Encouraging Sustainable Catering Practices in the HEP Community

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Disclaimer

- The views in these slides reflect best efforts at retrieving the most up-to-date and independent research
- They are not presented on behalf of an institute or working group
- Research is evolving fast in this complex field: feedback contributions and science-backed opinions are welcome

Catering as an Environmental Consideration in HEP?

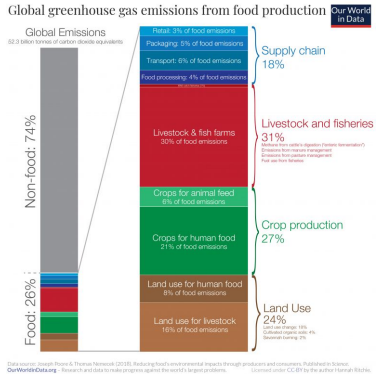
- Is catering an important environmental consideration given its relatively* low and indirect contribution to the total CO_2e emissions in HEP ?

  **at large facilities e.g. it is of course not particularly meaningful to compare direct and indirect emissions given e.g. for catering emission we don't consider people that eat at home*

- Yes! Reputable academic and scientific sectors can potentially have a large demonstrative influence outside the field on key global environmental issues such as food production.
- Optimizing food choices is key to global sustainability and can be demonstrated at e.g. at lab restaurants which are visited by young and impressionable visitors, or at conference dinners, which are social occasions and reflect the stance of the community.

Direct Emissions*: 78 169 tCO_2e
Catering Emissions: 738 tCO_2e

Example: CERN CO2e emissions in 2019.
**Direct emissions lower per annum (less than half) than in recent operational periods 2017, 2018.*
DOI: https://doi.org/10.25325/CERN-Environment-2021-002



Globally CERN CO2e emissions in 2019.
**Direct emissions lower per annum (over a half) than in recent operational periods 2017, 2018*

Examples of Leading Academic Institutes Adjusting Food Options

Berlin's university canteens go almost meat-free as students prioritise climate

The 34 outlets catering to students at four universities will offer only a single meat option four days a week

From October Berlin's university canteens will offer a menu that is 68% vegan, 28% vegetarian and 2% fish-based, with one meat option offered four days a week. Photograph: Fudio/Alamy

Removing beef and lamb from menu dramatically reduces food-related carbon emissions at Cambridge University

Published

10 Sep 2019

Image

Vegetables

Credit: SvenHilker (Pixabay)

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A Sustainable Food Policy at the University of Cambridge, which includes removing beef and lamb from the menu and promoting plant-based food options, has had a dramatic effect on food-related carbon emissions at the University, a report released today reveals.

Goldsmiths bans beef from university cafes to tackle climate crisis

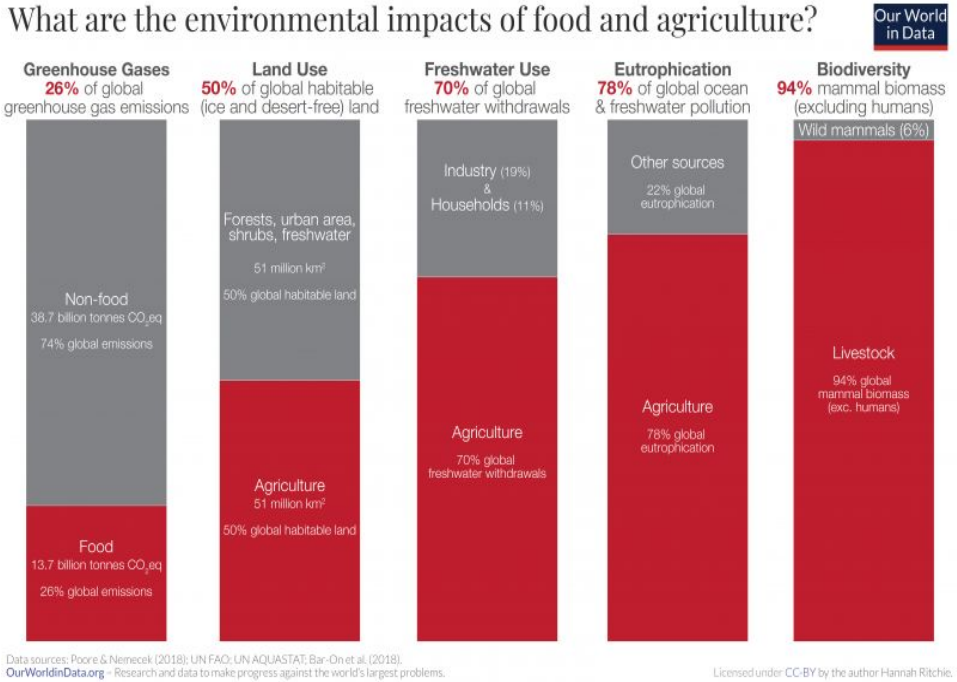
University of London college will also seek to limit single-use plastics

The best way to reduce impact on the environment is to avoid meat and dairy products, scientists have said. Photograph: Farm Images/UIG via Getty Images

References: Berlin University, Cambridge University, Oxford University, Goldsmiths, University of London, EPFL, ..

The Relative Environmental Impacts of Agriculture

- Greenhouse Emissions
  - Greenhouse Gasses (GHGs) including CO_2, methane, nitrous oxide, etc.
- Land Use
  - 71% of the earth's land is desert and ice free.
- Freshwater Withdrawals
  - Freshwater consumption (a limited resource)
- Eutrophication
  - Pollution of oceans and freshwater with excess nutrients
- Biomass/Loss in Biodiversity
  - The impact of agriculture on proportion of livestock versus wildlife

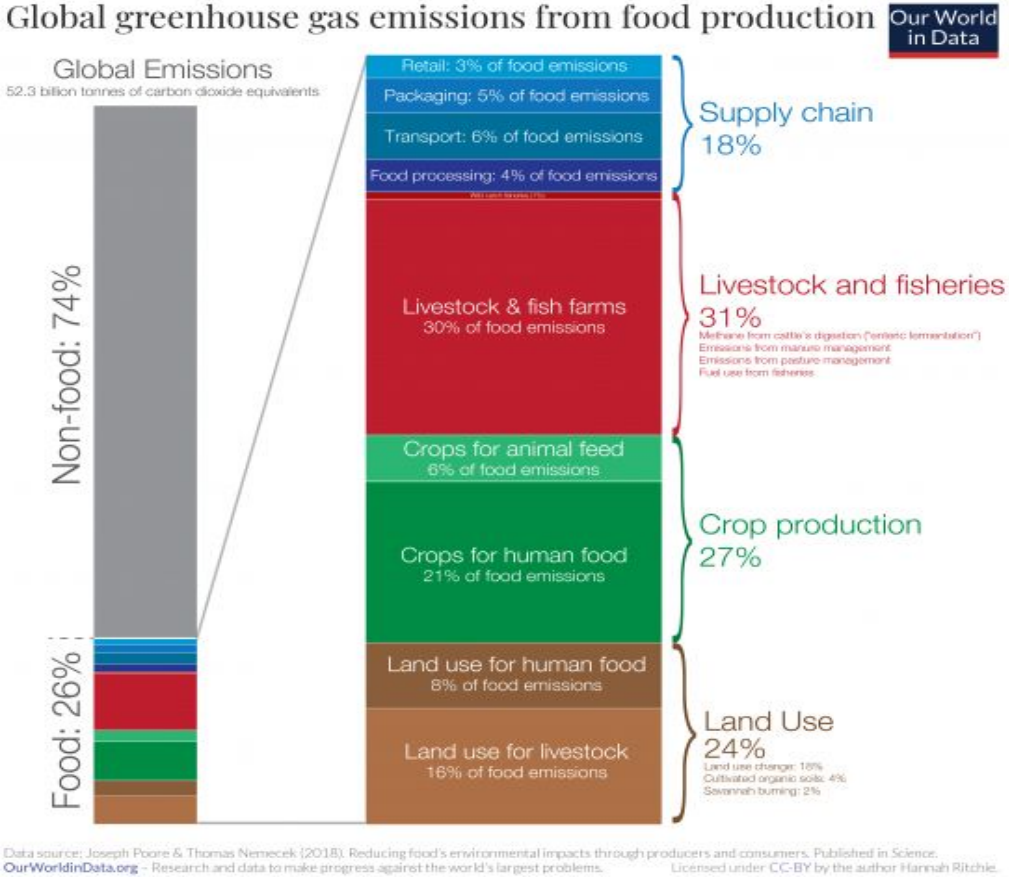


- *Impacts are all interrelated, but biodiversity is more directly dependent on the first 4 (especially land).*
- *The relative contribution of meat to each of the first 4 impacts is summarised in the next slides*

5 environmental impact types, (slides 5-9) follow the structure of: https://ourworldindata.org/environmental-impacts-of-food

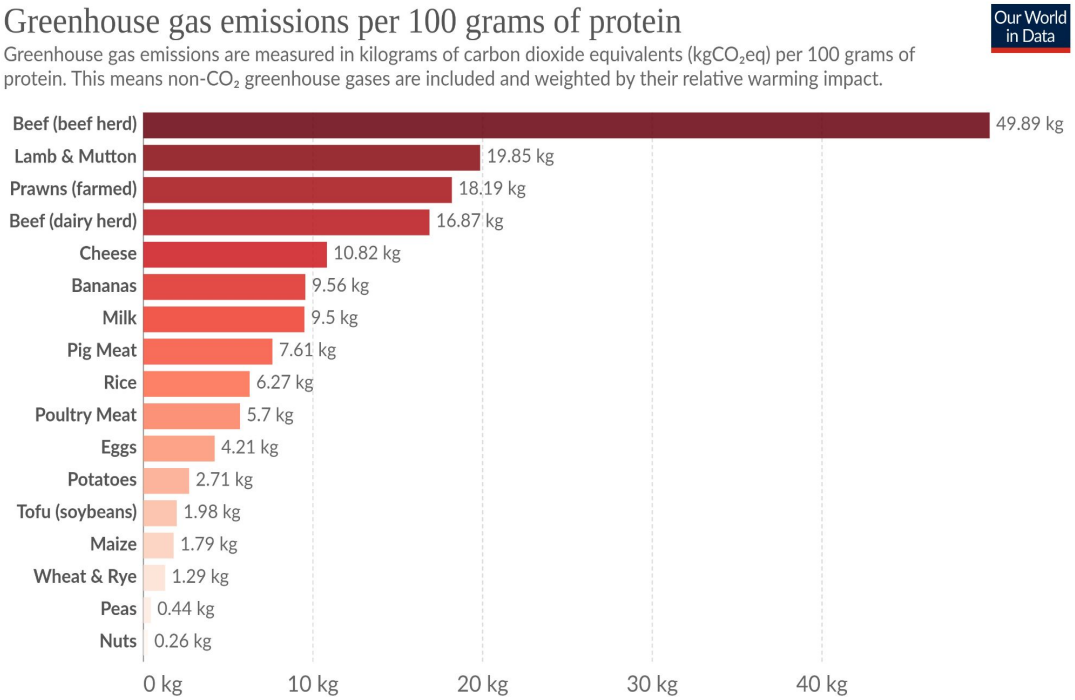
GreenHouse Gases (GHGs)

- Food accounts for 26% of global emissions
- Of which at least 53% is from livestock and fisheries
    - 31 (direct) + 16 (land change) + 6 (crops)
    - Transport not included as no separated meat value which is between 0-6%.
- Main message: Switching <u>what</u> we eat generally has bigger impact than switching to local
    - At least in terms of transport - which does not account for significant contribution to GHGs (6%)



GHG per 100 Grams Protein

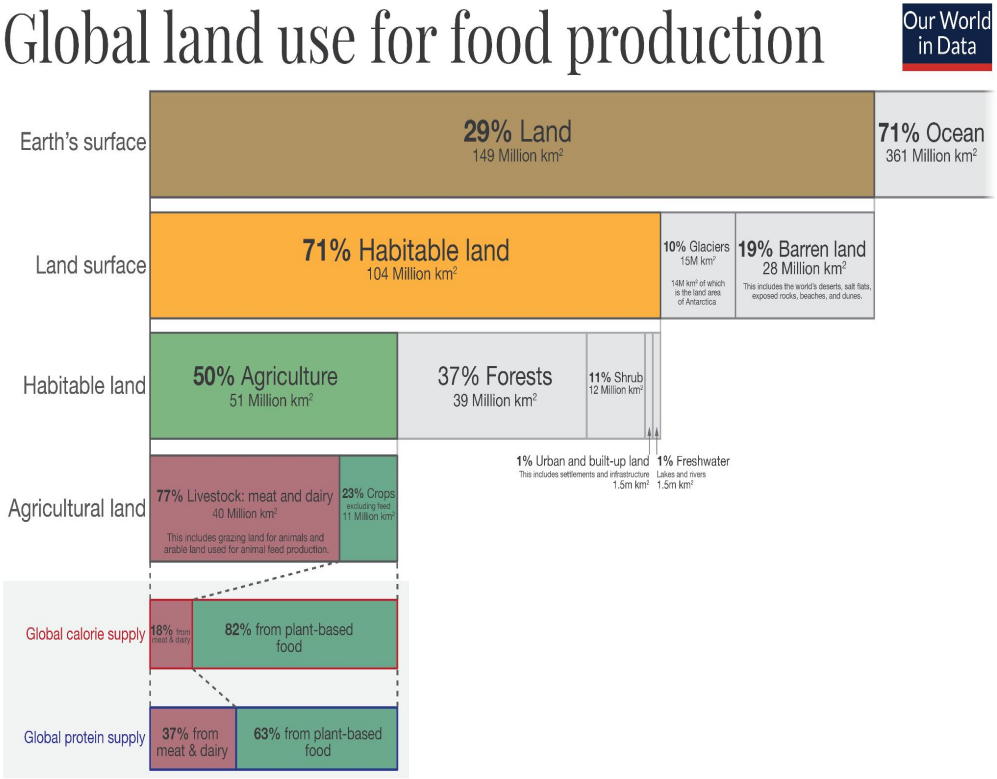
- In general, switching from meat to plant based, helps reduce GHGs, especially from beef, lamb, mutton, cheese !
- **To produce 100 g of protein:**
  - **Peas emit 0.4 $kgCO_2eq.$**
  - **Beef emits 49.9 $kgCO_2eq.$**
- *Based on mean, global averages. See later for more sustainable meat production*



Similar trends per calorie. See reference

Land Use

- Meat and dairy use a disproportionate amount of agricultural land:
- **77% of agricultural land for meat and dairy, (that's 38.5% of all habitable land!)**
- But only produces:
  - **18% of the calorie supply**
  - **37% of the protein supply**

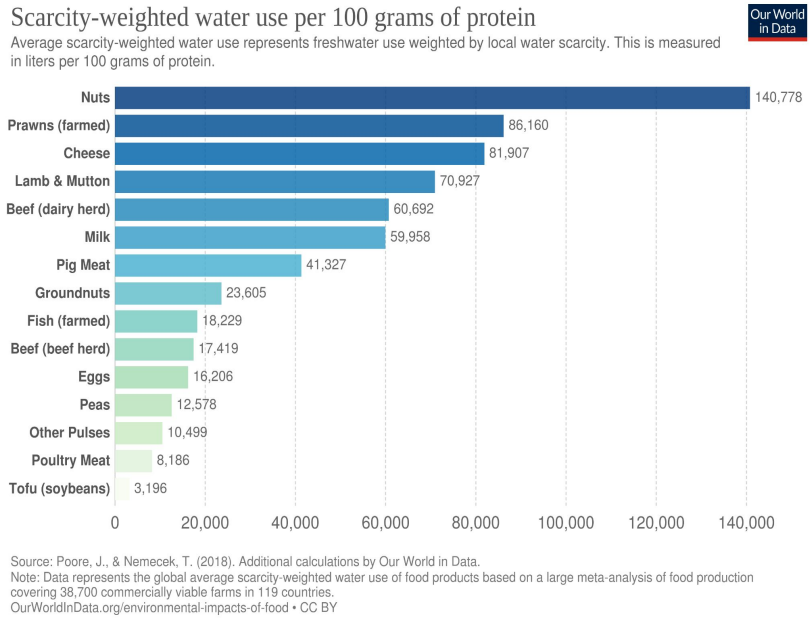


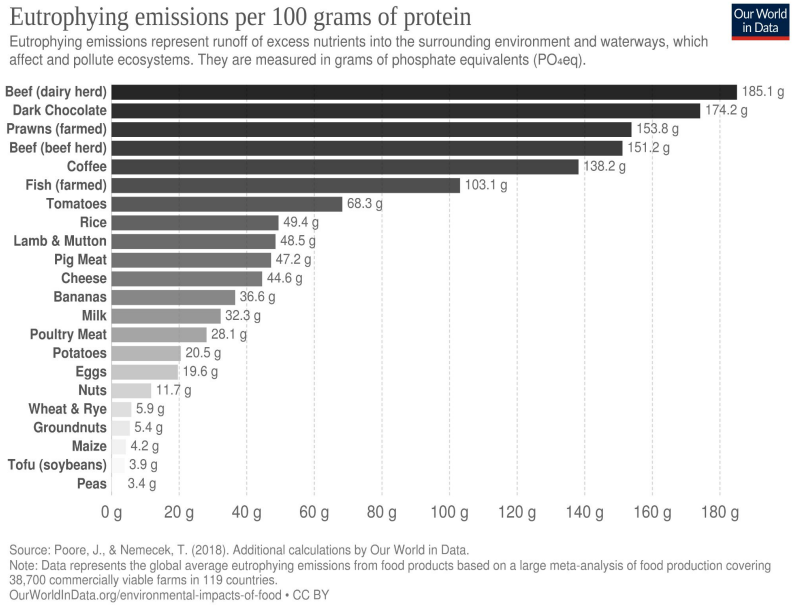
Data source: UN Food and Agriculture Organization (FAO)
OurWorldinData.org – Research and data to make progress against the world's largest problems.

Fresh Water and Eutrophication

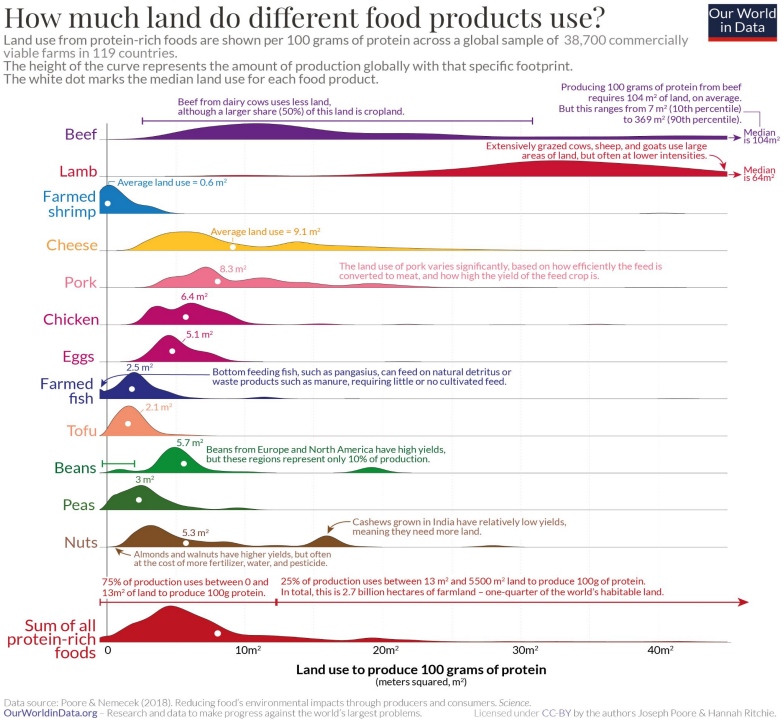
Left: considers that freshwater scarcity varies across the world. Some regions have abundant water resources (water demands have little impact) whilst others experience severe water stress.

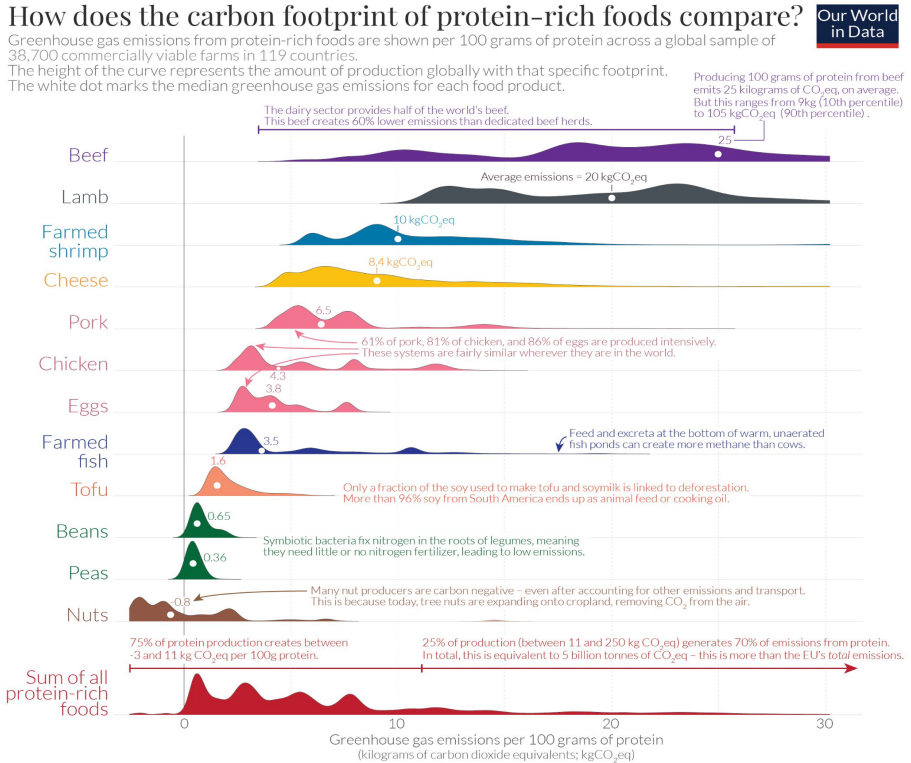
Right: The runoff of nitrogen and other nutrients from agricultural production systems is a leading contributor to Eutrophication .





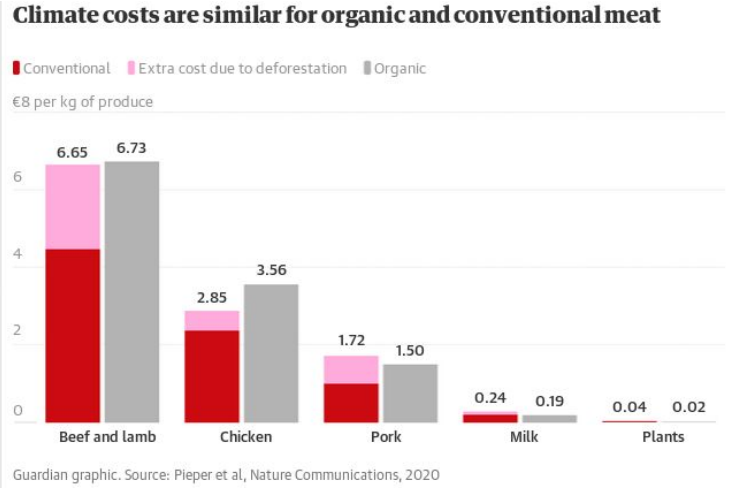
How Do Effects Compare ?





What About Organic Meat ?

- In terms of GHGs there is a substantial spread in emissions for particular meat
- But, it is not necessarily "organic" that makes a meat more environmentally friendly option
- Conventional livestock emissions come from manure, and methane they burp. The grain they are fed can also result in high emissions, especially if it is associated with deforestation, e.g. in South America.
- Organic livestock are often grass-fed, but this means they produce less meat and grow more slowly, therefore spending longer emitting greenhouse gases before slaughter. They also require more land that is often sequester more carbon when rewilded



Pieper et al, Nature Communications 2020

What About Carbon Sequestration From LiveStock ?

- Ruminates are responsible for almost 11.6 % of human caused GHG emissions and the demand for beef is growing
- To keep global warming less than 2 degrees celsius, human GHG emissions need to fall to zero by 2050 and this clearly necessitates changes from livestock sector
- But is the carbon sequestration from grass fed cattle is underestimated ?
  - Plants can be stimulated to grow by carefully managed cattle grazing causing more CO_2 to be taken out of the atmosphere.
  - But is there a net benefit (offset of all cattle emissions) as often claimed ?
- Sifting through over 100 papers the Food Climate Research Network (FCRN) group concluded in their report 'Dazed and Confused' that this not generally the case: Grass-fed cattle do contribute to CO_2 sequestration, but only under very rare ideal conditions (weather, minimum number of cattle,..) can this have a net benefit.
- Even the sequestration, at global level to its maximum potential, grazing livestock would still be a net contributor to the climate problem. Carbon sequestration is not at levels high enough to counteract the ruminants' own emissions.

Report: *https://tabledebates.org/sites/default/files/2020-10/fcrn_gnc_report.pdf*

Summary: *Grazed and Confused? How much can grazing livestock help to mitigate climate change? - YouTube*

What About Phasing Out Meat and Dairy ?

- The focus on fossil fuels often justified due to its long lived CO2 emissions and the fact that its extraction is (definitely) not part of a cycle
- Conversely with shorter lived, but potent CH4 emissions, from the livestock industry (and land use factors), the rapid phase out of animal agriculture, can buy a lot of time to find alternative energy solutions while we phase out fossil fuels.and still meet global warming targets

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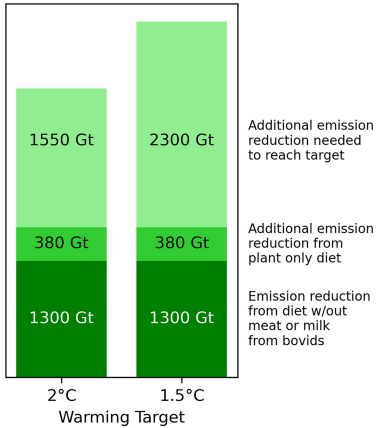

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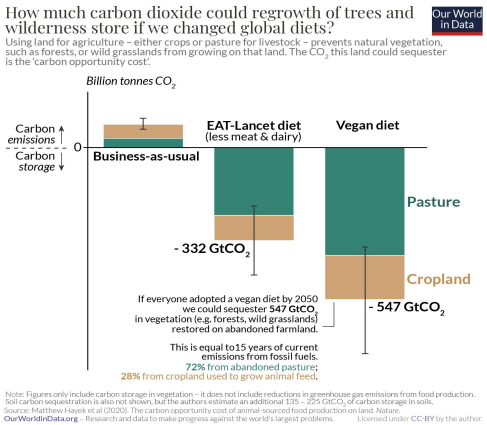

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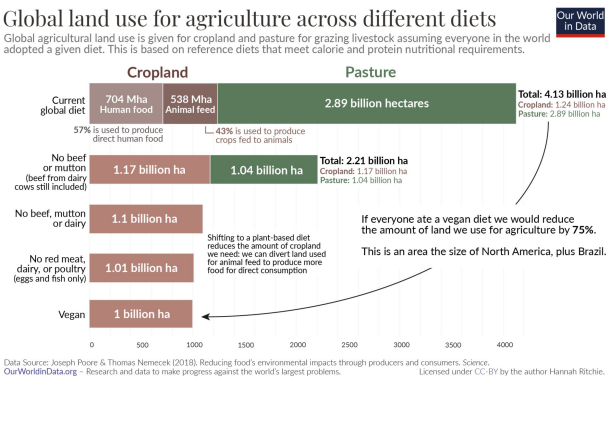


1. Rapid global phaseout of animal agriculture has the potential to stabilize greenhouse gas levels for 30 years and offset 68 percent of CO2 emissions this century | PLOS Climate
2. What are the carbon opportunity costs of our food? - Our World in Data
3. How much of the world's land would we need in order to feed the global population with the average diet of a given country? - Our World in Data

Overview on Meat and Dairy

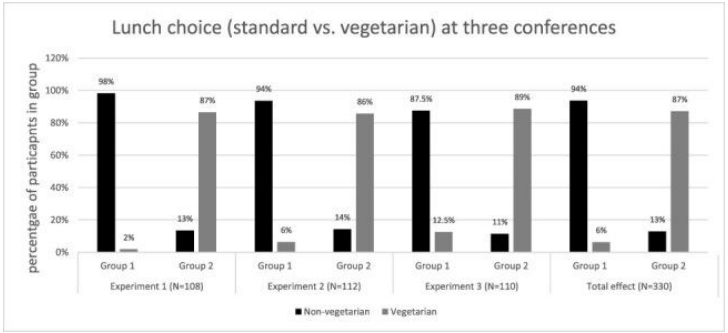
- Animal agriculture produces food that is very nutrient dense, and farm animals can convert biomass that humans cannot eat into food they can
- When population densities are sufficiently low and land is abundant, livestock can play an important role in transferring nutrients from grasslands and onto croplands via their manure.
- This however is not applicable for high population densities. On a global scale, no methods are sustainable for our current consumption rates.
- Well sourced more plant based diets can be healthy and environmentally preferable.
- Meat consumption needs to fall drastically to reach 2050 targets regardless of current proposals to improve the emissions of the industry.
- Meat Consumption Guidelines : Greenpeace (consistent with Lancet Report) recommends a global reduction to 300 g of meat (carcass weight) per week per capita before 2050. Approximate average consumption rates are 2000g per person in Western Europe!
- Dairy Consumption Guidelines Similar reduction in dairy is needed in parallel. From > 2000g to 600g
    - https://www.greenpeace.org/static/planet4-international-stateless/2018/03/6942c0e6-longer-scientific-background.pdf

What Can We Do in HEP community? General Actions

- Ensure the topic is discussed in any general climate related talk organised by your institute.
  - 4 generic environmental talks at CERN with (understandable) focus on Fossil Fuels but not one mention of agriculture !
  - Follow up with speakers reveals very little rationale for this. Some agreed the topic should have been included.
  - Always press an environmental speaker on animal agriculture.
  - Do NOT let the conversation fall into the 'it's ambiguous' territory. The necessary action to reduce consumption is not! *Discussing possible ambiguity about the sustainable or even optimal (?) amount of meat consumption below the 300g per capita per week is a dangerous distraction from our pressing need to reduce from our current averages*
- Encourage 'reductionism' philosophy
  - The perceived "all or nothing" approach associated with veganism and vegetarianism can put people off accepting issues with meat, or taking an interest in plant based options. Normalise eating meat free options w/o being vegan or vegetarian
- Nudging techniques and requests to your cafeteria can help: 'Meat free mondays' can cause a backlash in the wrong environment . Increasing availability or making meat free the default (see next slide) is often the first step
  - Impact of increasing vegetarian availability on meal selection and sales in cafeterias - PubMed (nih.gov)

Nudging Case Study: Less Meat at Conference Dinner

- 3 conference dinners each with 2 groups types of phrasing for the dinner request
  - 1. Non vege buffet is default. Vege is the active choice
  - 2. Vege buffet is the default. Non vege is the active choice
- Results - Most people choose the default either way. Follow up revealed most participants who were ‘nudged’ were okay with it when asked,



Nudging healthy and sustainable food choices: three randomized controlled field experiments using a vegetarian lunch-default as a normative signal - PMC (nih.gov); https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8185453/

Example Action: Supporting Restaurants at CERN

- Novae, the catering company responsible for all CERN restaurants have been very engaging
- CERN Eco Actions club have voiced requests to have more plant based options.
  - Most requests have been met and sales have been seemingly successful
  - It's too early to determine whether people switching to more plant based options or if Novae are selling to people that would otherwise bring their own food
  - But promoting plant based as standard option is important
- CERN Eco Actions club have a list to collect suggestions and questions for Novae (about waste compost, single use plastics) that we intend to revisit periodically
- Novae appear to independently take a genuine (not greenwashing) approach to improving their sustainability, for example
  - Intend to reduce meat sales* (through nudging)
  - Careful selection of produce (e.g. do not serve out of season avocados)
  - Reduction of single use plastics
- See more here: Novae Report- Commitment - Novae (novae-restauration.ch)
- We need to keep in mind that they are an independent company and have to run at a profit:. e.g. Meat is very subsidised product (EU, CH) despite its environmental impact. So vege options cannot be made substantially cheaper. Convenience might matter to make sales - think single use cups.
- It is up to us, the consumers to support them: choose environmentally preferable options, understand and obey their recycling schemes, bring our own cups, be prepared to soak up the costs of environmentally preferable options

Outlook / Best Practice

As mentioned in previous talks, any hope of minimizing the effects of the climate crisis involves a combination of a top down as well as a bottom up approach

We do have a certain power as consumers, and a responsibility as educated and relatively wealthy consumers to influence and subsidise the right choices where possible (including our HEP community)

Diets have to be analyzed on a case by case basis, but certain steps, like the reducing the consumption of beef and dairy are on average the most effective way to optimize our diets

Thank you for your attention !

Supporting slides

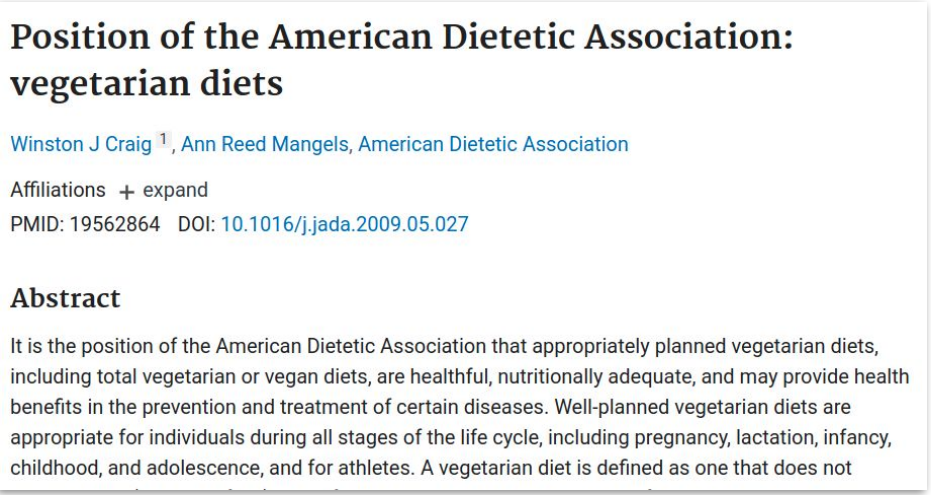
Plant Based Diets and Nutrition

Is plant based diet healthy ?

Nutrition is a complex subject, it can be healthy or unhealthy. Moreover, we all have different health needs, absorb and process nutrients differently, nevertheless the science is pretty consistent on whether a well-planned plant-based diet is optimal for all stages of life.

A well-planned fully plant based diet can be **nutritionally complete**, **optimal for health, reverse some diseases,** while **helping** in attaining the **climate goals** of a country. It can also be **the cheapest option**, according to this large study from Oxford.

References (non-exhaustive): American Dietetic Association, British Dietetic Association



Position of the American Dietetic Association: vegetarian diets

Winston J Craig [1], Ann Reed Mangels, American Dietetic Association

Affiliations + expand

PMID: 19562864 DOI: 10.1016/j.jada.2009.05.027

Abstract

It is the position of the American Dietetic Association that appropriately planned vegetarian diets, including total vegetarian or vegan diets, are healthful, nutritionally adequate, and may provide health benefits in the prevention and treatment of certain diseases. Well-planned vegetarian diets are appropriate for individuals during all stages of the life cycle, including pregnancy, lactation, infancy, childhood, and adolescence, and for athletes. A vegetarian diet is defined as one that does not

British Dietetic Association confirms well-planned vegan diets can support healthy living in people of all ages

Related resources

19 Nov 2021

07 Aug 2017

One of the UK's longest-standing organisations that represents dietetics and nutrition, the British Dietetic Association, has affirmed that a well-planned vegan diet can "support healthy living in people of all ages" in an official document signed by its CEO.

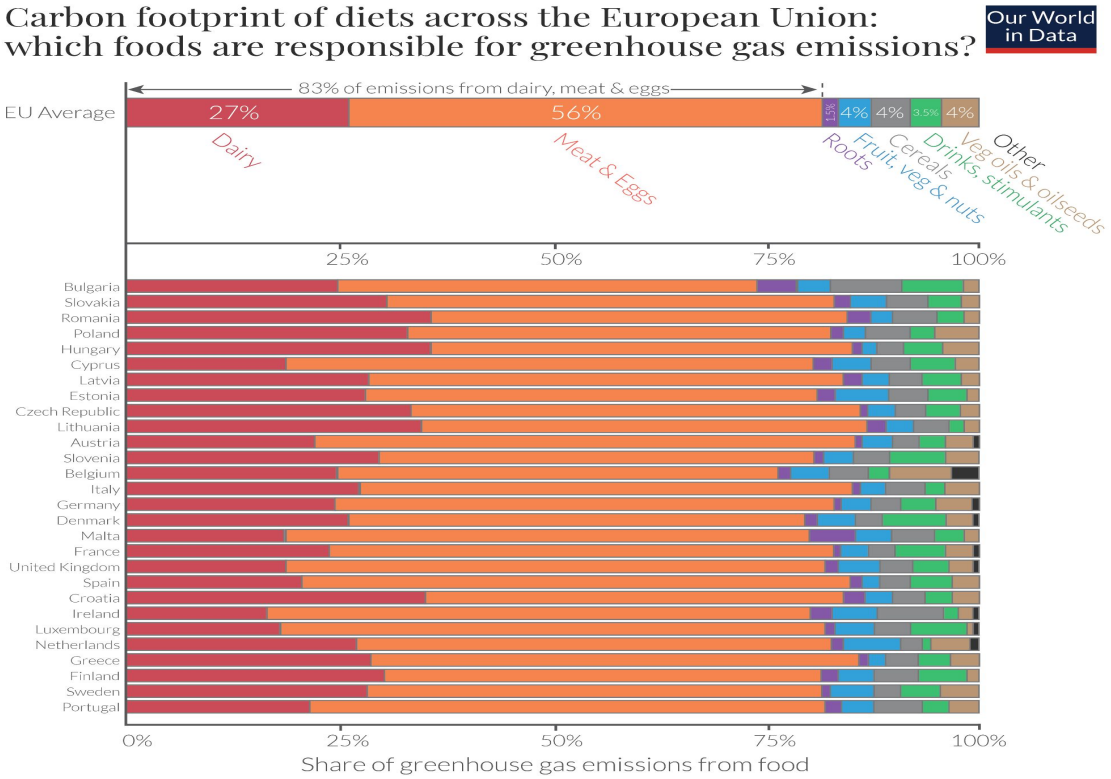
How EU and CH compare to the rest of the world?

1. Globally, the emissions from animal products to plant products is approximately **65%** (See slide 9).

2. In the EU alone, this number shifts to **83%** (emissions from animal products:emissions from plant products).

3. In Switzerland 12.4% of emissions come from agriculture and 74% (including manure) come from animal agriculture.

Reference:
Swiss Agricultural Greenhouse Gas Inventory



Is too much meat unhealthy ?

- One of the biggest health studies (including 13 cohort studies), performed on 1.4 million show the following.

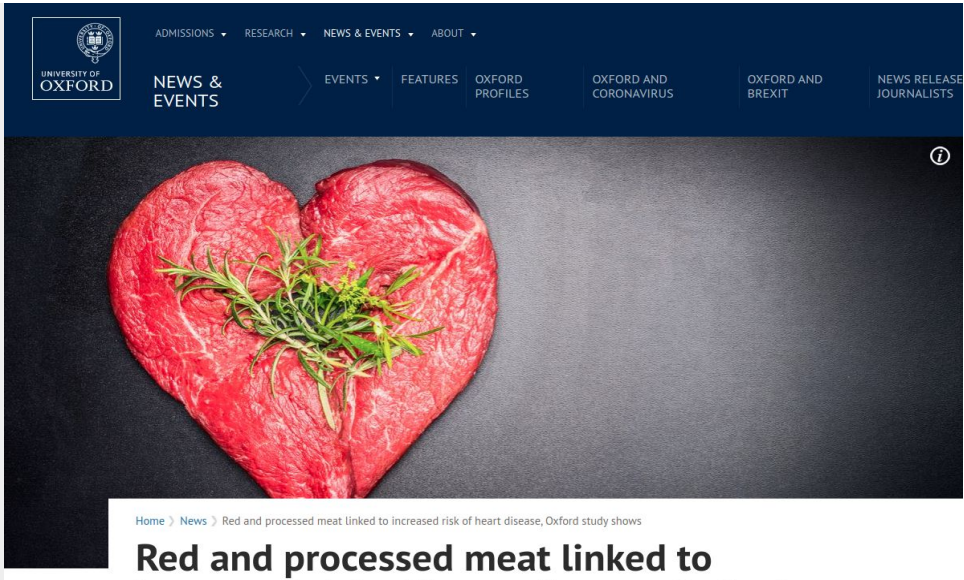
- Several more studies show similar conclusions and show the benefits of replacing red and processed meat with plant-based proteins in certain aspects.
- In terms of cholesterol white meats maybe no better (and plant based beats both)

- The most healthy/optimal omnivore type diet typically includes a **drastic reduction in animal based food** relative to the current consumption rates

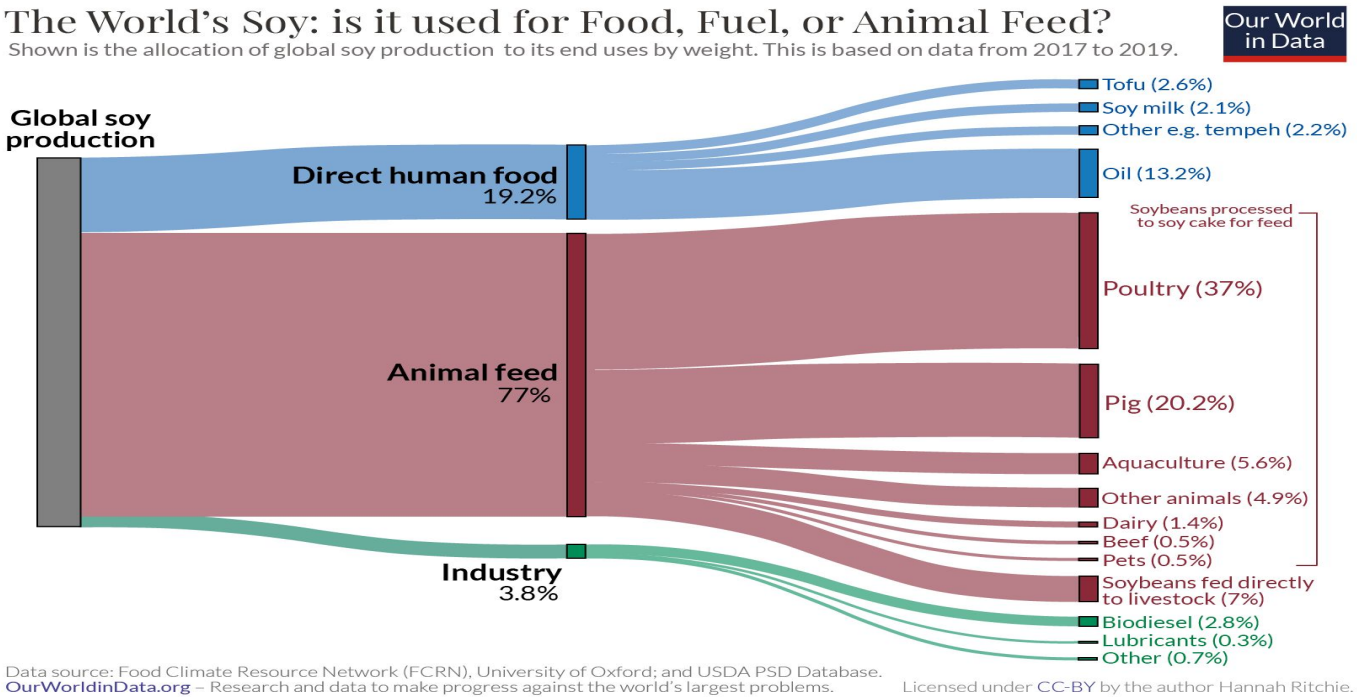
Studies: Red and processed meat Oxford study

Cause-Specific Mortality

Red meat, white meat, or non-meat?



What about soya?



A side note on Animal Ethics and Pandemics

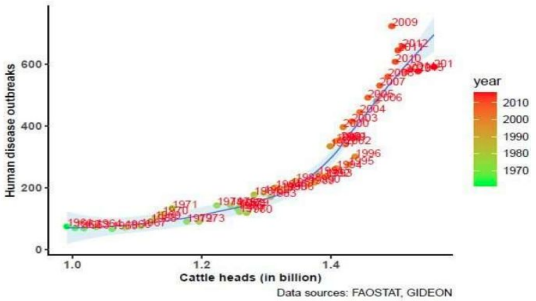
Other motivations for plant-based eating.

1. CERN does not have an official position on animal ethics in the meat trade so unlike environmental concerns we do not use it as direct justification for serving more plant based food.
2. However, most people (vegans and non vegans alike) have desire high standards when it comes to animal welfare
3. Moreover we have been greatly affected by the recent pandemic
4. Overconsumption of meat leads to cramped intensive factory farming, associated extreme cruelty and use of antibiotics, and are reasons for zoonotic diseases
5. 6 out of every 10 new infectious diseases are zoonotic
6. References:Emerging diseases and Livestock expansion, Antimicrobial resistance from cattle, chickens, pigs.

JULY 24, 2020

Livestock expansion is a factor in global pandemics

by CNRS



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NEWS | 20 September 2019

Alarm as antimicrobial resistance surges among chickens, pigs and cattle

Drug-resistant bacteria are gaining a stronghold in developing countries where meat production has soared.

Emiliano Rodríguez Mega

Antibiotics are given to farmed pigs to to promote growth and prevent infections. Credit: Ryan Woo/Reuters