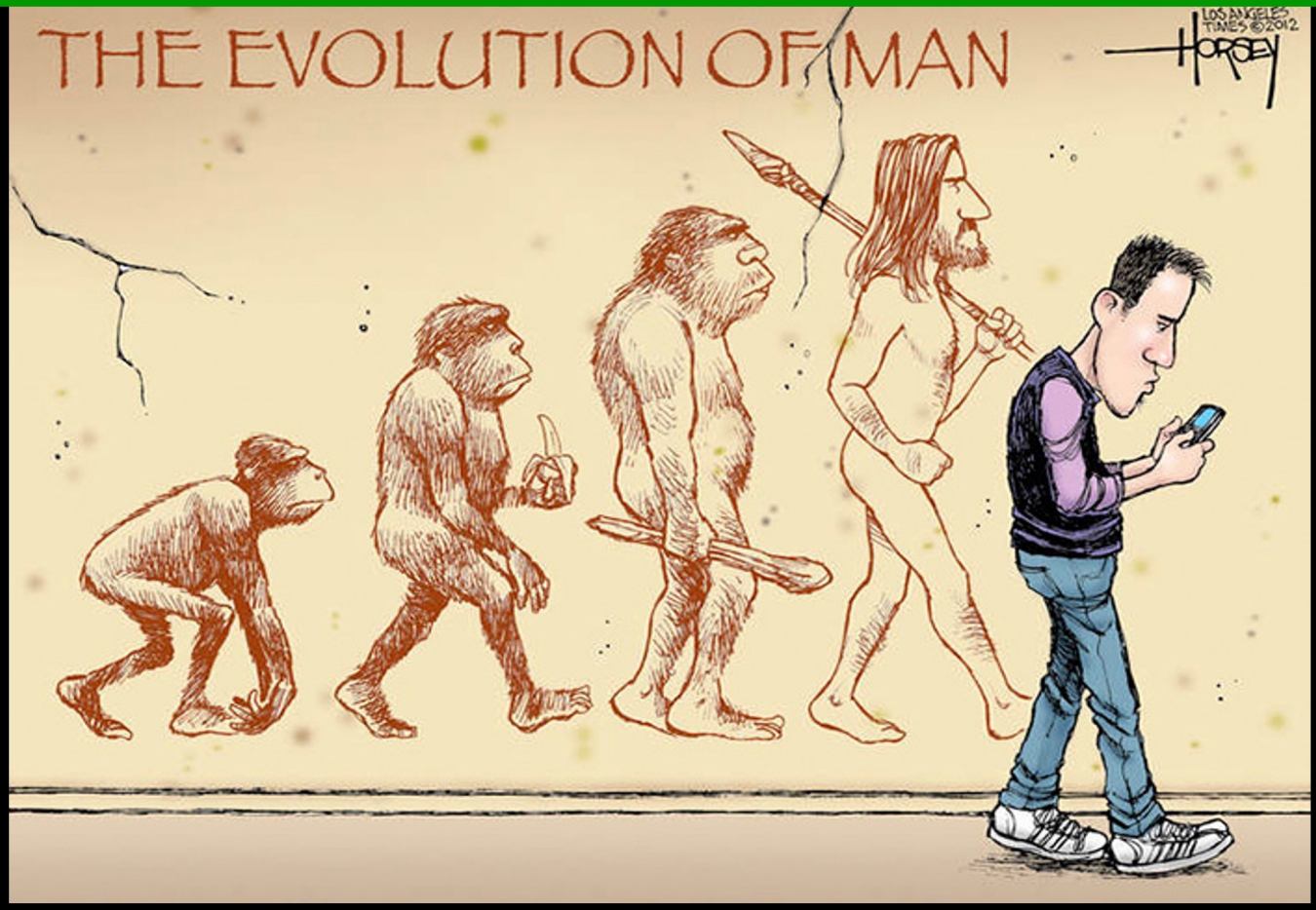
We've got the technology – now we need to use it to its potential



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

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Reducing age at slaughter has both economic and environmental benefits

Birth weight	40 kg	40 kg
Slaughter weight	670 kg	670 kg
Total gain	630 kg	630 kg
Age at slaughter	27 months	30 months
Daily liveweight gain	0.77 kg/d	0.69 kg/d
Maintenance feed needed	821 days	912 days

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

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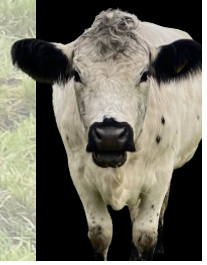

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B

Reducing age at slaughter has both economic and environmental benefits

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

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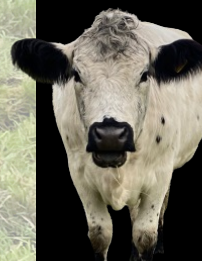

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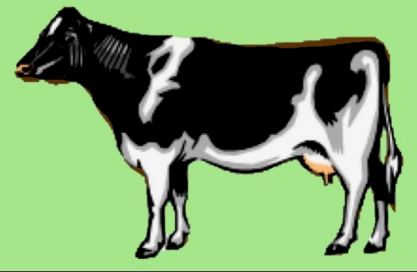
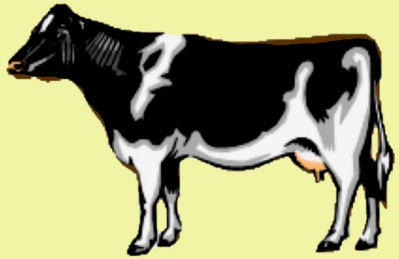
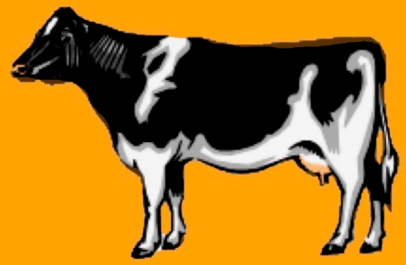
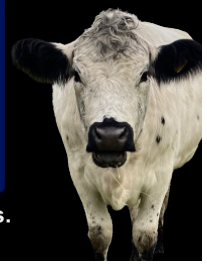
DS

Dairy heifer losses are significant in UK herds

Birth	Calving	100 d lactation
		
100 heifers are born	81 heifers enter herd	77 survive past 100 days

Each heifer requires 6,118 kg feed DM to rear it from birth to calving



Source: Created by Dr. Jude L. Capper, 2017. Data from Wathes et al. (2008) Factors affecting heifer survival and fertility on commercial dairy farms. *Animal*; Hanks and Kossaibati (2016) Key performance indicators for the UK national dairy herd. University of Reading, Reading, UK.

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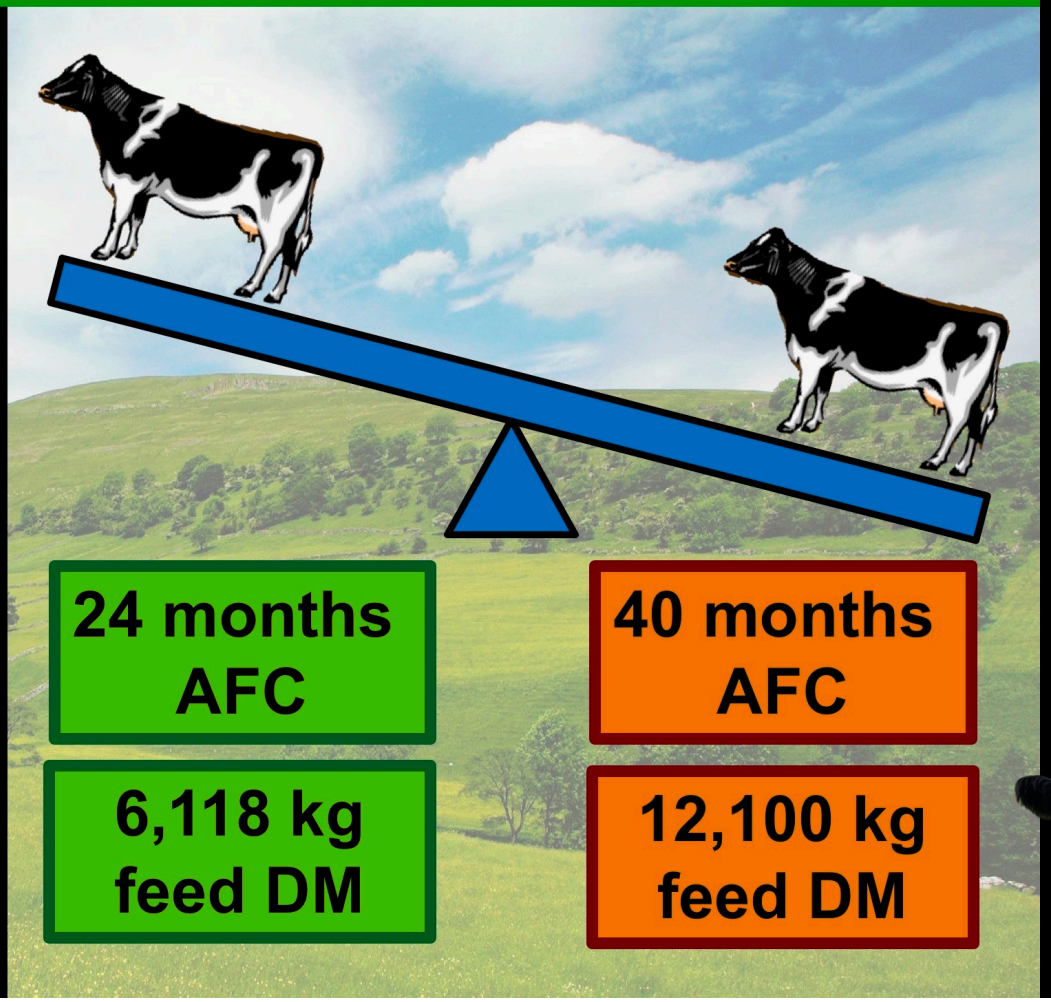
DS

Age doesn't matter – unless you're a heifer

Calving a heifer at 40 months of age requires an extra 5,982 kg feed DM. Inefficiency increases resource use and GHG emissions.



Source: Created by Dr. Jude L. Capper, 2017. Based on analysis of feed use to 24 months or 40 months at DMI = 3% of bodyweight from 24-40 months.

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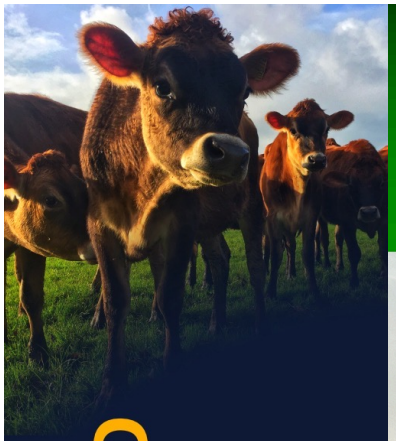

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Reproductive interventions must be economically and environmentally sustainable

Improving maternal trait genetics via AI over 20 yrs

Decreased mature weight and calving interval

£47-344 improved economics per cow calving

95 - 2,009 kg CO_2 reduction in GHG emissions per cow

Source: Created by Dr. Jude L. Capper, 2022. Data from Quinton et al. (2018) Predicted economic and greenhouse gas benefits from using improved maternal genetics in UK beef cattle. Proceedings of the World Congress on Genetics Applied to Livestock Production, 11.364

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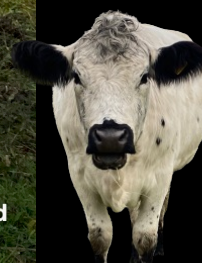

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s

Science and technology are often frightening concepts when applied to food

Source: Created by Dr. Jude L. Capper, 2022. Original art "The Farm" by Alexis Rockman.

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B

Negative consumer perceptions increase in tandem with technological artifice

- Sexed semen – 53% negative
- Embryo transfer – 58% negative
- Fertility programs – 65% negative
- Gene editing
- Cloning – 81% negative

Consumer perception

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Source: Created by Dr. Jude L. Capper, 2022. Data from survey of 1,646 German consumers published in Pieper et al. (2016). *J. Dairy Sci.* https://doi.org/10.3168/jds.2015-10169

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D

Sexed semen – beef environmental responsibility 1

Modelling effects of sexed semen and moving from 50:50 to 78:22 dairy:suckler beef in Ireland

Economic value of dairy beef to the industry improved by 60.4%

GHG emissions per tonne beef reduced by 24.6% assuming dairy herd expands to maintain supply

Source: Created by Dr. Jude L. Capper, 2022. Data from: Holden and Butler (2018) doi:10.1017/S1751731118000721

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D

Sexed semen – beef environmental responsibility 2

Modelling effects of using sexed semen on medium and large Scottish dairy farms

Farm gross margin increased by ~1.0%, cost-effectiveness = -€15 - €7/tonne CO_2e

GHG emissions per tonne milk reduced by 9.5-11.6% assuming dairy beef replaces sucklers

Source: Created by Dr. Jude L. Capper, 2022. Data from: Eory et al. (2014) German Journal of Agricultural Economics, 63:133-142.

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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_2**

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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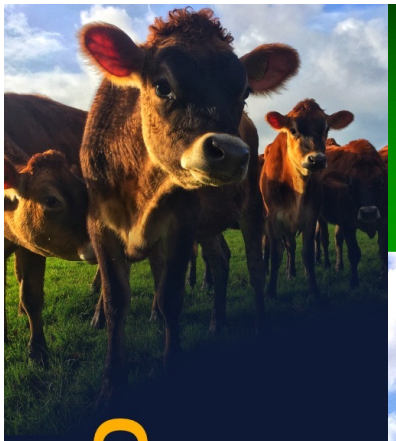

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Can we grow human food crops everywhere?

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

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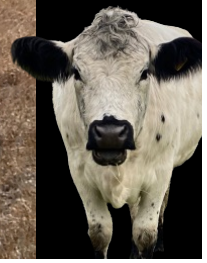

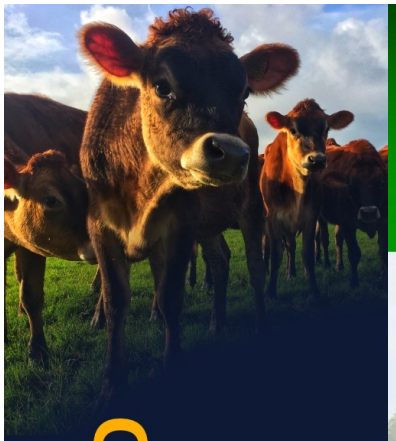

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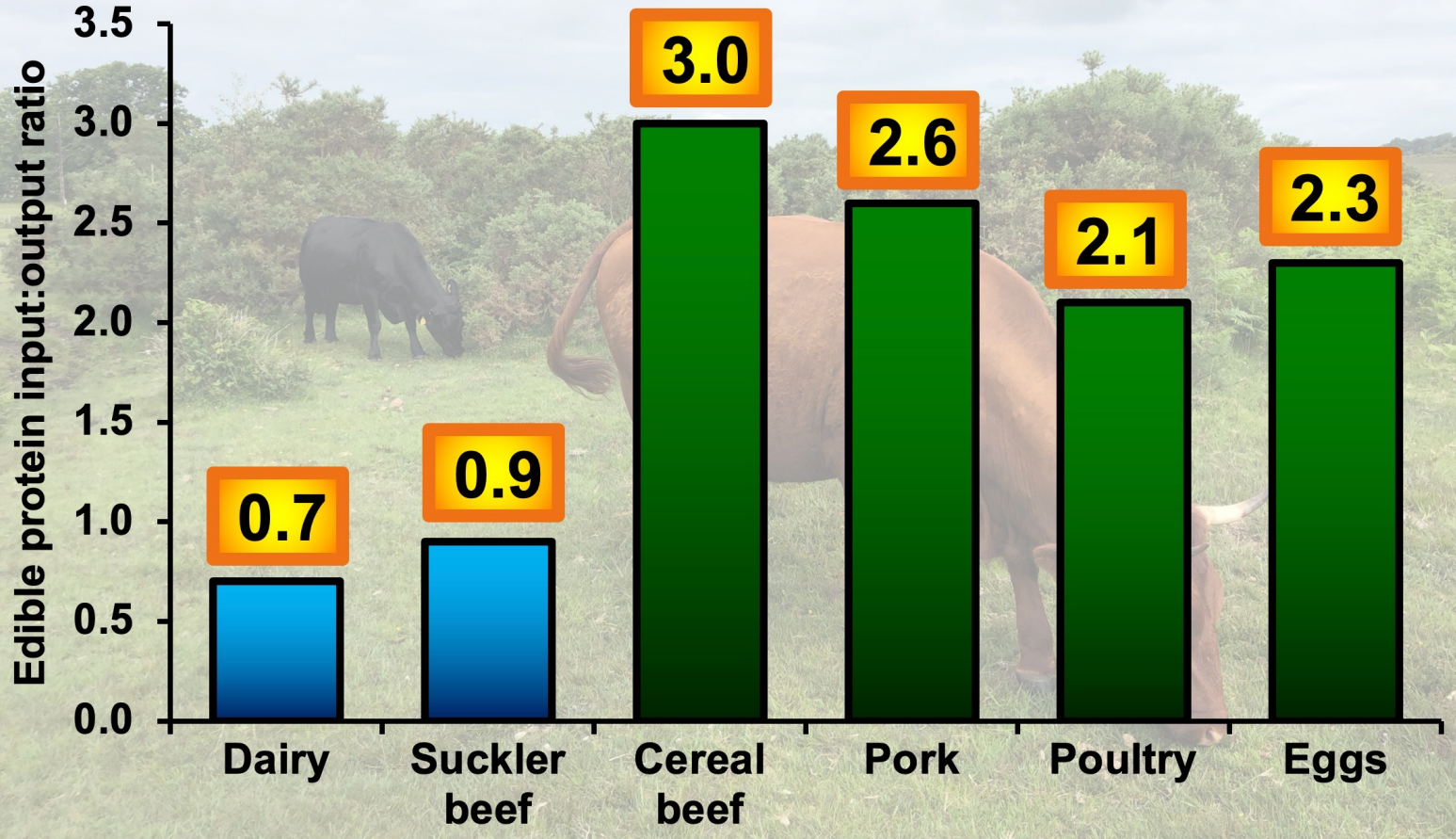
Grazing cattle systems produce more human-edible protein than they consume



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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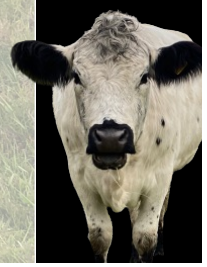

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B

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	76%
Carbon footprint (under GWP*)	81%
Water footprint	66%
Antibiotic footprint	88%
Community support rating	95%

Farm webcam and sustainability assessment data

*compared to ideal protein

Produced on certified culturally appropriate farmsteads

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

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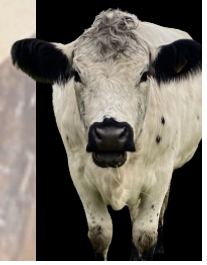

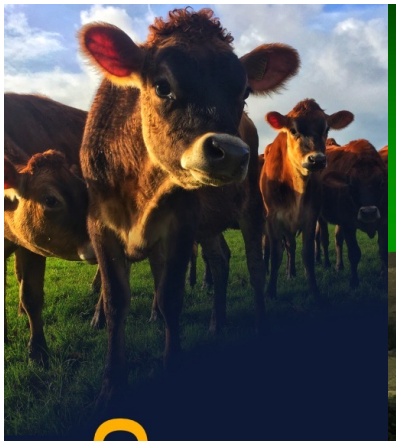

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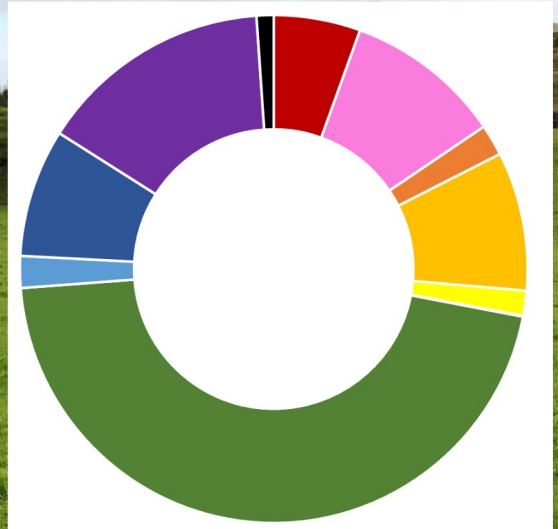
Standard footprinting tool urgently needed across the industry



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

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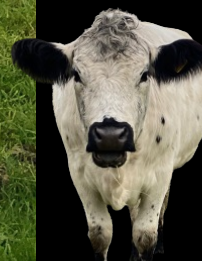

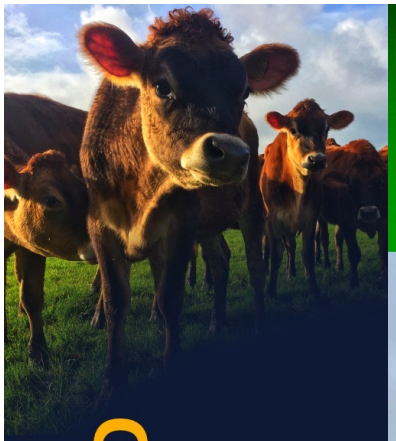

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Peer-to-peer learning, discussion groups and farmer incentives aid behavioural change

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

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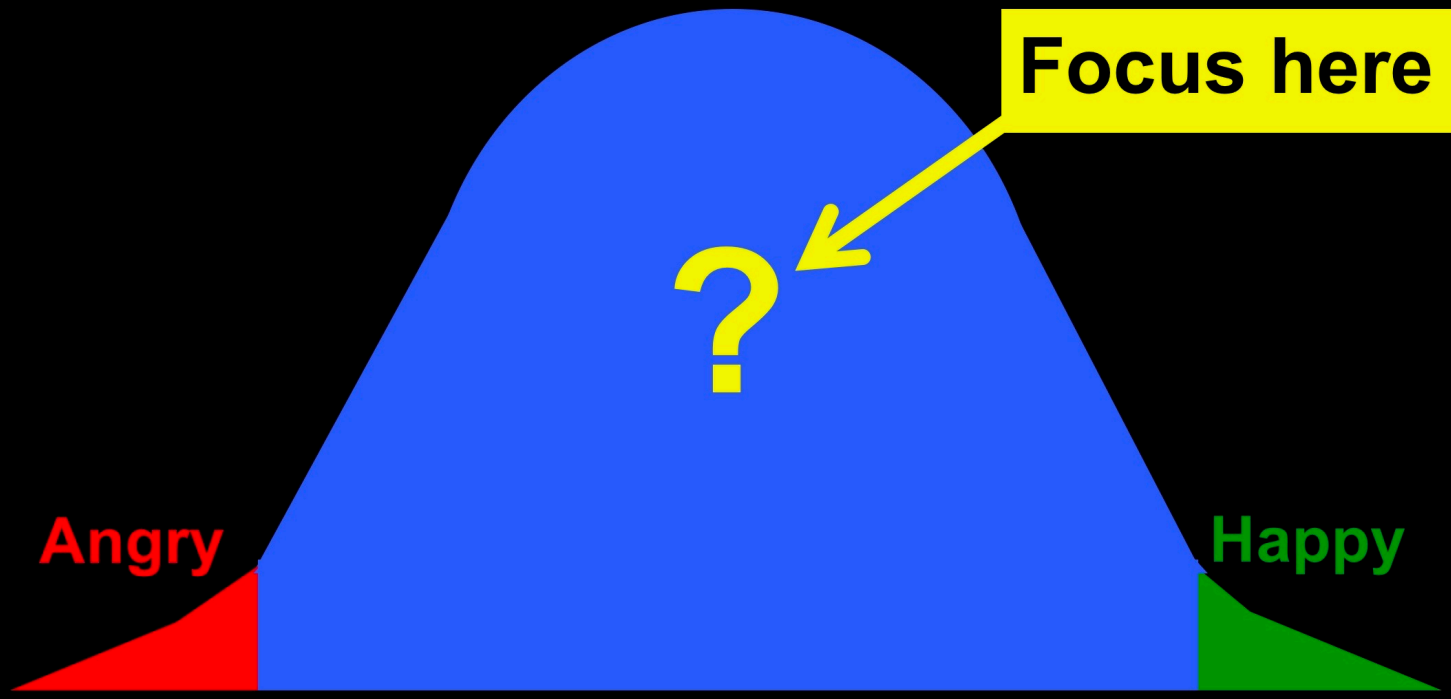
We need to communicate with consumers who don't yet have fixed opinions of agriculture



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

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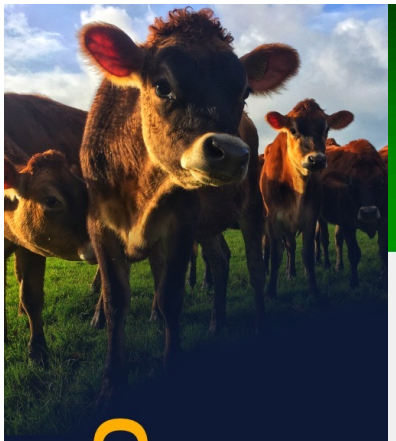

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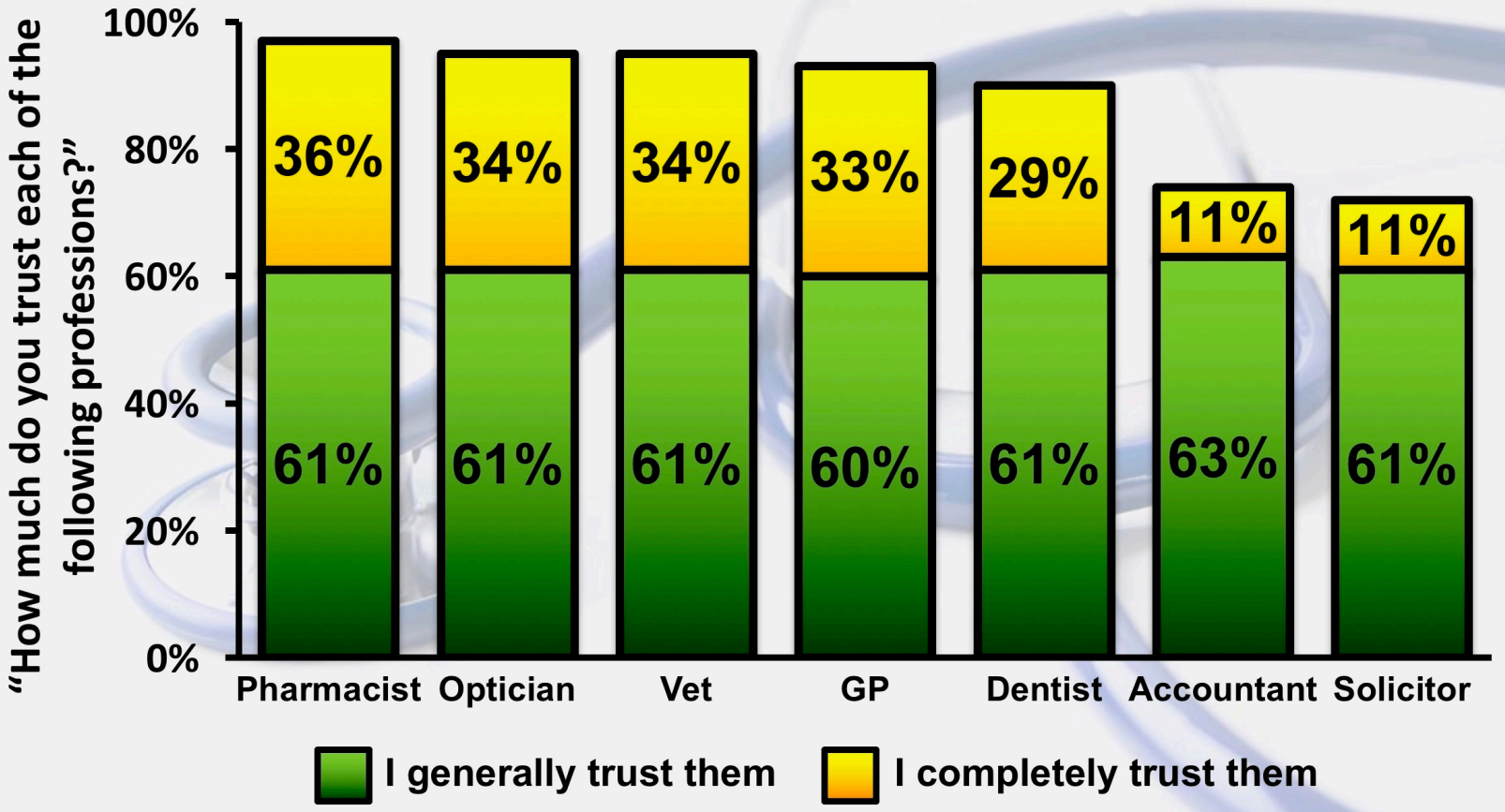
Consumer trust in the veterinary profession is extremely high



Source: Created by Dr. Jude L. Capper, 2017. Data from: Vet Futures (2015) https://www.vetfutures.org.uk/download/surveys-filebase/Public_trust_in_the_professions.pdf

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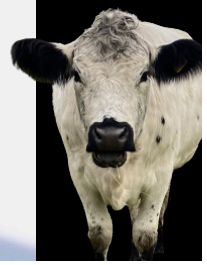

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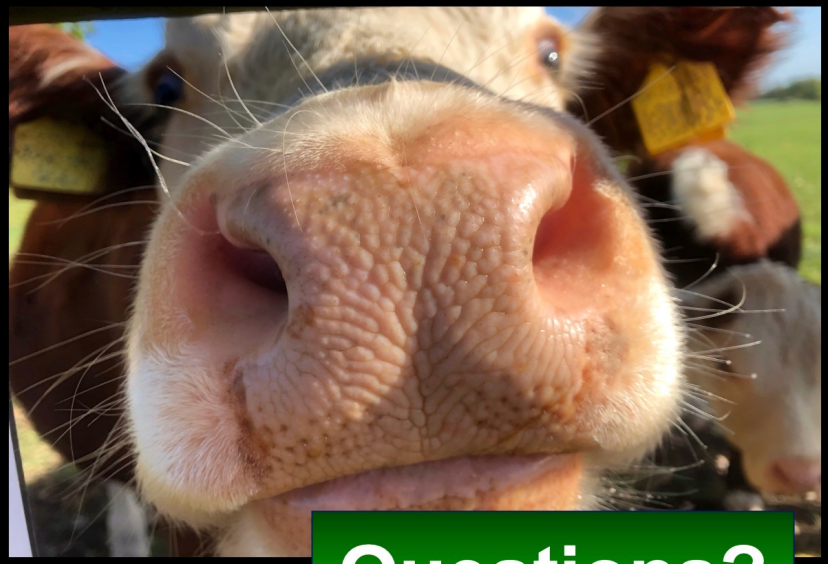
Thank you!

jude@livestocksustainability.com

http://bovidiva.com/presentationlinks



Questions?

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Source: Created by Dr. Jude L. Capper, 2022. Cartoon from: http://snipurl.com/methanecartoon