EAUC-Scotland Conference

The Elephants in the Room

Tuesday 26 November 2019

The Lighthouse, Glasgow

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The Alliance for Sustainability Leadership in Education

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Sustainable Food

Sustainable Food

Prof Helen Harwatt, Research Fellow, Harvard University

Alexandra Hepple, Sustainability Officer, King's College London

Dr Amy Munro-Faure, Living Laboratory for Sustainability Coordinator, University of Cambridge

Sustainable Food

Prof Helen Harwatt

Research Fellow

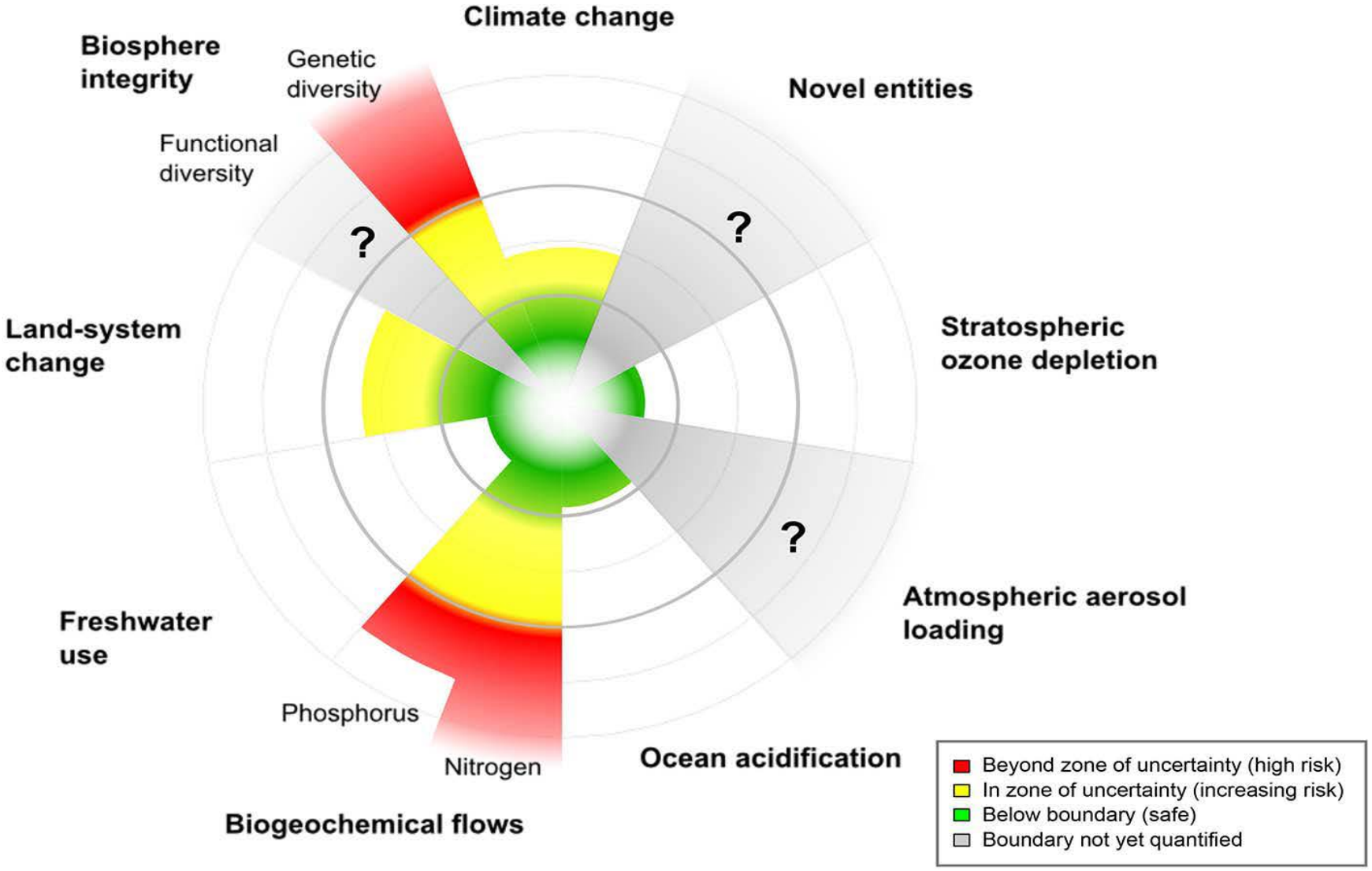
Harvard University

The Role Of Food Systems In Creating A Sustainable Future

Dr Helen Harwatt
Animal Law & Policy Program
Harvard Law School

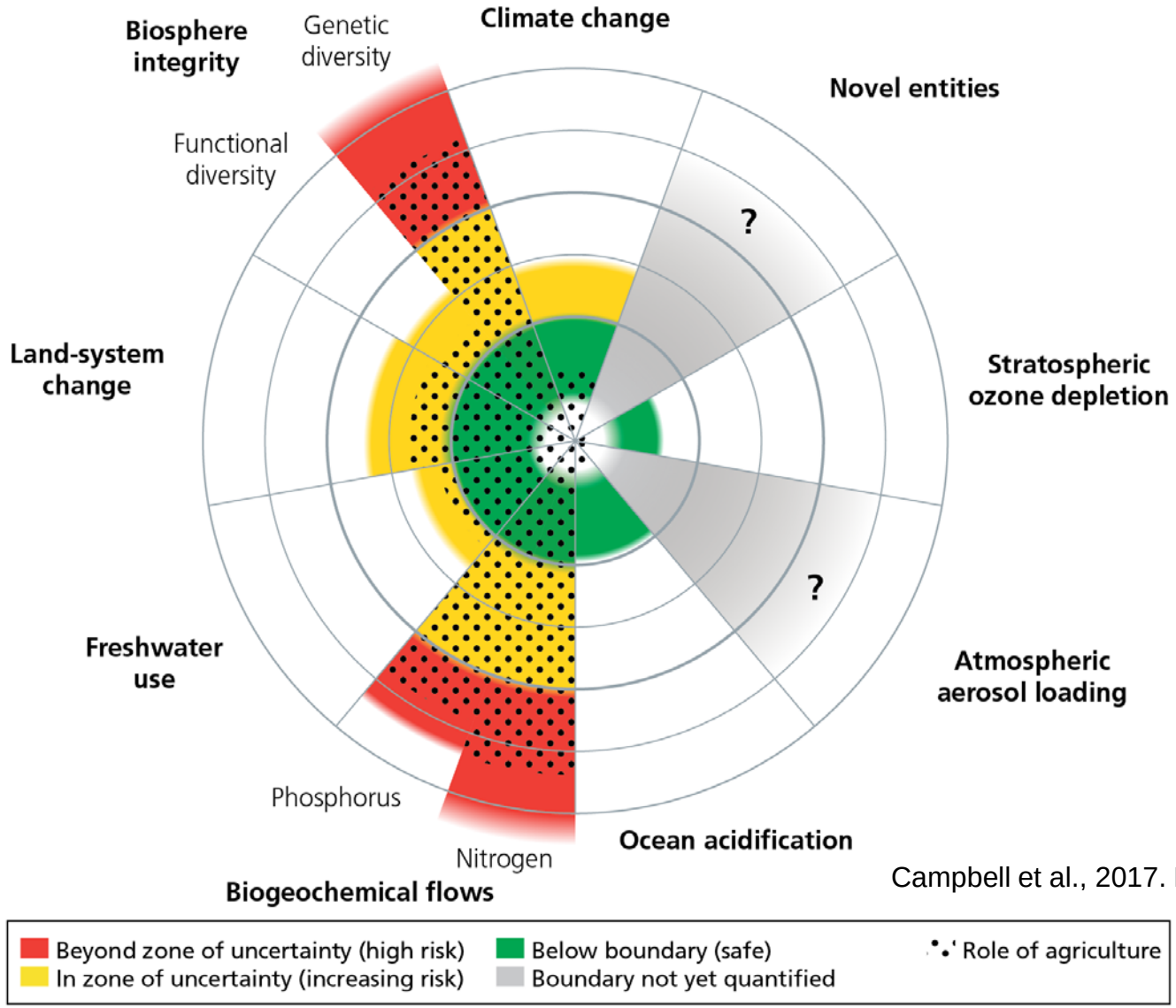
We are exceeding Earth's biophysical capacity…

Safe operating space for a number of key components has been exceeded…



Steffen et al., 2015. Science.

Food systems play a major role…



Campbell et al., 2017. Ecology & Society.

Environmental impacts: 4 main areas of concern

Climate Change

Paris Agreement requires global mean temperature rise to stay *well below* 2°C above pre-industrial levels, ideally to no more than 1.5°C

Context:

- Global temperature is >1°C - already having negative impacts
- Impacts at 1.5°C > current but < 2°C
- Impacts greater if temperature overshoots 1.5°C then returns to 1.5°C
- Best option for adhering to precautionary principle & equity = 1.5°C with no overshoot.
  - Requires:
    - 45% reduction in CO_2 by 2030
    - Net zero by 2050

Raftery et al., 2017. Nature Climate Change; IPCC 2014. Brown and Caldeira, 2017. Nature. UNEP, 2017. Emissions Gap Report; Rahmstorf and Levermann., 2017; IPCC, 2018.

Where things stand:

- Current pledges to the Paris Agreement >3°C
- Chances of meeting Paris goals could be depleted by 2030

The coming decade is CRUCIAL

Raftery et al., 2017. Nature Climate Change; IPCC 2014. Brown and Caldeira, 2017. Nature. UNEP, 2017. Emissions Gap Report; Rahmstorf and Levermann., 2017.

.

What's needed:

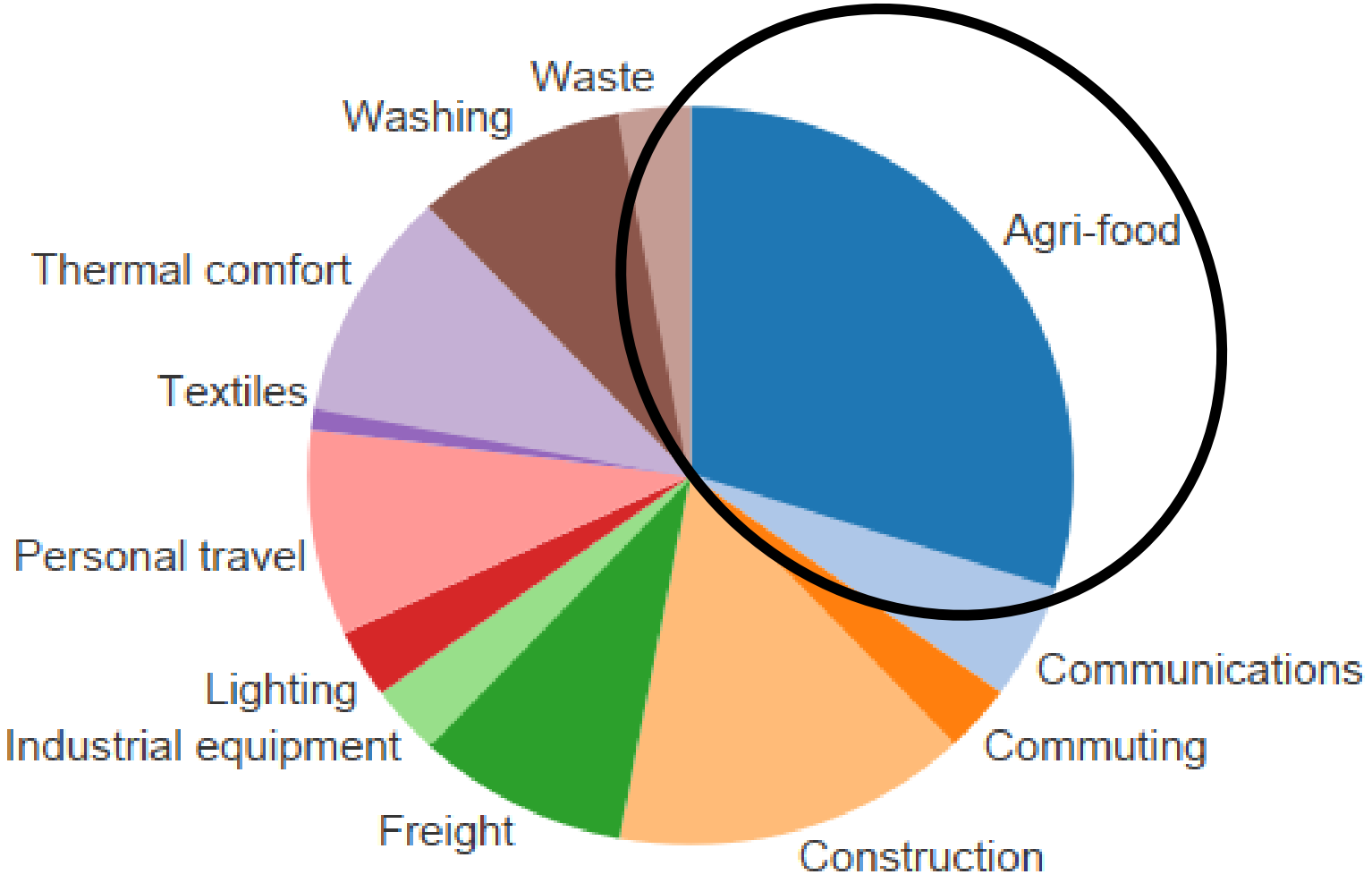
- Global emissions to **peak** asap
- **Strong** and **rapid** reductions before **2030**
- Enhanced **longer term** commitments

UNEP, 2017. Emissions Gap Report.

Unprecedented change is needed to meet ambitious climate change targets

- Net zero greenhouse gas emissions this century – by 2050 for 1.5°C goal.
- MAJOR change from ALL sectors is required.

Global Greenhouse Gas Emissions



Bajzelji et al 2014. NCC

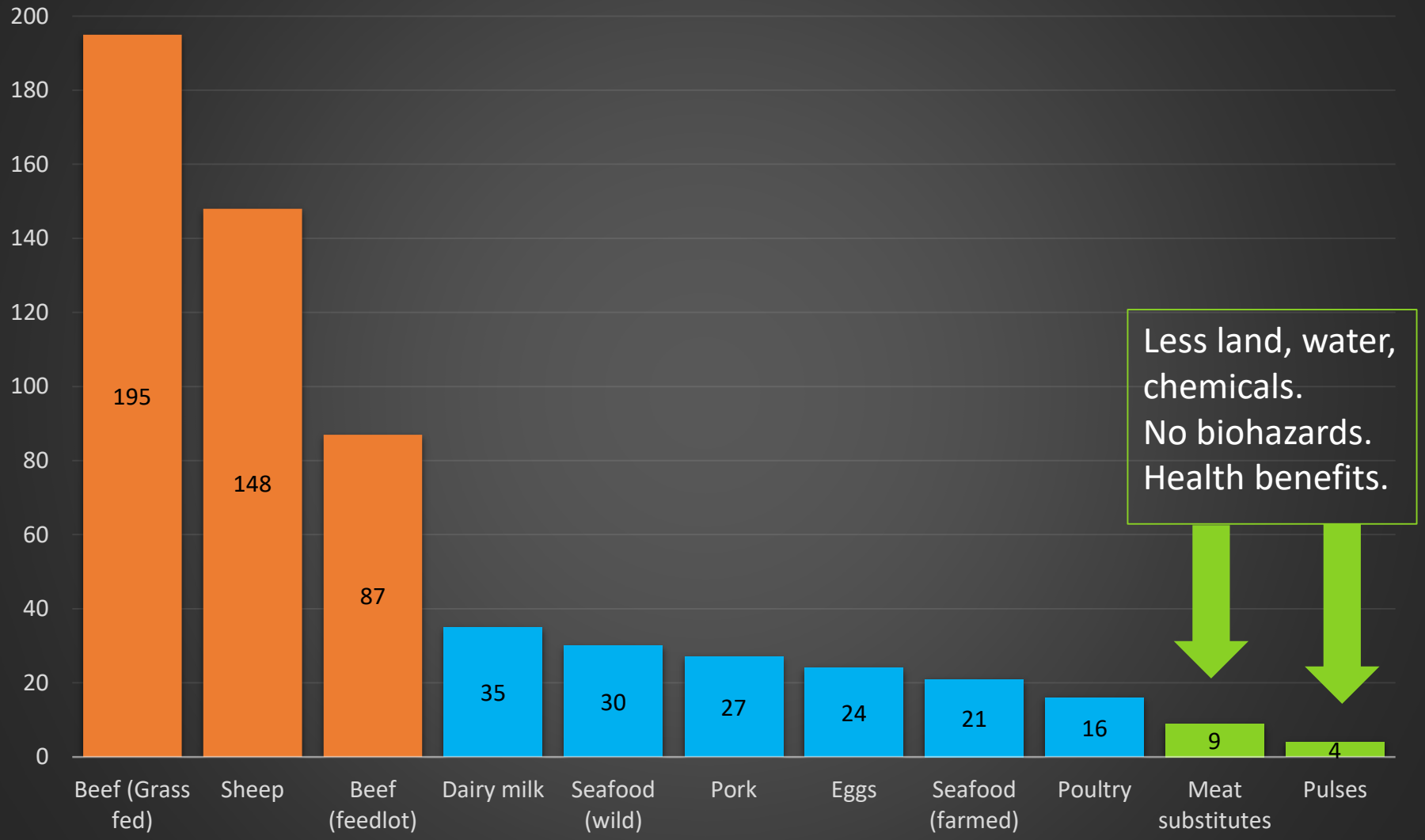
Livestock contributes:

- 16.5% of global greenhouse gas emissions (CO_2e)
  - 53% nitrous oxide
  - 44% methane
    - **expected to increase by 60% by 2030**

Smith et al., IPCC, 2007; UN FAO 2018; Sims et al., 2014. Reisinger and Clark, 2017. Global Change Biology.

Average greenhouse gases emitted for high protein foods

(kg CO_2e per 1kg protein)



Nijdam et. al. 2012

Good news for tofu lovers

Kg of CO_2e/kg product:

Tofu = 1 (3 miles)
Lamb = 39 (131 miles)
Beef = 27 (90 miles)
Cheese = 14 (47 miles)
Pork = 12 (40 miles)
Farmed salmon = 12 (40 miles)
Chicken = 7 (23 miles)
Eggs = 5 (17 miles)

Mejia and Harwatt et al., 2017. Journal of Hunger and Environmental Nutrition. Hamerschlag et al, 2011.

Good news for meat analog lovers

2.2 kg CO_2e/kg product (7 miles)

Mejia and Harwatt et al, 2019. Journal of Hunger and Environmental Nutrition.

What are the impacts of animal to plant-sourced food shifts on climate change targets?

Food system hotspot: beef

- **41%** of **livestock sector** emissions.
- Contributes **6% of global CO_2e** emissions

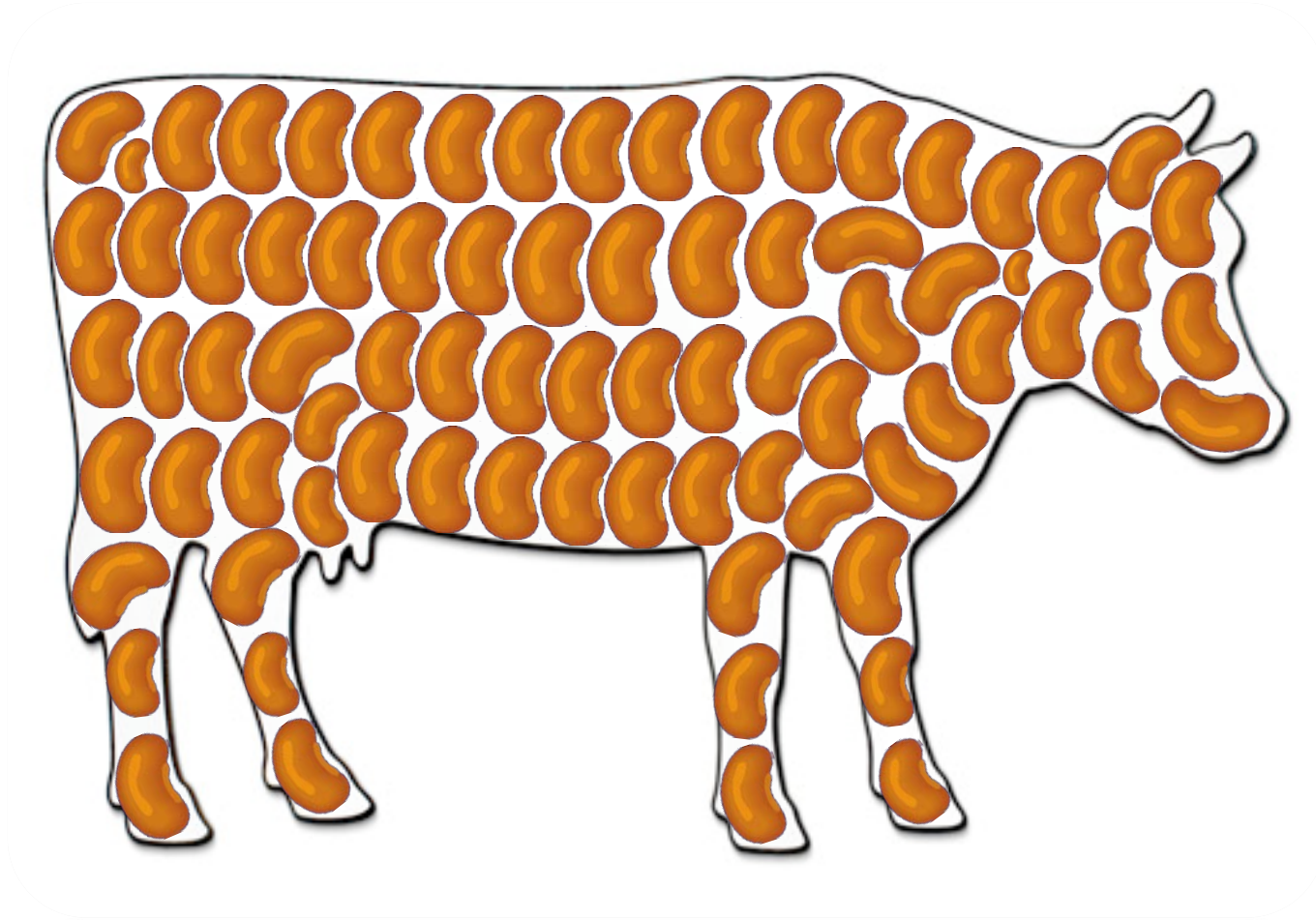
Gerber et al., 2013. FAO; IPCC, 2014.

Climatic Change
DOI 10.1007/s10584-017-1969-1

Substituting beans for beef as a contribution toward US climate change targets

Helen Harwatt[1] · **Joan Sabaté**[1] · **Gidon Eshel**[2,3] · **Sam Soret**[1] · **William Ripple**[4]

Received: 16 February 2016 /Accepted: 10 April 2017




75%
U.S. 2020
emissions target

Inaction on Agricultural Emissions

- Livestock alone could use 49% of 1.5°C and 37% of 2°C budget by 2030.
- GHG reductions from technology insufficient- reducing production and consumption of animal products is unavoidable.
- Would require other sectors to increase mitigation efforts.

Harwatt 2018, *Climate Policy*. Gerber et al., 2013. FAO; Herrero et al., 2016. Nature Climate Change. Springmann et al 2018, PNAS. Hedenus et al 2014. Climatic Change.

Wildlife Loss

Wildlife loss

- 6th mass extinction – global rate of extinction at least 10s to 100s times higher than averaged over past 10 million years.
- ~1 million species already face extinction, many within decades.
- Food production is a leading cause of biodiversity loss.
- 30% of global biodiversity loss is linked to livestock production.

Wiens, 2016. PLOS Biology. Thomas et al., 2004, Nature. Hallmann et al, 2017, PLOS ONE. Ripple et al., 2017. Bioscience. Tilman et al., 2017. Nature. Westhoek et al., 2011. PBL. IPBES 2019.

Received: 22 August 2018 | Revised: 27 December 2018 | Accepted: 1 January 2019

DOI: 10.1111/conl.12627

LETTER

WILEY Conservation Letters
A journal of the Society for Conservation Biology
Open Access

Are we eating the world's megafauna to extinction?

William J. Ripple[1] | Christopher Wolf[1] | Thomas M. Newsome[1,2] | Matthew G. Betts[1] |
Gerardo Ceballos[3] | Franck Courchamp[4] | Matt W. Hayward[5] | Blaire Van Valkenburgh[6] |
Arian D. Wallach[7] | Boris Worm[8]

[1]Department of Forest Ecosystems and Society, Forest Biodiversity Research Network, Oregon State University, Corvallis, Oregon

[2]School of Life and Environmental Science, The University of Sydney, Sydney, New South Wales, Australia

[3]Instituto de Ecología, Universidad Nacional

Abstract

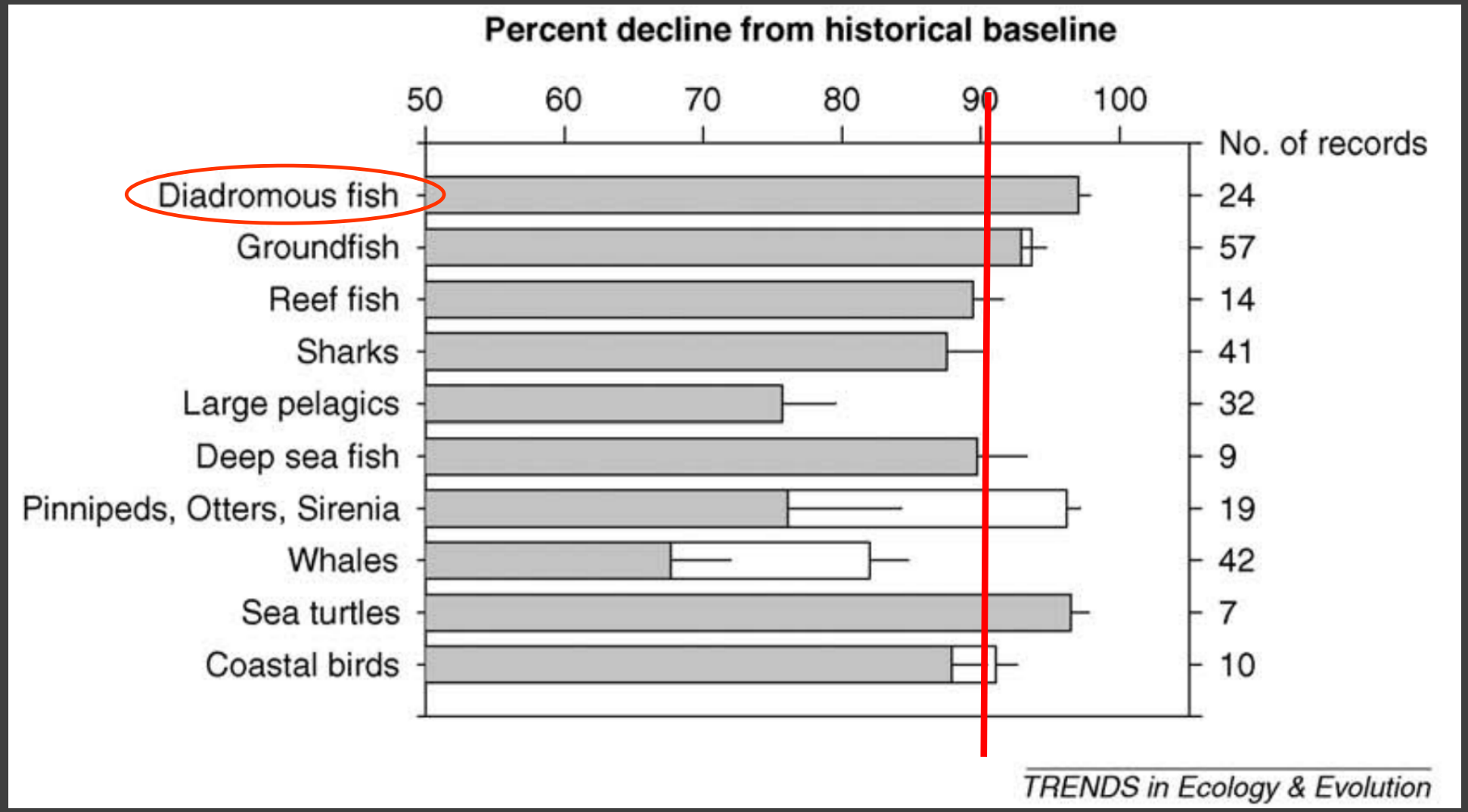
Many of the world's vertebrates have experienced large population and geographic range declines due to anthropogenic threats that put them at risk of extinction. The largest vertebrates, defined as megafauna, are especially vulnerable. We analyzed how human activities are impacting the conservation status of megafauna within six classes: mammals, ray-finned fish, cartilaginous fish, amphibians, birds, and rep-

Are we eating the world's largest species to extinction?

- Identified 362 megafauna species.
- Six classes: mammals, ray-finned fish, cartilaginous fish, amphibians, birds, and reptiles.
- 70% of megafauna species with sufficient information are decreasing.
- 59% are threatened with extinction.
- Human consumption of meat or body parts is the largest individual threat to each of the classes examined.

Ripple et al 2018. Conservation Letters.

Marine biodiversity loss is also apparent



Lotze and Worm, 2009

Global collapse of fishing is expected by 2048

Worm et al., 2006. Science.

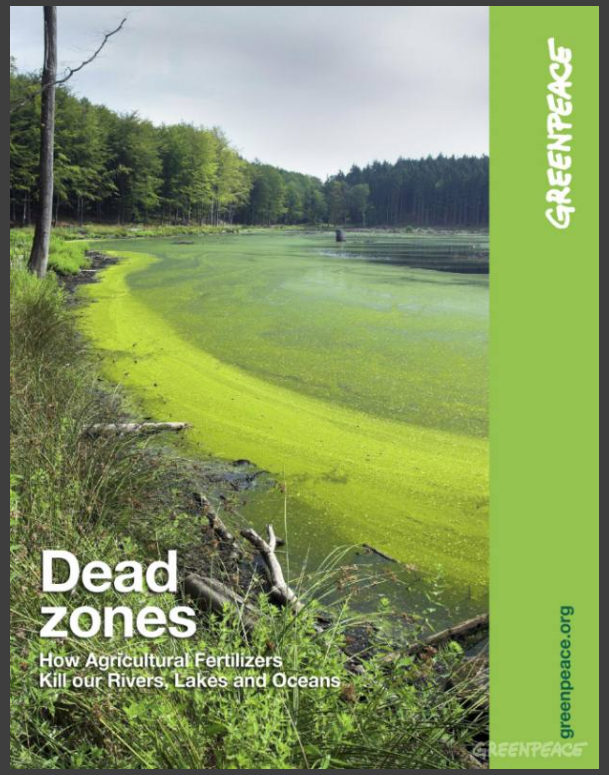
Nitrogen and Phosphorus pollution

Nitrogen and Phosphorus

- Food production – 80% phosphorus and 71% of nitrogen pollution.
- 72% of phosphorus and 63% nitrogen is linked to livestock production.
- Excessive amounts disrupts natural biochemical flows.
- Range of adverse environmental impacts…

Metson et al 2012. Environmental Research Letters; Pelletier & Tyedmers, 2010. PNAS.

Excess nutrients cause algal blooms which reduce light and oxygen availability for all other fauna and flora



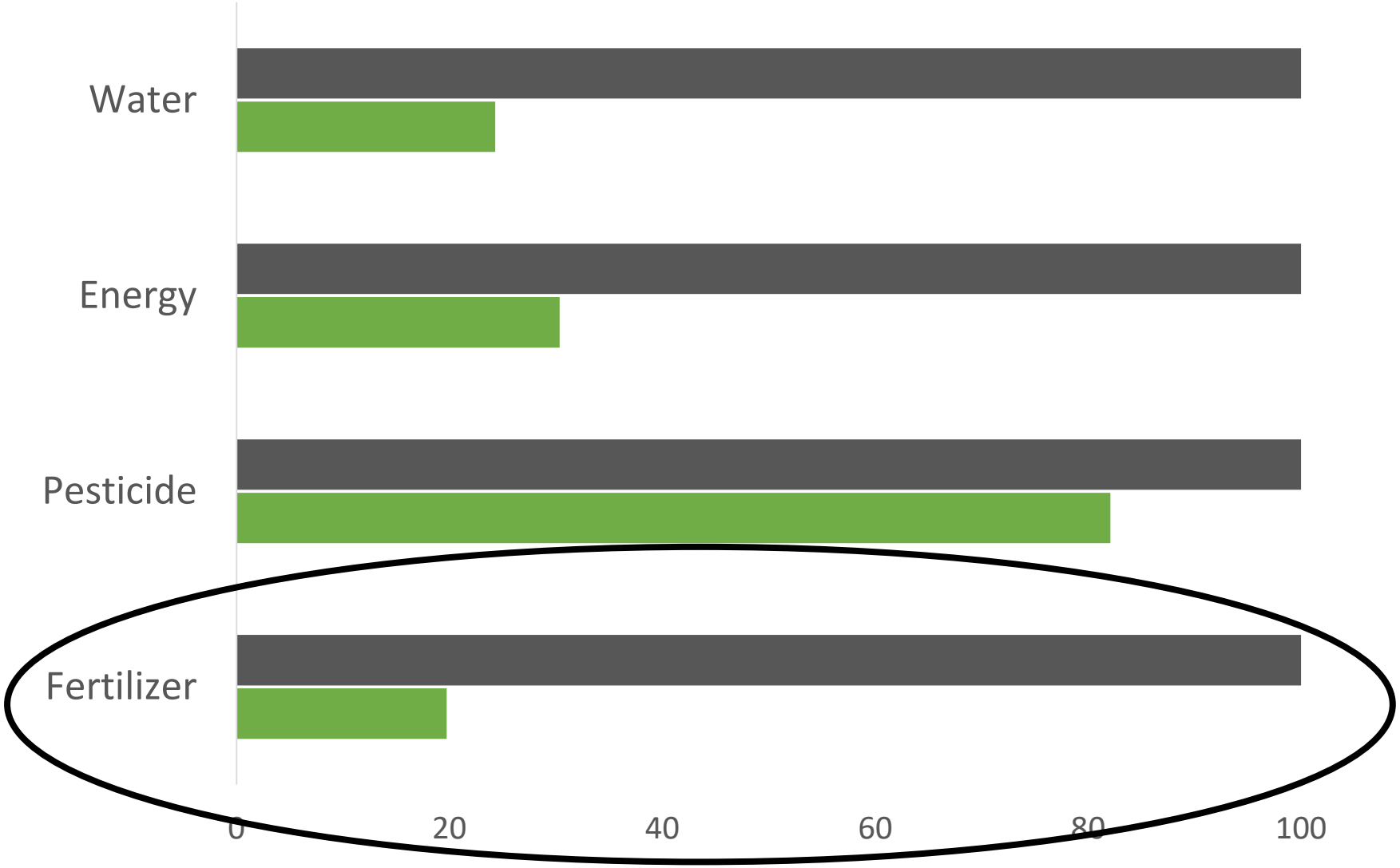
Excess nutrients also cause oceanic ‘dead zones’

Public Health Nutrition

Comparing the water, energy, pesticide and fertilizer usage for the production of foods consumed by different dietary types in California

Harold J Marlow[1,†], Helen Harwatt[1,*], Samuel Soret[2] and Joan Sabaté[1]
[1]Department of Nutrition, Loma Linda University, 24951 North Circle Drive, Loma Linda, CA 92350, USA:
[2]Department of Environmental Health and Geoinformatics Sciences, Loma Linda University, Loma Linda, CA, USA

Resources Used: LAP Vs HAP Diets



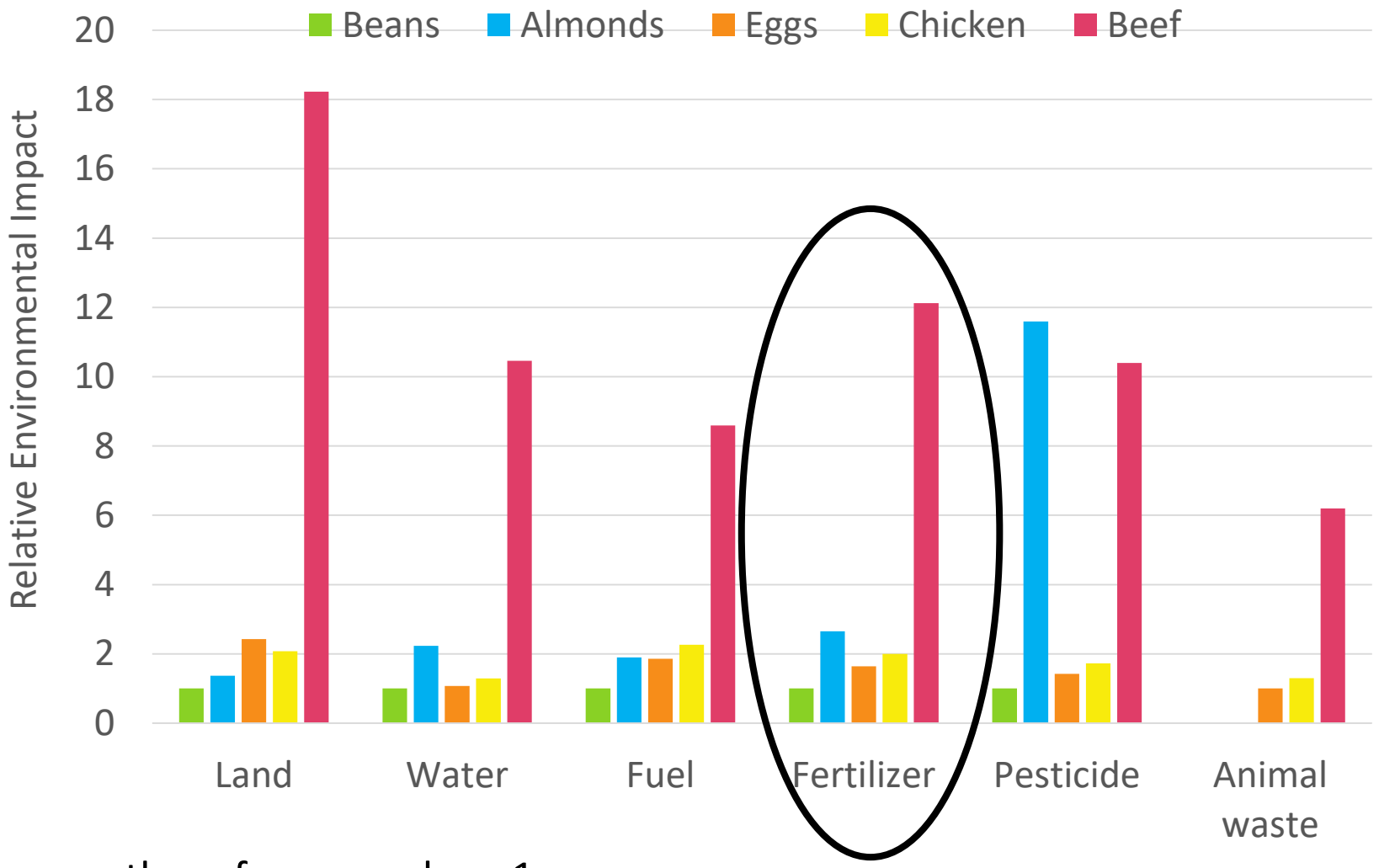
Public Health Nutrition

The environmental cost of protein food choices

Joan Sabaté[1,*], Kitti Sranacharoenpong[1], Helen Harwatt[1], Michelle Wien[2] and Samuel Soret[3]

[1]Department of Nutrition, Loma Linda University, Nichol Hall 1102, Loma Linda, CA 92350, USA: [2]Human Nutrition and Food Science Department, School of Agriculture, California State Polytechnic University, Pomona, CA, USA: [3]Department of Occupational and Environmental Health, Loma Linda University, Loma Linda, CA, USA

Relative Environmental Impacts To Produce Protein From Plant And Animal Sources*



*Beans as the reference value =1

Sabate *et al.* Public Health Nutr 2014.

Land Use Change

Food production is a major contributor to deforestation

- Agriculture - direct driver for around 80% of deforestation worldwide
- Animal agriculture is responsible for 65% of land use change since 1960
- Animal agriculture is linked to ~80% of deforestation in the Brazilian Amazon
- Forests are a natural carbon sink

Machovina and Feeley., 2014. Trends in ecology & evolution Wageningen University and Research Centre; Nepstad et al., 2014; FAO, 2015.

Not just developing nations…

- Queensland (northern Australia) deforestation hotspot.
- Conversion of forests to cattle pastures over the past 50 years.

Lepers et al., 2005; McAlpine et al., 2002; 2009; Seabrook et al., Woinarski et al., 2007 2006.

Key consideration regarding land use and climate change mitigation:

- **Deep and rapid emissions reductions needed**
- **~730 Gt CO_2 removal for 1.5°C**
  - requires large areas of land
- **Best option available at scale = reforestation/native vegetation regeneration**

IPCC, 2018

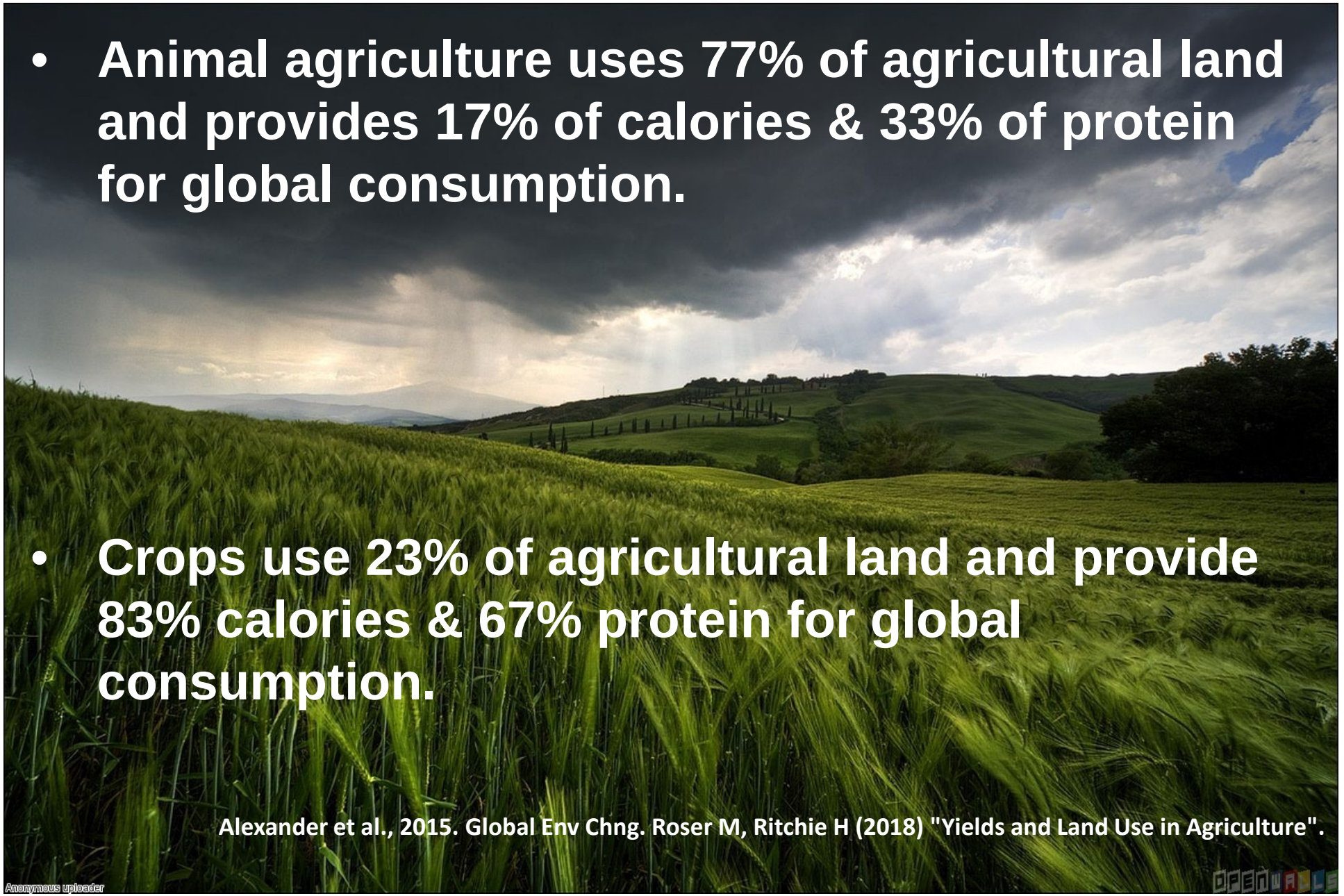


Photo credit: Open Walls

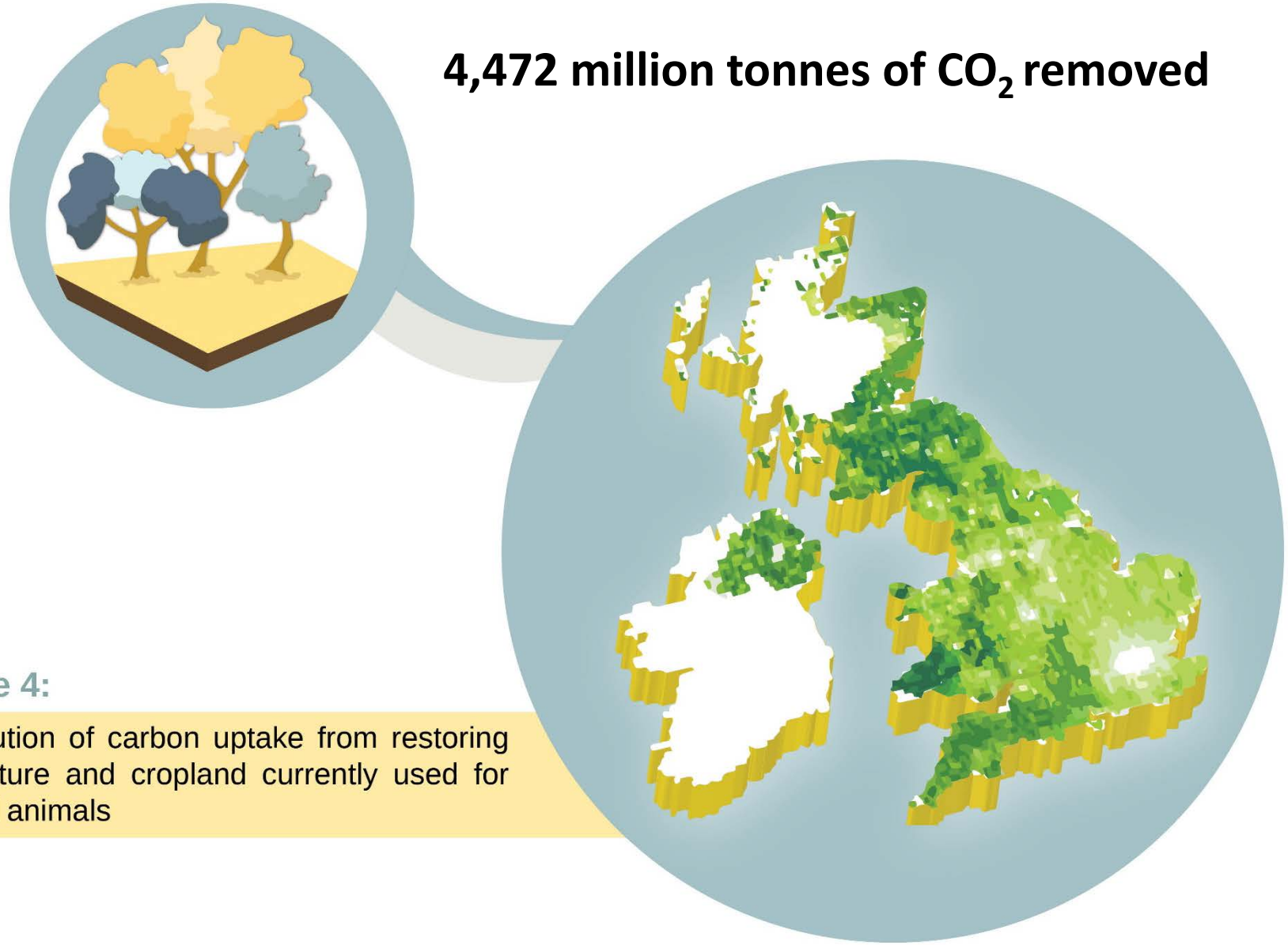
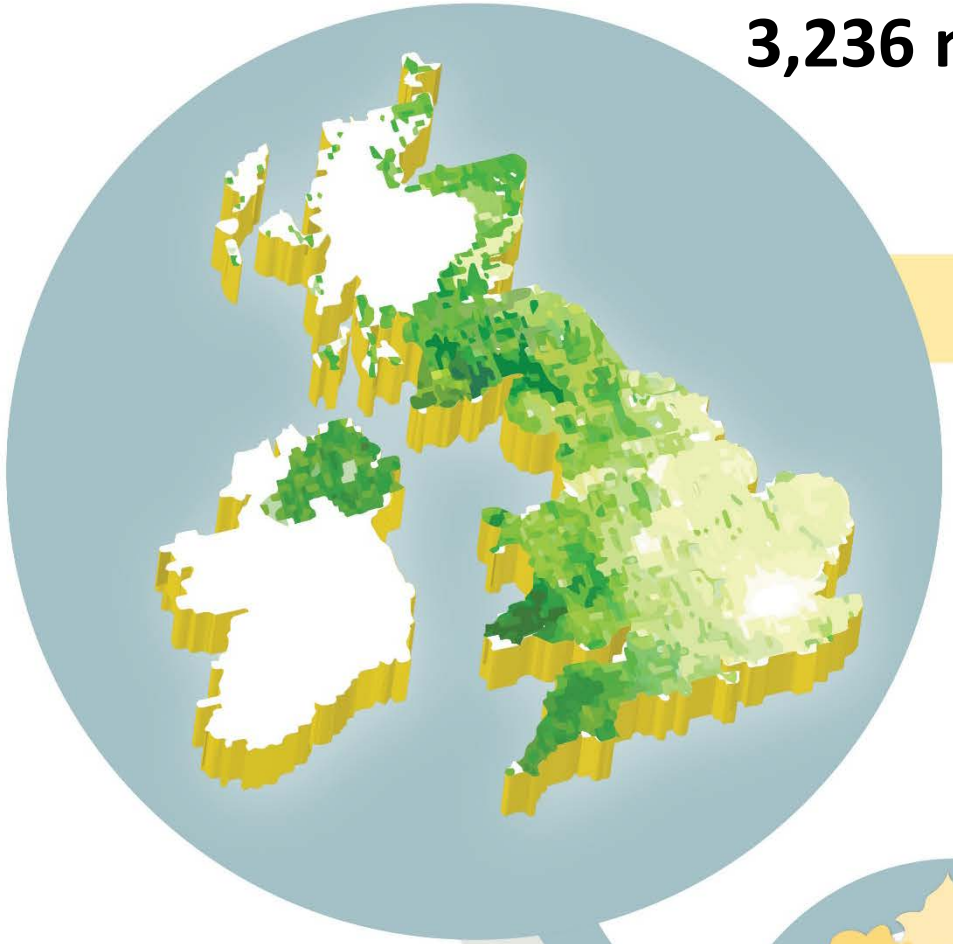


Figure 4:

Distribution of carbon uptake from restoring all pasture and cropland currently used for farmed animals

3,236 million tonnes of CO_2 removed



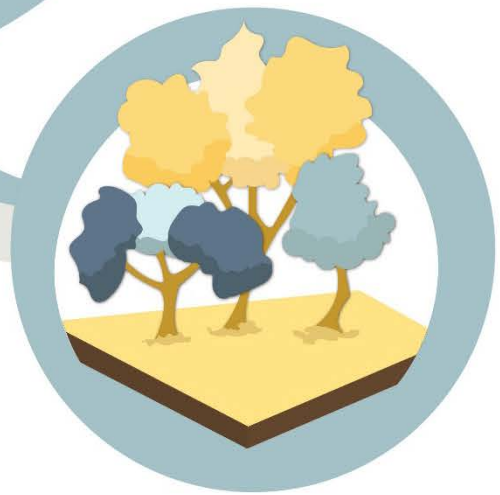
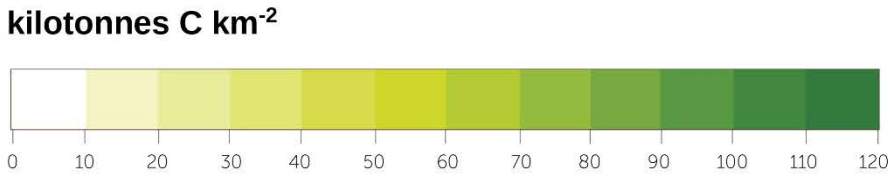


Figure 5:

Distribution of carbon uptake from restoring all UK pastureland currently used for farmed animals



Animal sourced foods are inefficient to produce…

To produce **1 calorie** of:

- **Beef** = **37** calories of plants
- **Pork** = **12** calories of plants
- **Chicken** = **9** calories of plants
- **Eggs or dairy** = **6** calories of plants

Eshel et al., 2014. PNAS. Cassidy et al. 2013. ERL.

>third of all crop calories are fed to animals – only 12% of those calories come back as human food.

Eshel et al., 2014. PNAS. Cassidy et al. 2013. ERL.

Much more efficient for humans to eat plants, not animals…

Could feed **twice** (350 million) as many people from same land by optimizing food production for human health and least resources.

Eshel et al., 2014. PNAS. Cassidy et al. 2013. ERL. Shepon et al., 2018. PNAS.

Scientists' Warning to Humanity: A Second Notice

"promoting dietary shifts towards mostly plant-based foods"

- Signed by >15k scientists from 184 Countries.

Ripple et al., 2017. BioScience.

How to bring food system shifts to the table?

CLIMATE POLICY
https://doi.org/10.1080/14693062.2018.1528965

Taylor & Francis
Taylor & Francis Group

OUTLOOK ARTICLE

Including animal to plant protein shifts in climate change mitigation policy: a proposed three-step strategy

Helen Harwatt

Farmed Animal Law and Policy Fellow, Animal Law & Policy Program, Harvard Law School, Harvard University, Cambridge, MA, USA

ABSTRACT

Strong and rapid greenhouse gas (GHG) emission reductions, far beyond those currently committed to, are required to meet the goals of the Paris Agreement. This allows no sector to maintain business as usual practices, while application of the precautionary principle requires avoiding a reliance on negative emission technologies. Animal to plant-sourced protein shifts offer substantial potential for

ARTICLE HISTORY
Received 12 March 2018
Accepted 21 September 2018

KEYWORDS
Climate change mitigation;

How to approach animal to plant protein shifts

- Embed in sustainability, health, wellness and CSR strategies.
- 3-step strategy:
  1. ‘Peak livestock’ & reduction targets
  2. ‘Worst first’ approach
  3. ‘Best Available Food’ (e.g. ‘beans for beef’)
- Can be spearheaded by food service sector!

Harwatt, H. 2018. *Climate Policy.*

Global greenhouse gas emissions from the 5 most highly produced livestock products

Product	Emissions ($mt CO_2e$)	Proportion of global CO_2e emissions (%)
Beef (and veal)	3,048	5.9
Cow milk	1,846	3.6
Pig meat	721	1.4
Chicken meat	579	1.1
Buffalo milk	377	0.7

Harwatt, H. 2018. *Climate Policy.*

Potential tools for measuring, labelling and target setting

- TUCO Greenhouse Gas Calculator:
- https://www.tuco.ac.uk/ghgcalculator/index.html

- Forward Food Greenhouse Gas Assessment:
- https://forwardfooduk.org/resources/

CONCLUSIONS

CONCLUSIONS:

TO CREATE SUSTAINABLE FOOD SYSTEMS AND A SAFE PLANET FOR CURRENT AND FUTURE GENERATIONS:

ANIMALS → PLANTS

Consider the broad appeal

- **Environment – local and global**
- **Wildlife loss**
- **Health – personal and public**
- **Equity – intergenerational justice; food security, unequal spread of climate impacts; farm labour**
- **Animal rights**
- **Restoring natural habitats – growing nature**

Thanks for being here!

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Sustainable Food

Alexandra Hepple

Sustainability Officer

King’s College London

Sustainable Food - King's College London

Our commitment to Sustainable Catering

Alexandra Hepple – Sustainability Officer (Engagement)

Sustainable Food
Tuesday 26 November 2019

King's Food Awarded 2-Star 'Food Made Good' Rating


KING'S College LONDON
Roots Café
Championing plant-based, ethical catering

Serving less meat and better veg

Environmental impact of reducing beef use

In an academic year, by replacing beef with ethically sourced fish in our restaurant dishes, we will save approximately:

- 9,218kg of CO2
- 31.66 Acres of land use
- 2,581,250 litres of water

Figures based on average meal sales across all campus sites


Sourcing locally

Sourcing locally

Bermondsey Bees

We now source honey from hives that can be seen (with binoculars) from Guy's campus

Paul Rhodes Bakery, Greenwich

Award winning London bakery

Reducing waste

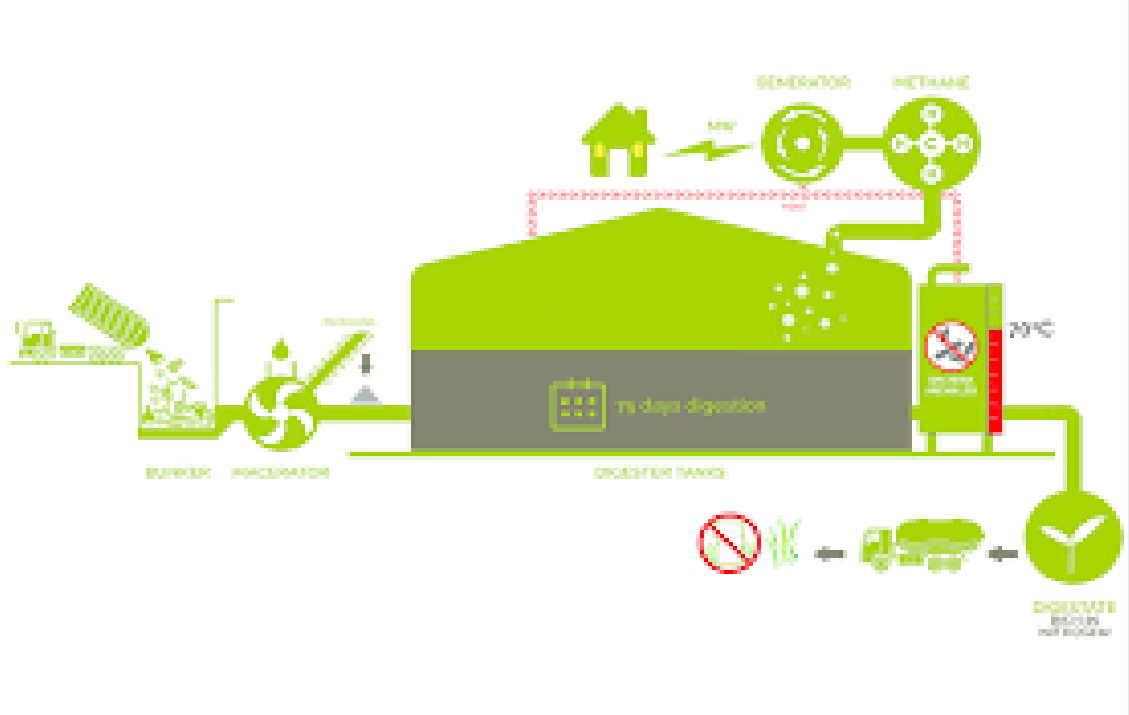
Disposable cup levy

Reducing waste and generating funds for sustainable initiatives

Food waste

Reducing, re-using and donating

Distributing food waste



Sustainable Food & Fairtrade Steering Group

Progress, planning, reporting

Thank you

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Sustainable Food

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University of Cambridge

UNIVERSITY OF CAMBRIDGE

THE CAMBRIDGE green CHALLENGE

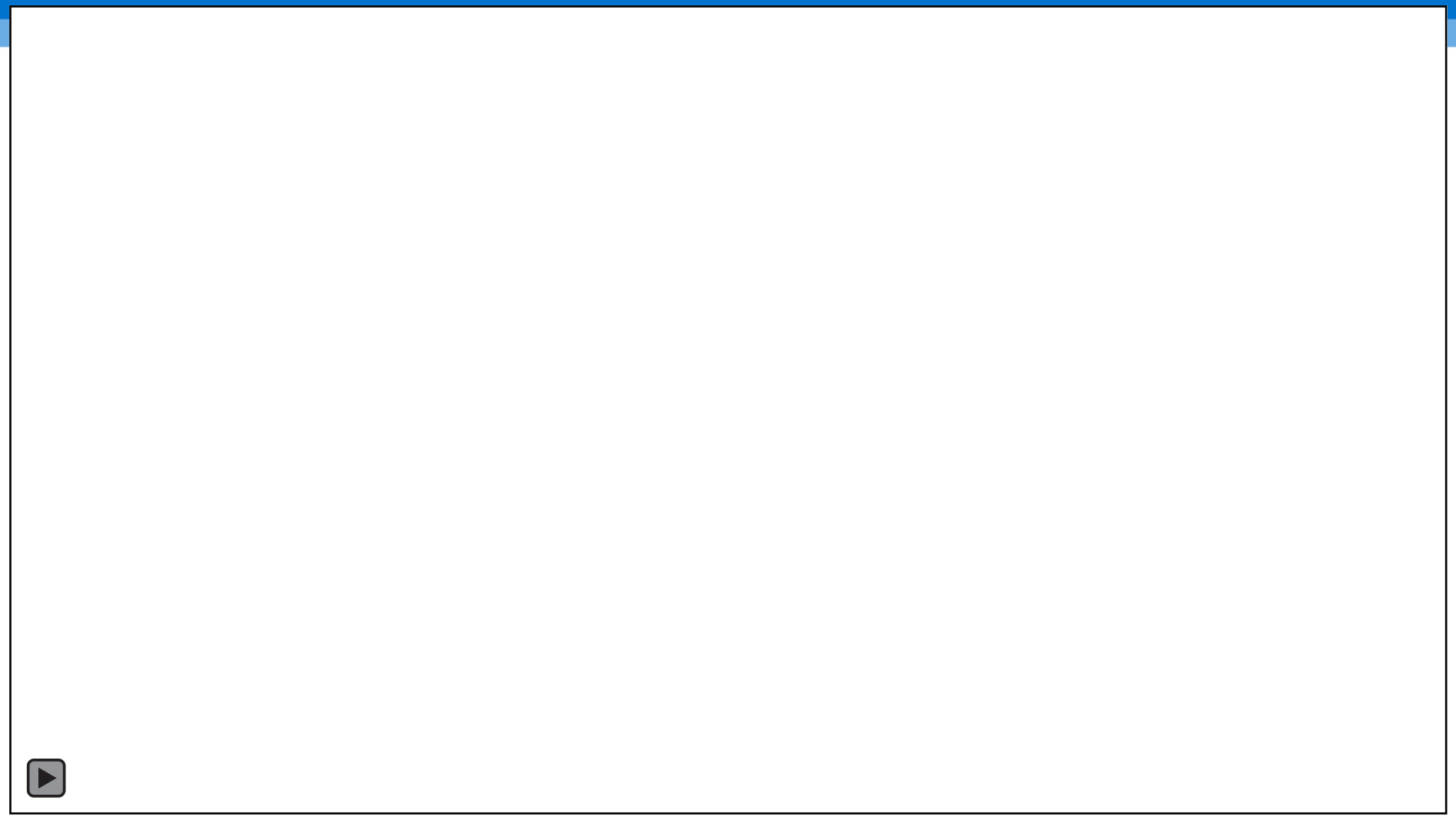
A Sustainable Food Journey

Dr Amy Munro-Faure – Living Laboratory for Sustainability Coordinator

Sustainable Food - Intro

- Why
- What we did
- How we did it
  - Operational Change
  - Behaviour Change
- How we measured it
- Impact

Sustainable Food - Why?



Sustainable Food - Why?

- Committed staff in the University Catering Service

Sustainable Food – Why? Partner with academics

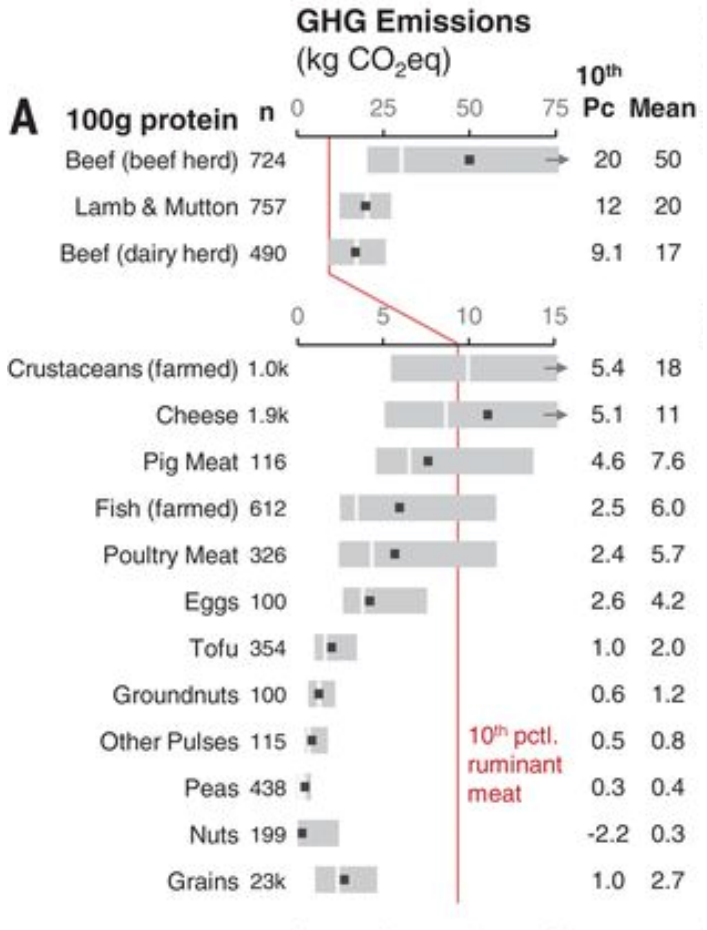
Theresa Marteau

Andrew Balmford

Emma Garnett

Chris Sandbrook

Sustainable Food – Why? Partner with academics

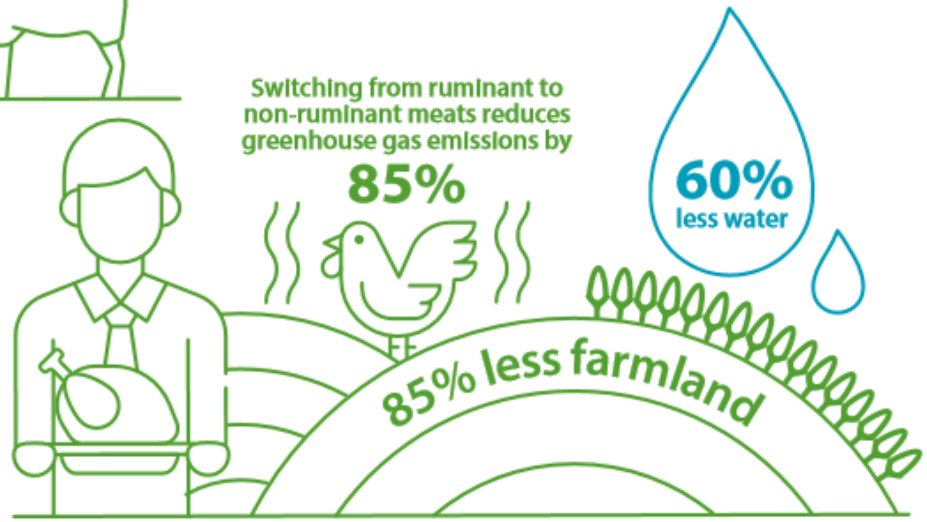


Poore & Nemecek, 2018, Science

Sustainable Food – Why?

- The **livestock sector accounts for 14% of global greenhouse gas emissions**[1].
- The production of ruminant meat (beef and lamb) demands more feed and water than other livestock as they have relatively inefficient "ruminant" stomachs. **Ruminant stomachs also produce methane during digestion, accounting for around 40% of livestock greenhouse gas emissions**. Methane has a stronger warming effect than carbon dioxide[1].

- Switching your diet to **non-ruminant meats results in emitting 85% less greenhouse gases, and using 60% less water and 85% less farmland**[2]. These figures increase to 95%, 85%, and 95% respectively when removing meat altogether[2].
- While dairy produces less emissions than meat production, it is still reliant on the rearing of an animal. Plant based proteins require less resources than dairy[3].



Sustainable Food – What we did

UNIVERSITY OF CAMBRIDGE

THE CAMBRIDGE *green* CHALLENGE

University of Cambridge
Sustainable Food Policy

Introduction

The University of Cambridge recognises its responsibility to provide healthy and sustainable food to our staff, students, and visitors. This Policy sets out the University's intentions to minimise the impact of its catering operations on the environment, and to promote sustainable practices and consumption. This Policy applies to the catering outlets in departments of the University run by the University Catering Service; it does not apply to the Colleges.

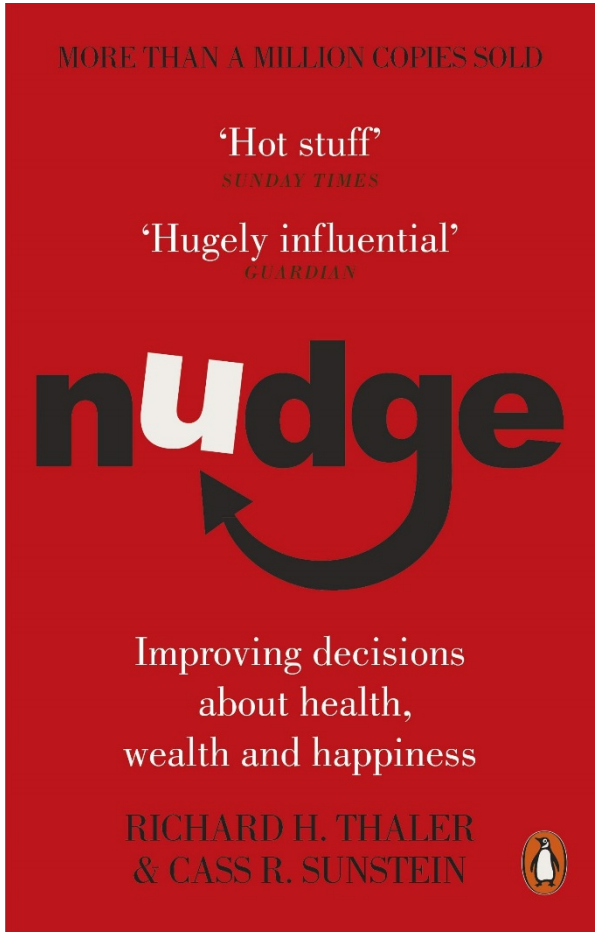
Policy aims

- Reduce the consumption of meat, in particular ruminant meat (e.g. beef and lamb).
- Promote the consumption of more vegetarian and vegan foods.
- Ensure that no fish from the Marine Conservation Society (MCS) 'Fish to Avoid' list is served in the University and seek Marine Stewardship Council certification.
- Reduce the amount of food that is wasted in the University.

Sustainable Food – How we did it? (Operational)

- Quietly at first.
- Staff were briefed on the environmental benefits of the Sustainable Food Policy.
- Chefs received training in plant-based cooking from the Humane society and a trip to Borough market to get inspiration for plant based dishes.
- Café managers were given training on marketing for sustainability rather than profit.

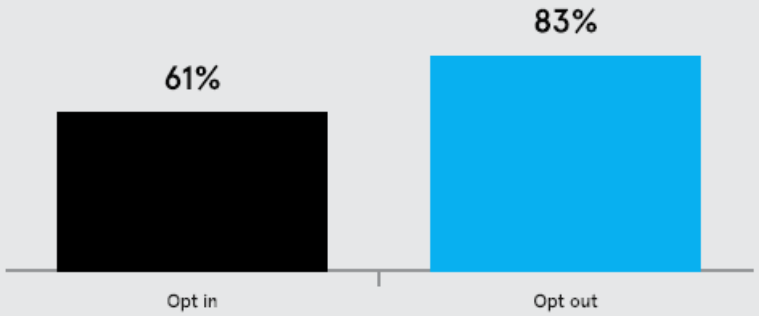
Sustainable Food – How we did it? (Behavioural)



Box 1.1: Pension defaults

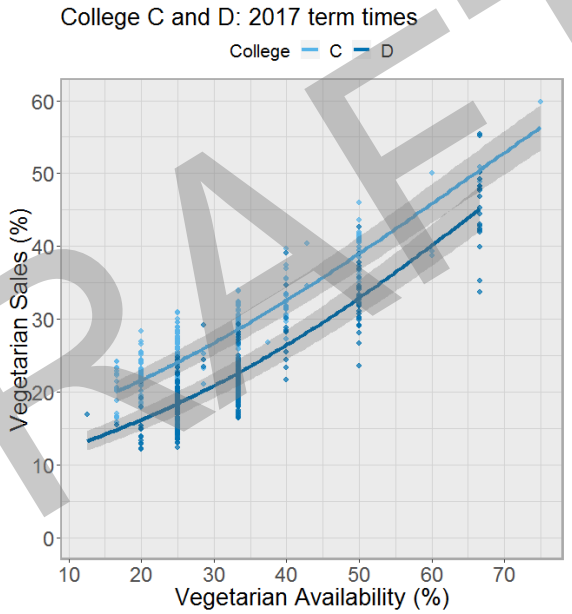
Studies in the US, Chile, Mexico, Denmark, and Sweden show that automatically enrolling individuals onto retirement plans and allowing them to opt out (rather than expecting them to opt in to existing systems) is a highly effective way of increasing pension savings – as well as being popular amongst employees.[4]

In October 2012 UK employers started automatically enrolling their workers into a pension. The scheme started with the largest UK employers (250 or more workers) and by 2018 will cover all employers. Initial results show that the overall participation rate rose from 61% to 83% and 400,000 more people now have a pension.[5]



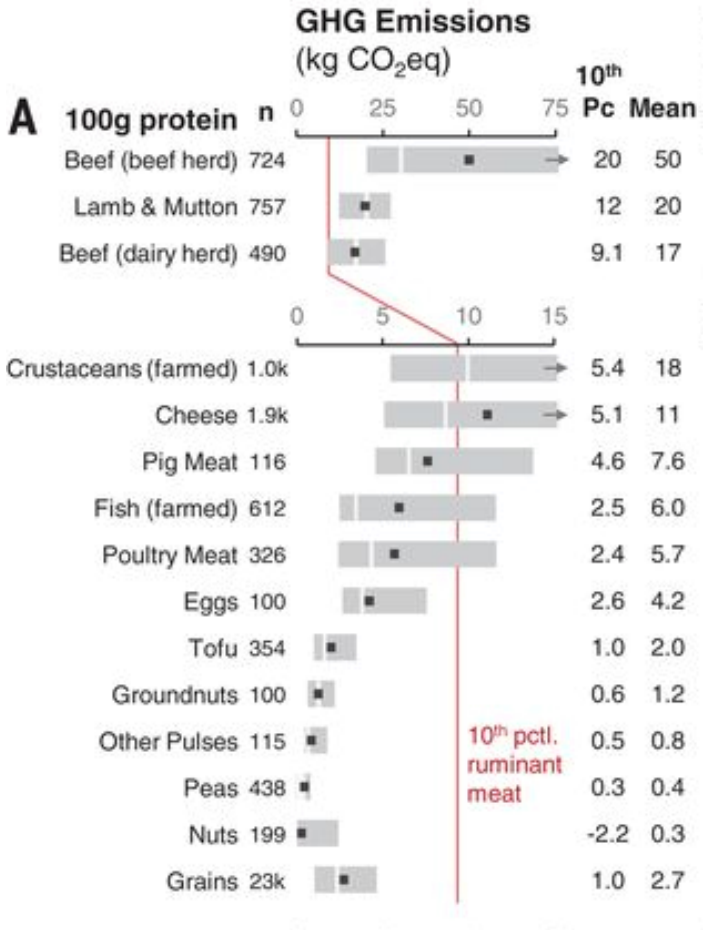
Sustainable Food – How we did it? (Behavioural)

- Increasing vegetarian availability significantly increases vegetarian sales
  - ($p<0.001$, pseudo-$R^2=0.31$)
- Doubling vegetarian availability:
  - From 25% to 50% vegetarian availability: **~15.0 percentage point** increase in vegetarian sales
  - From 33% to 67% availability: **~22.5 percentage point** increase



Emma Garnett, Andrew Balmford, Theresa Marteau and Chris Sandbrook, 2019, PNAS

Sustainable Food – How we measured it?



Poore & Nemecek, 2018, Science

Sustainable Food - Impact

1 Reducing the consumption of meat, in particular ruminant meat

Implementing the Sustainable Food Policy has reduced the UCS's emissions by 500 tonnes of carbon dioxide each year (Figure 3). That's equivalent to driving 1.2 million miles, or around the equator over 94 times!

Carbon emissions were reduced by 10.5% between 2015 and 2018, despite an increase in volume of food purchased. When standardised, there was a 33% reduction in carbon emissions per kilogram of food purchased, and a 28% reduction in land use per kilogram of food purchased (Table 1).

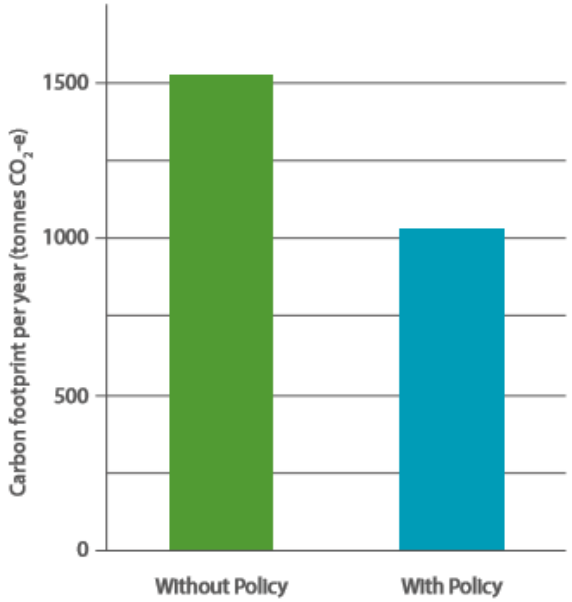


Figure 3. Projections of carbon footprint per year shown in tonnes comparing with and without the policy implementation.

	March-May 2015	March-May 2018	% Reduction
Overall Carbon Footprint of Food (tonnes)	287	257	10.5%
Overall Land Use of food (m per year)	434,102	414,107	5%
Kg CO_2 per kg food purchased	4.78	3.22	33%
Land Use per kg food purchased	7.22	5.18	28%
Total food purchased (kgs)	60107	79863	

Table 1. Overall carbon footprint and land use of food, proportional carbon footprint and land use per kg food purchased and the total amount of food purchased during two different time intervals.

Sustainable Food - Impact

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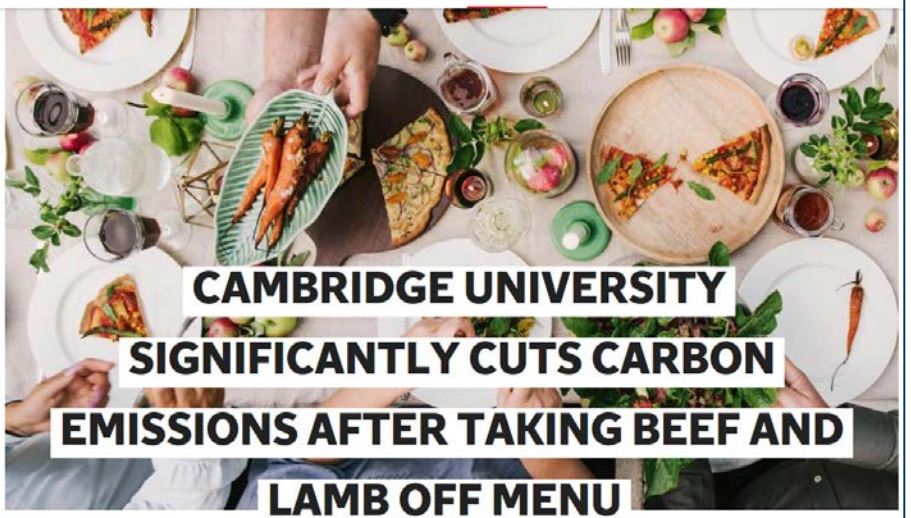

'Sustainability is extremely important to our students and staff'

Sustainable Food – Top tips

- ‘Just do it’ (but quietly and slowly at first!)
- Gain academic input / seek academics as champions
- Focus on most impactful actions
- Secure buy-in/endorsement from committees
- Monitoring & reporting – demonstrate impact
- Ride the wave of ‘hot topics’ (cup waste, plastics)
- Enter awards!

Thank you for listening!

- Nick and Paula White and all the staff at the University Catering Service.
- All the academics involved.
- Everyone in the Environment and Energy section.

EAUC-Scotland Conference

The Elephants in the Room

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