# The evolution of “sustainable” and vegetarian recipes from manuscripts and cookbooks to online

*Amsterdam Symposium on the History of Food*
*Food and the Environment: The Dynamic Relationship Between Food Practices and Nature*
Saturday 12th February 09:30
Panel 4 —Recipes for (un)sustainability

Speaking: Christian Reynolds
*Centre for Food Policy, City, University of London*
***@sartorialfoodie*** ***christian.reynolds@city.ac.uk***

Wider project team:
Christian Reynolds, Berill Takacs, Anastasiia Klimashevskaia, Aslaug Angelsen, Eline van Oosten, Mark A. Greenwood, Rebeca Ibanez Martin, Steve Brewer, Marieke van Erp, Alain Starke, Diana Maynard, Christoph Trattner

This research and the GATE NLP tool have been developed with a research grant from the alpro foundation

# Who am I? – Christian Reynolds

Senior Lecturer at the Centre for Food Policy

wrap · STFC Food Network+ · N8 AgriFood · The Nutrition Society – Advancing Nutritional Science → City, University of London – Est 1894

University of South Australia · University of Aberdeen · The University Of Sheffield. Institute for Sustainable Food. · UK Data Service

Focus: healthy sustainable diets and food consumption (including waste)

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Review

Review: Consumption-stage food waste reduction interventions – What works and how to design better interventions

Christian Reynolds[a,b,*], Liam Goucher[c], Tom Quested[b], Sarah Bromley[b], Sam Gillick[b], Victoria K. Wells[d], David Evans[e], Lenny Koh[c], Annika Carlsson Kanyama[f], Cecilia Katzeff[g], Åsa Svenfelt[f], Peter Jackson[a]

*Public Health Nutrition*: 22(8), 1503–1517 doi:10.1017/S1368980018003774

Healthy and sustainable diets that meet greenhouse gas emission reduction targets and are affordable for different income groups in the UK

Christian J Reynolds[1], Graham W Horgan[2], Stephen Whybrow[1] and Jennie I Macdiarmid[1,*]

[1]The Rowett Institute University of Aberdeen, Aberdeen AB25 2ZD, UK: [2]Biomathematics & Statistics Scotland, Aberdeen,UK

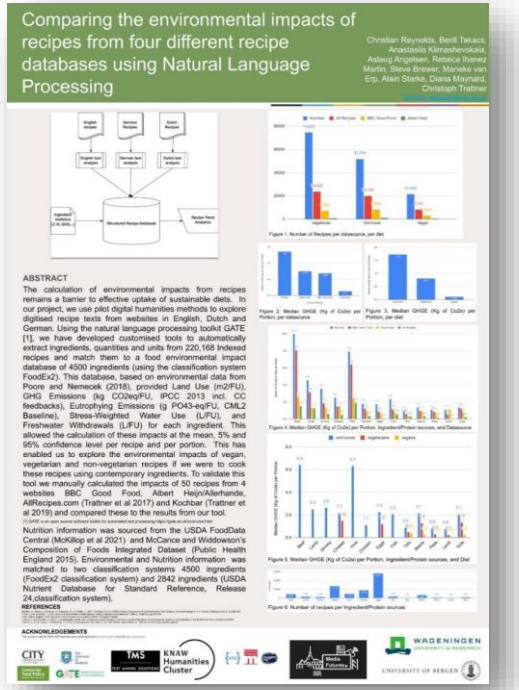
Previously: Food waste politics/history, social sciences approaches

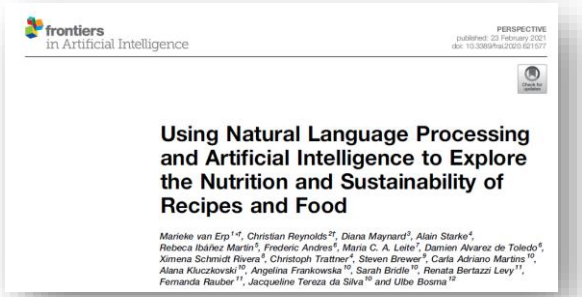
# This presentation is part of ongoing work

- https://dhlab-nl.github.io/sustainable-recipes/

Communicating the environmental impact of plant based recipes

project funded by The Alpro Foundation



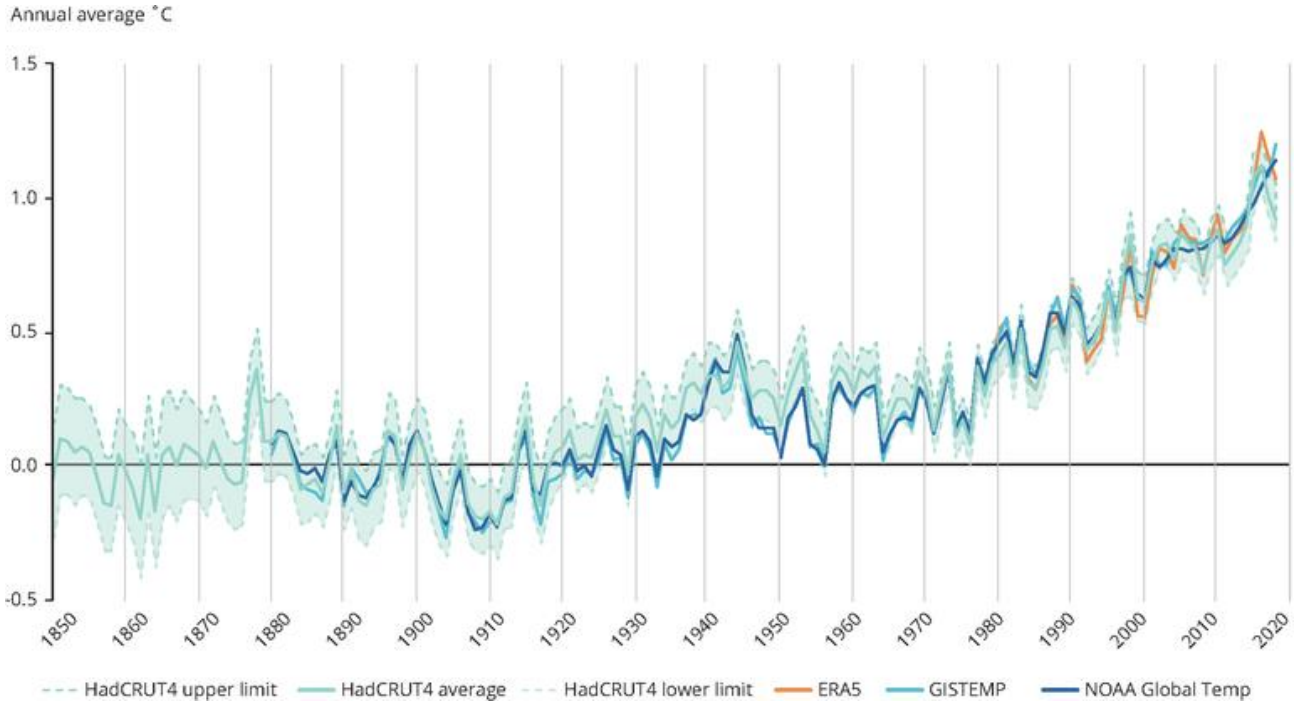



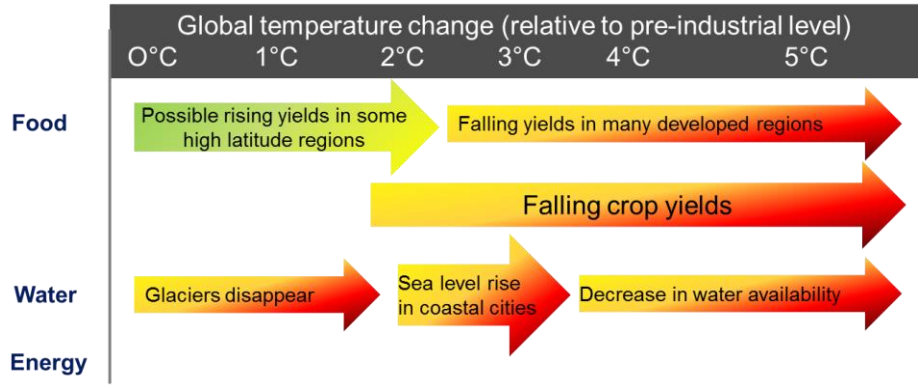

Christian Reynolds, Berill Takacs, Anastasiia Klimashevskaia, Aslaug Angelsen, Eline van Oosten, Mark A. Greenwood, Rebeca Ibanez Martin, Steve Brewer, Marieke van Erp, Alain Starke, Diana Maynard, Christoph Trattner

# The climate is changing…

**Global average near surface temperature since the pre-industrial period**

Source [European Environment Agency (EEA)]



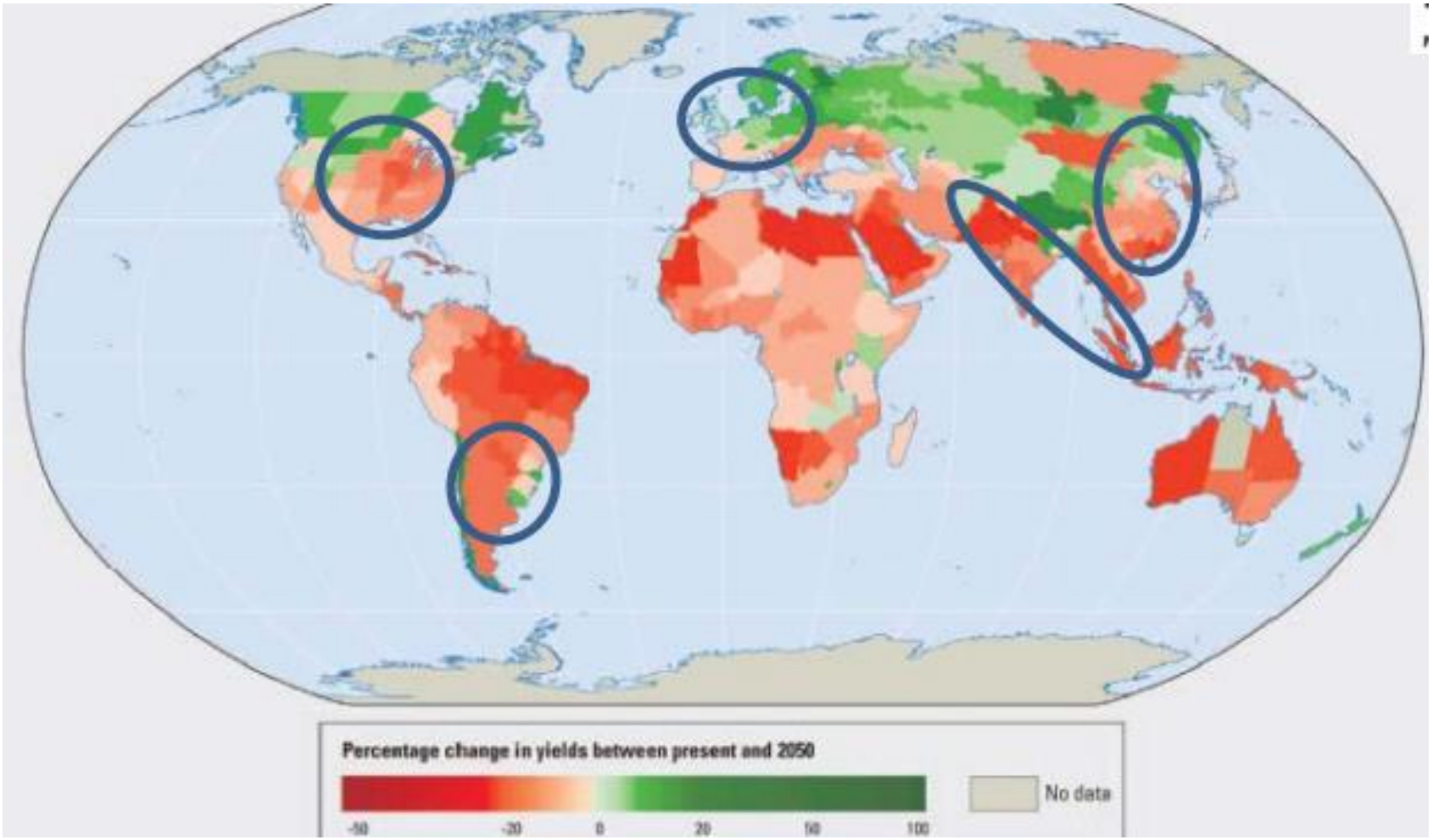




## French winemakers count cost of 'worst frost in decades'

**Government prepares rescue package as rare freezing temperatures damage crops and vines**

▲ Burgundy vines have been set alight to fight against frost. Photograph: Etienne Ramousse/Zeppelin/Sipa/Rex/Shutterstock

# Food production and climatic change are linked

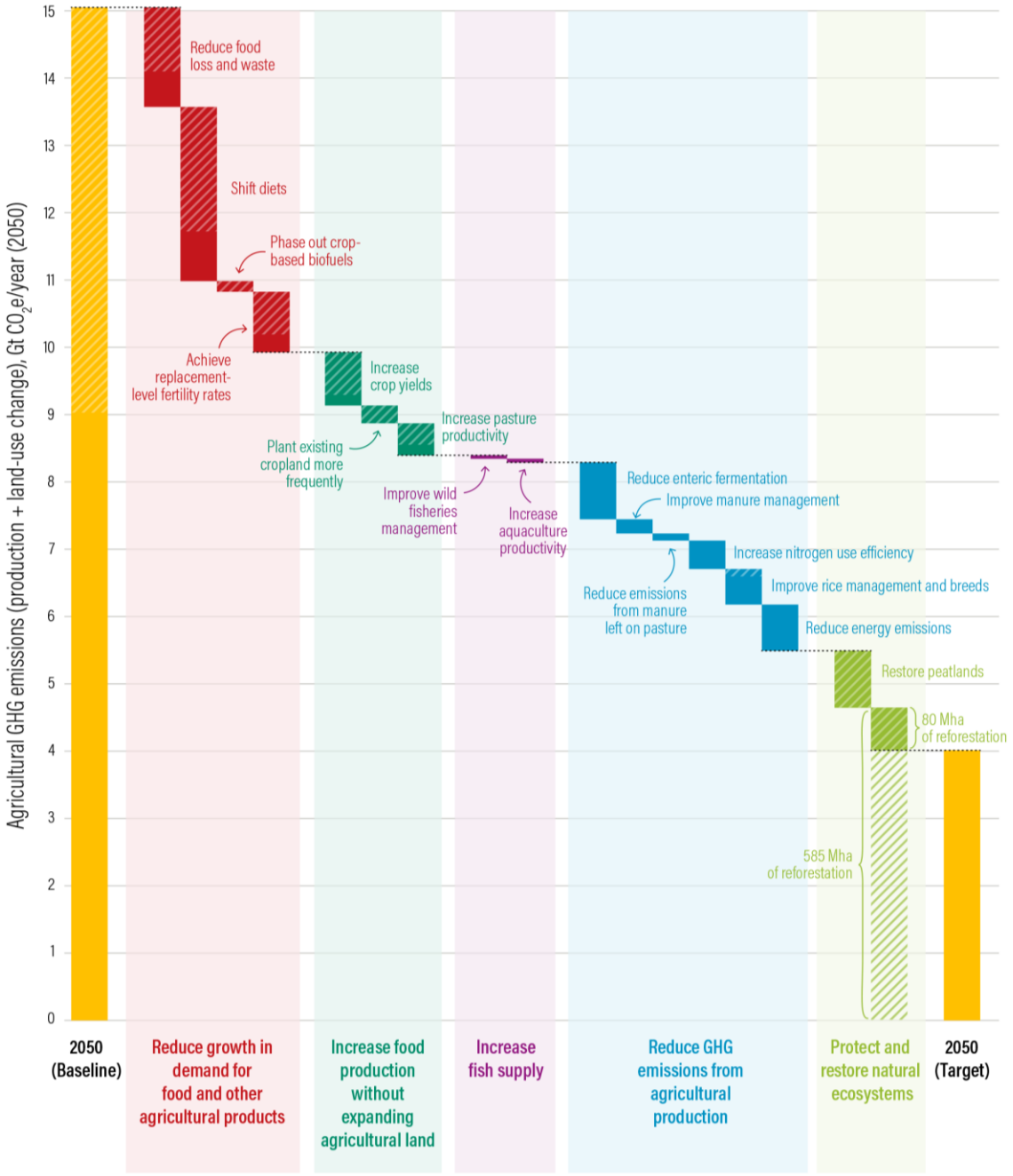



Wheeler, Tim, and Joachim Von Braun. "Climate change impacts on global food security." *Science* 341.6145 (2013): 508-513.

# The emissions reduction challenge – A warming food system

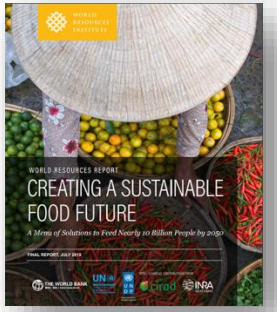
The two biggest reductions we can make to agricultural GHGE to achieve a **2°C** warming target (4 Gt/year) or **1.5°C** warming target (0 Gt/year) are through:

1. **Shifting to sustainable diets**
2. Reducing Food Loss and Waste




*Note:* Solid areas represent agricultural production emissions. Hatched areas represent emissions from land-use change.
*Source:* GlobAgri-WRR model.

Source WRI, [World Resources Report: Creating a Sustainable Food Future]



# Sustainable diets and The EAT–Lancet report

Published in 2019

Setting Scientific Targets for Healthy Diets and Sustainable Food Production

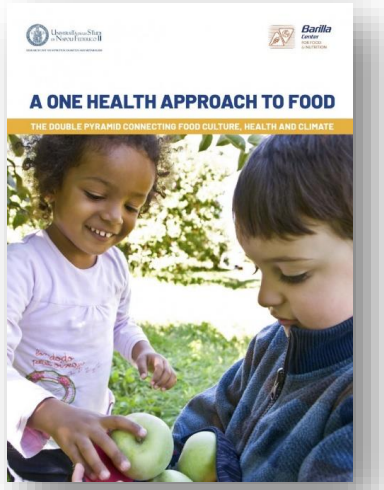
↑ consumption of fruit (100 -300g/day) & vegetables (200-600g/day)

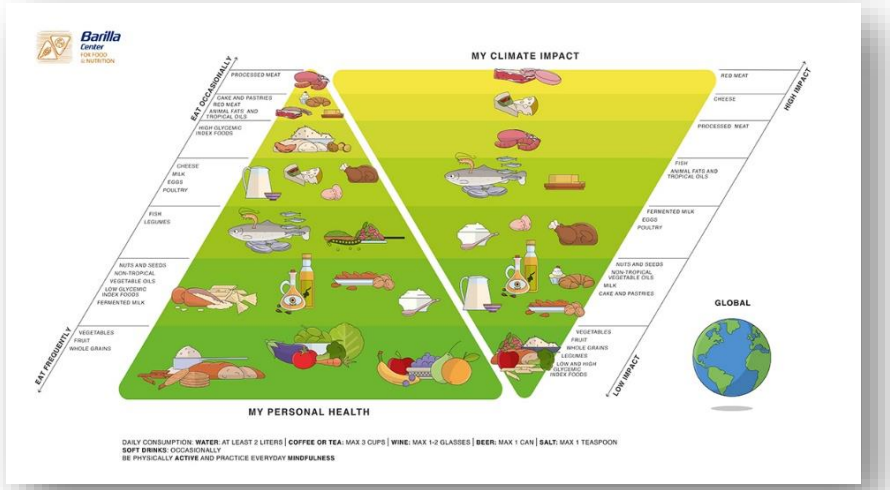
↓consumption of animal products


# The EAT–Lancet report - A Critique

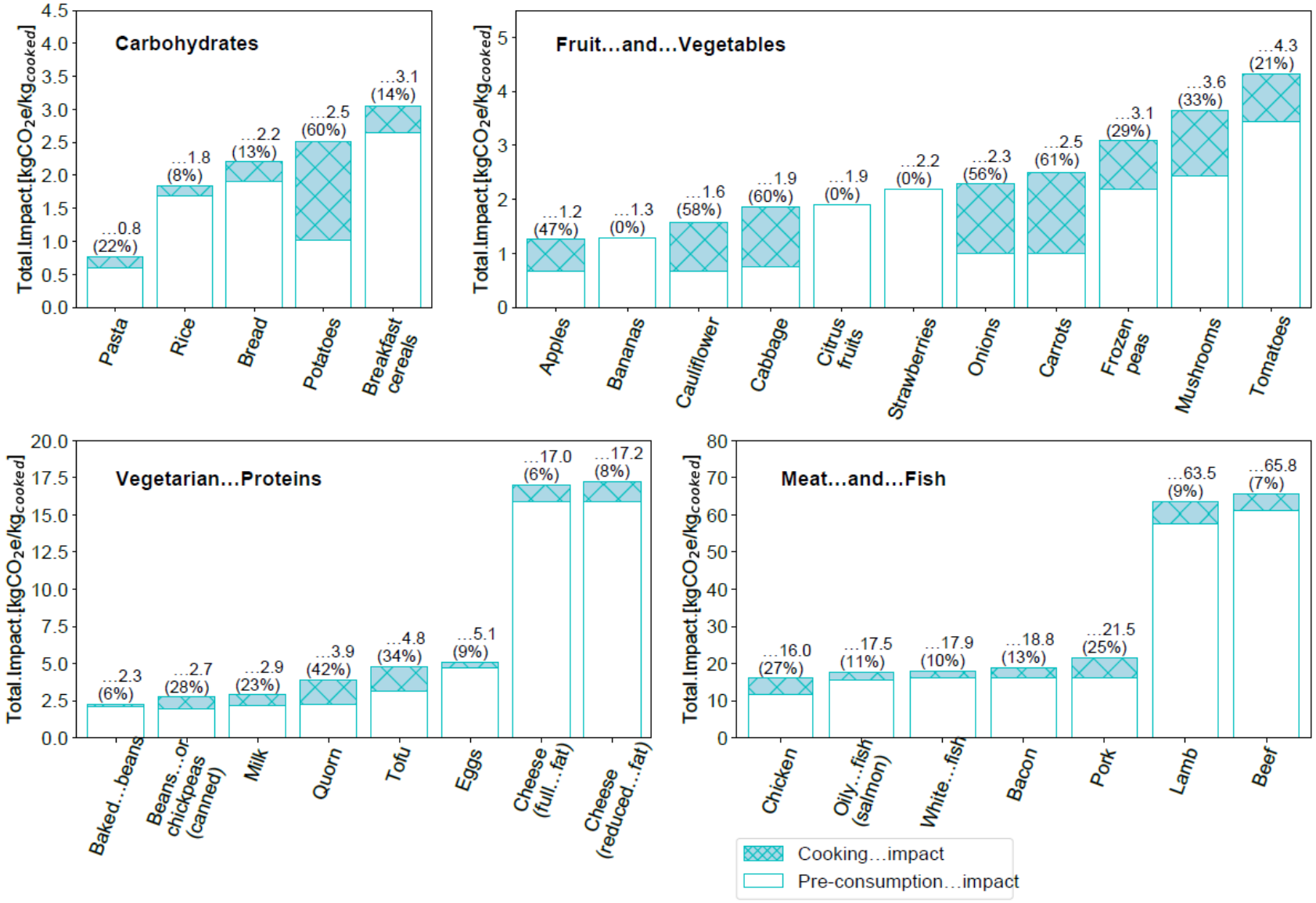
- Lack of consideration of local and traditional diets, food ways or systems of production.
- Limited suggestions on how to implement the ‘global healthy sustainable diet’ (only photos).
- Minimal discussion of cooking and real life examples (e.g. no recipes)

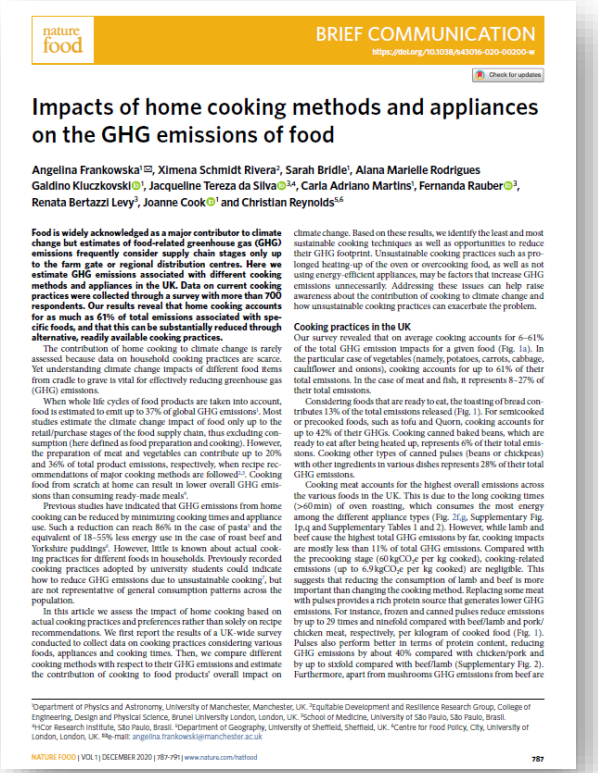
- Current sustainable dietary guidance is given as ingredients
- We have only just started to see translation into sustainable gastronomy – see Barilla foundation reports (2021)



# How we cook matters! Up to 61% of GHGE impacts





nature food

BRIEF COMMUNICATION

https://doi.org/10.1038/s43016-020-00200-w

Impacts of home cooking methods and appliances on the GHG emissions of food

Angelina Frankowska, Ximena Schmidt Rivera, Sarah Bridle, Alana Marielle Rodrigues Galdino Kluczkovski, Jacqueline Tereza da Silva, Carla Adriano Martins, Fernanda Rauber, Renata Bertazzi Levy, Joanne Cook and Christian Reynolds

Frankowska, A., Rivera, X.S., Bridle, S. *et al.* Impacts of home cooking methods and appliances on the GHG emissions of food. *Nat Food* **1,** 787–791 (2020). https://doi.org/10.1038/s43016-020-00200-w

# A wider timeline of “sustainable” food books…

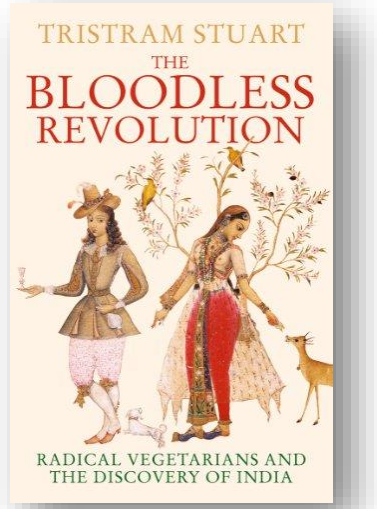
Depending on your definition of “sustainable” there is a long history of manuscripts that advise (proselytizing) what we would now think of as a sustainable diet…

*"The greater production of food by agriculture than by pasture, shews that a nation nourished by animal food will be less numerous than if nourished by vegetable"...*
*"The inequality of mankind in the present state of the world is too great for the purposes of producing the* ***greatest quantity of human nourishment, and the greatest sum of human happiness****“* - Erasamus Darwin Zoonomia (1794–1796)

- Thomas Tryon, *The Way to Health and Long Life* (1683).
- Thomas Tryon, *Pythagoras His Mystic Philosophy Revived* (1691)
- John Oswald, *The Cry of Nature, Or, an Appeal to the Mercy and to Justice, on Behalf of the Persecuted Animals* (1791).
- Joseph Ritson, *Essay on Abstinence from Animal Food* (1802)
- William Andrus Alcott, *Vegetable Diet, Sanctioned by Medical Men and by Experience in All Ages* (1838)
- Howard William, *The Ethics of Diet* (1883).
  Henry Salt, *A Plea for Vegetarianism* (1886)
- Anna Kingsford, *The Ideal in Diet* (1898).

- Frances More Lappé, *Diet for a Small Planet* (1971)


Thomas Tryon (1634–1703)

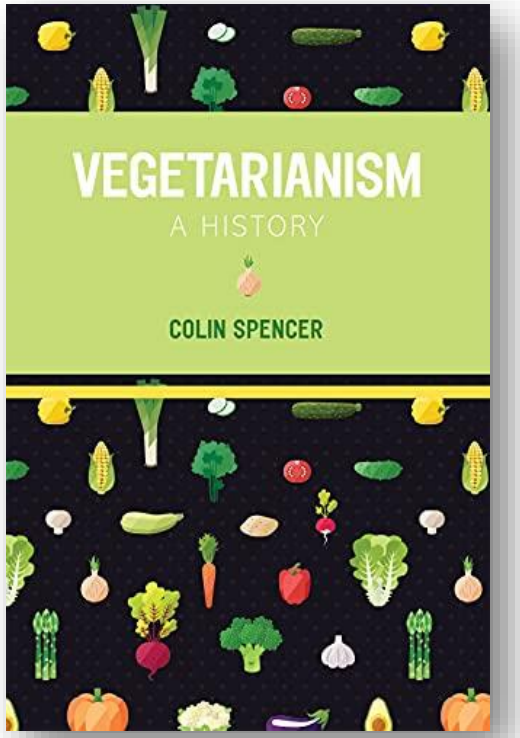


# Vegetarian cookbooks also have evolved.

- Colin Spencer highlights an evolution of the vegetarian cookery book and vegetarianism for multiple reasons.

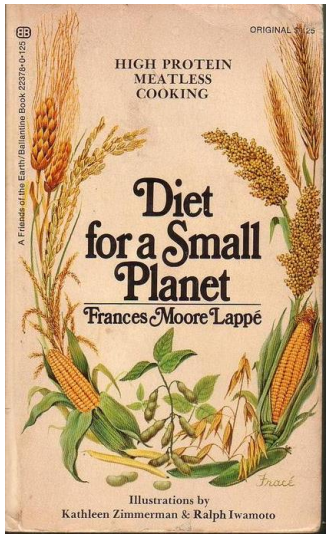
1821 Mrs Brotherton's A New System of Vegetable Cookery
1833 Vegetable Cookery 'By a lady',
1847 A Few Recipes of Vegetarian Diet,
1849 The Vegetable Diet, William Alcott
1895 Fast Day and Vegetarian Cookery, by E.M. Cowen and Beaty-Pownall,
1895 Fat of the Land and How to Live On It, Elizor Goodrich Smith;
1899 The Natural Food of Man and How to Prepare It. Mrs Leadsworth
1904 Substitute for Flesh Foods: Vegetarian Cookbook by E.G. Fulton
1909 Mrs Rover's Vegetable Cookery and Meat Substitutes, Sarah Tyson Rover
1910 Jeanne Jardine wrote The Best Vegetarian Dishes I Know,
1914 Meatless Cookery; with Special Reference to Diet for Heart Disease, Blood Pressure and Autointoxication, by Marie McIlvaine Gillmore,
1920 to 1930 12 books
1960 to 1980 183 books
Etc….

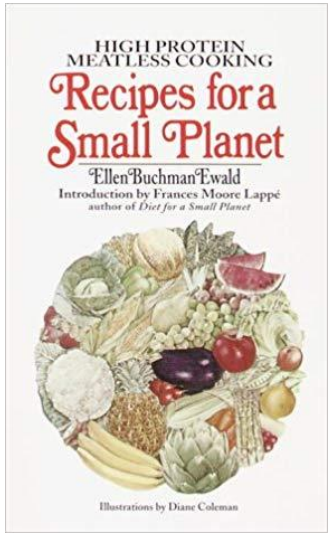
On https://www.eatyourbooks.com there are now vegetarian n=5,428 (oldest book 1950) , vegan n=1,433 (oldest book 1982)



# Is there such a thing as a sustainable cookbook?

Earliest English language “modern” “cookbook” rather than book on food?
1971 (Diet for a Small Planet) -> 1973 (Recipes For A Small Planet)



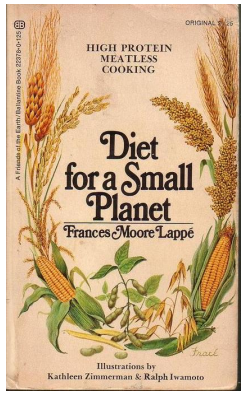

1971 0 recipes
1992 152 recipes
2022 85 recipes

1973 202 recipes

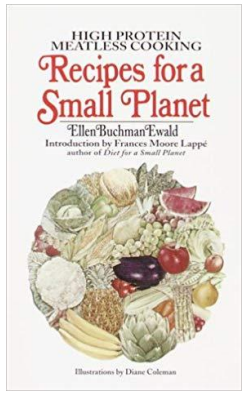
- Shifting of diet towards environmental vegetarianism (not carbon focused)
- Lentil and nuts – focused
- Large geography of cuisine styles: middle eastern, Indian, Brazilian, Mexican, Greek, Italian and ‘oriental’.
- Oven (and other high energy use methods) used.

# A timeline of sustainable cookbooks

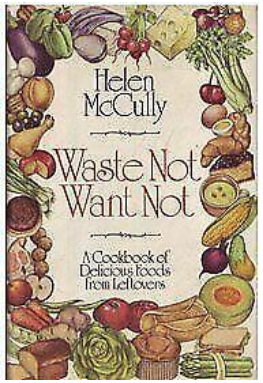
I searched https://www.eatyourbooks.com/* to find **278 cookbooks** that had titles including "sustainable", "eco", "planet", "climate", "carbon", "waste", and "flexitarian" 1973-2022



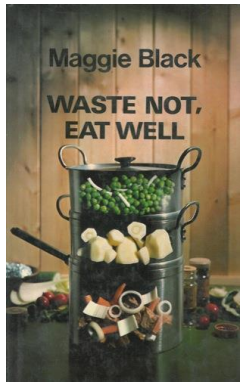

1971/2021
30 editions



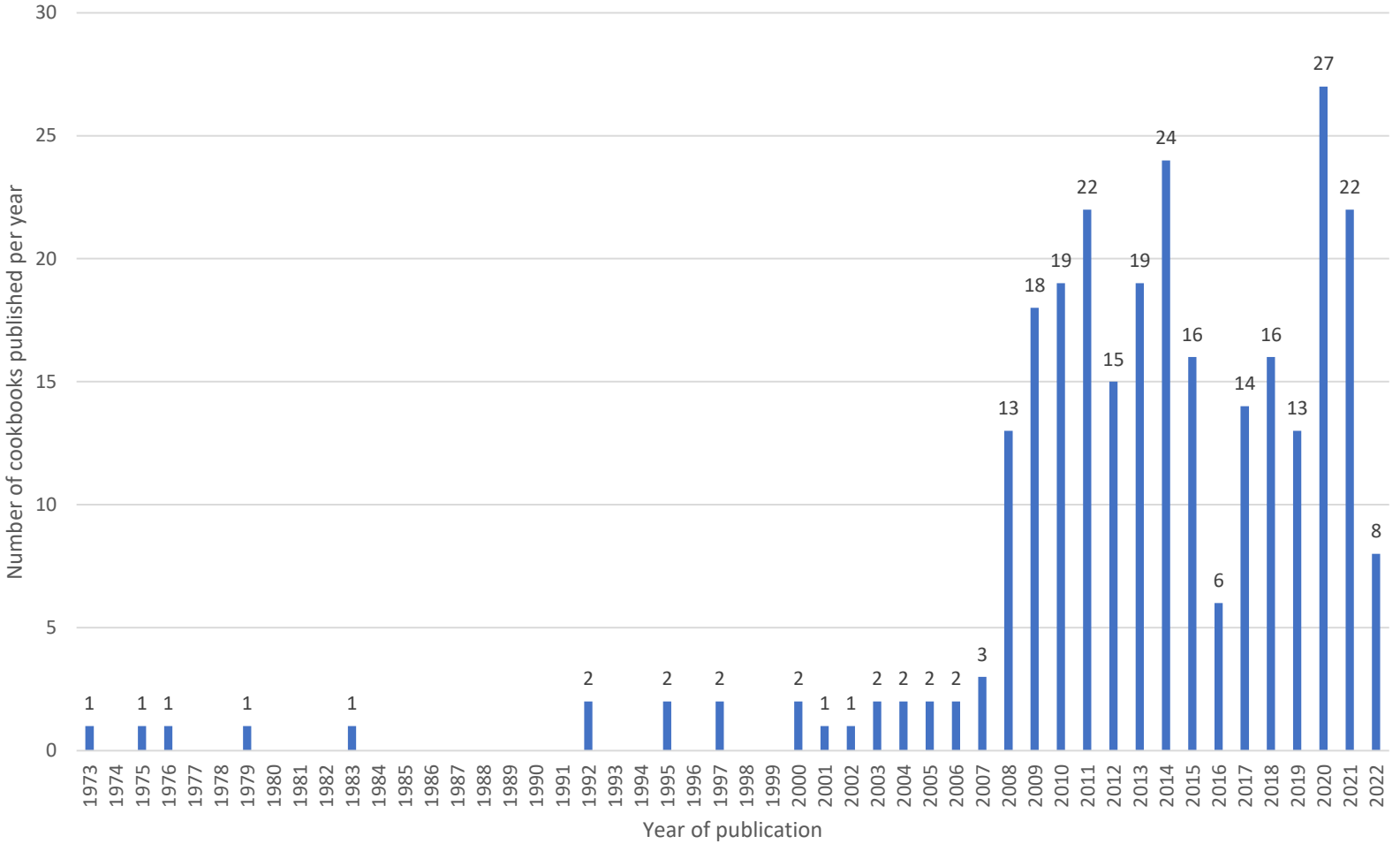

1973/1985

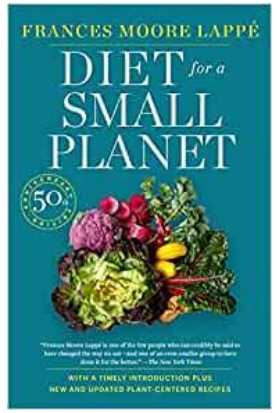



1975




1976



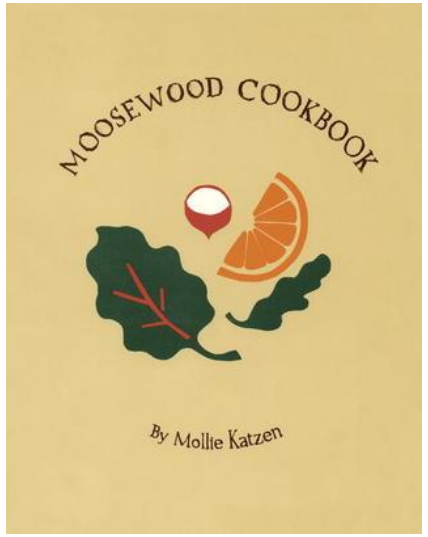



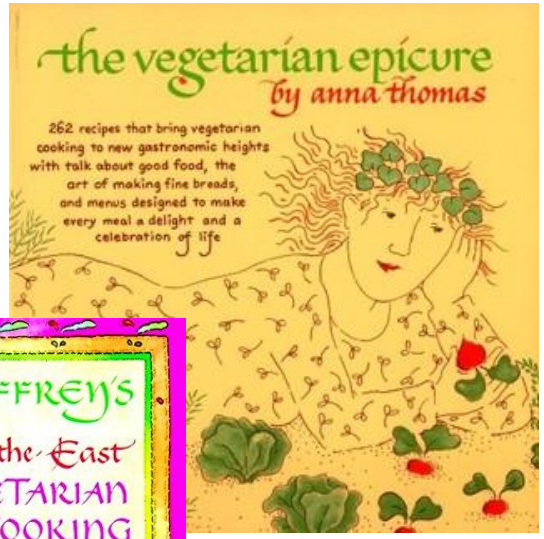

2021

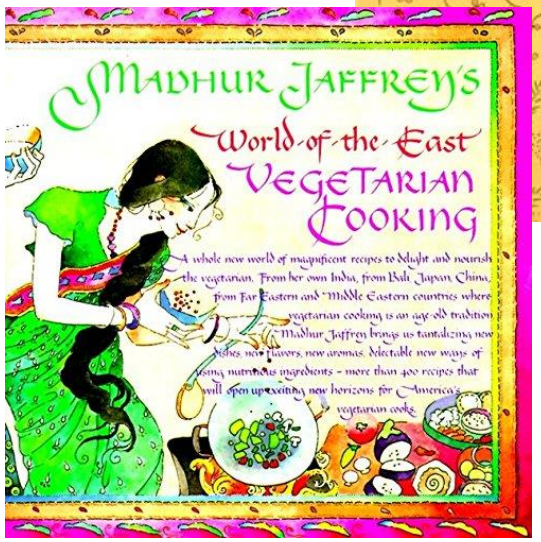
* https://www.eatyourbooks.com/ has n=160,943 books in its database (oldest book 1833), vegetarian n=5,428 (oldest book 1950) , vegan n=1,433 (oldest book 1982)

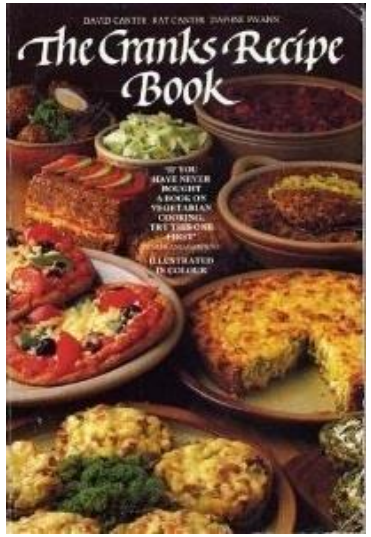
# This did not include other “classics”

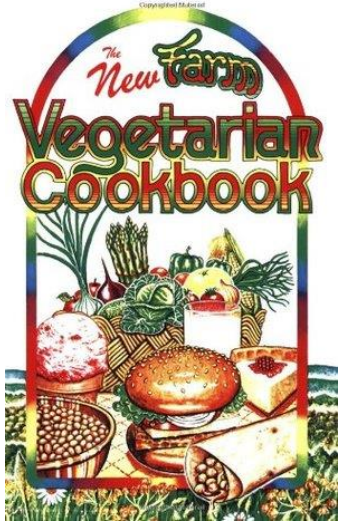
A limitation of this survey was that it missed many classic books that might also be considered sustainable such as vegetarian or vegan cookbooks that do not mention “sustainability” etc. in their title (but do in the text). This method also misses non English language cookbooks.



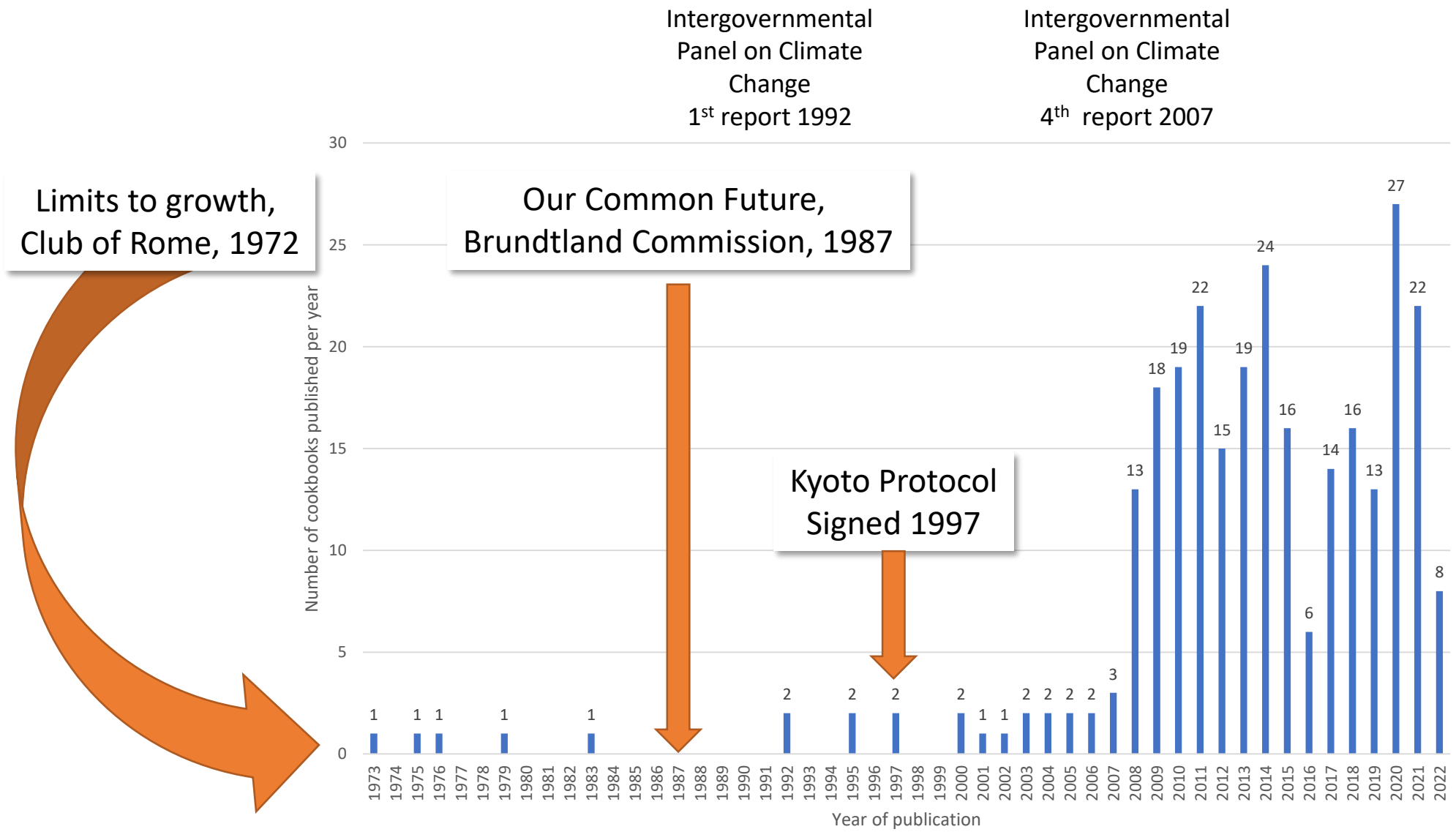



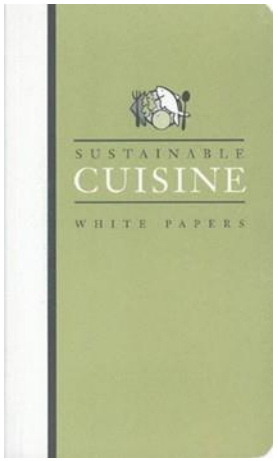



# Context for sustainability and climate change

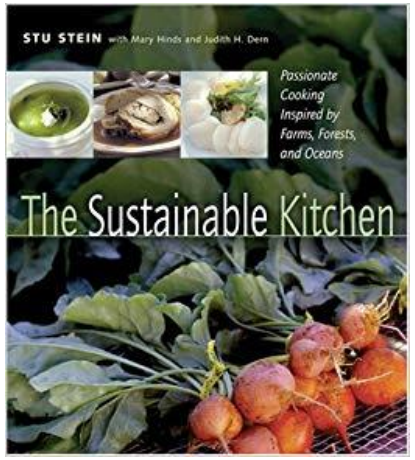
*2007, the IPCC and U.S. Vice-President Al Gore were jointly awarded the Nobel Peace Prize*



# 2000-2007







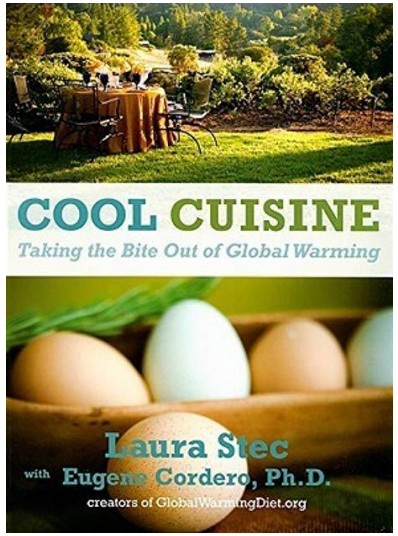

15 titles including…

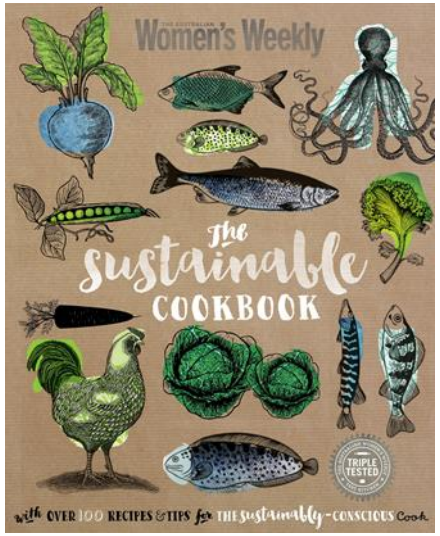
*2000 Planet Organic: Organic Cookbook by Eric Treuille and Renee Elliot*
*2000 Sustainable Cuisine: White Papers by Earth Pledge*
*2004 The Sustainable Kitchen: Passionate Cooking Inspired by Farms, Forests and Oceans*

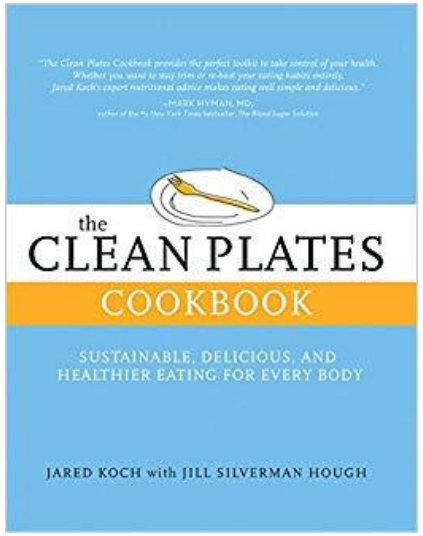
- ‘Local’ and small scale (supporting CSA) Understand ingredients (and their complex production processes and histories).
- Highlighted sustainable food is more than low environmental impact, needed to sustain heritage and community economies.
- No mention of cooking impacts
- Contains beef, lamb etc.

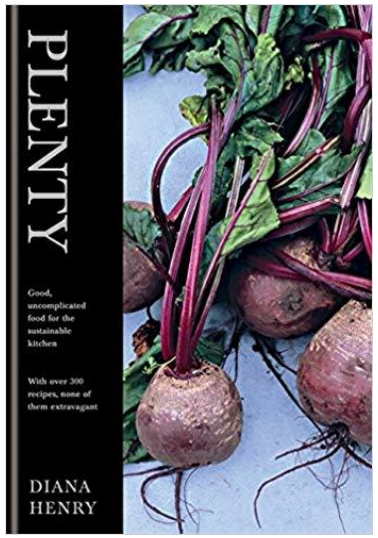
# 2008-2022

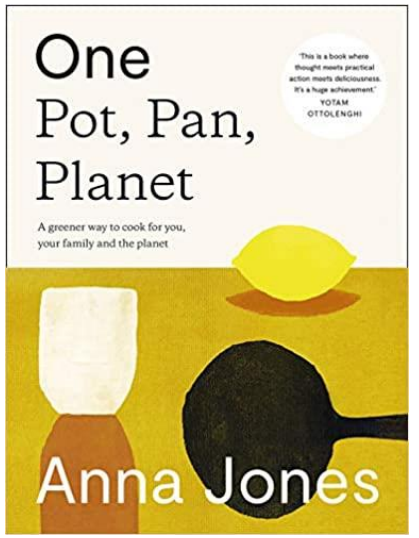
- 252 books, average of 16 published per year!
- Majority omnivorous recipes (containing beef or lamb), Become more plant based as time goes on…
- Rise and fall of sustainable seafood.
- Some read like “wellness” books.
- None of the books give the amount of carbon embodied in their recipes.
- All ask the reader to change behaviour: using leftovers, shopping organic, buying local, mindful eating, and eating seasonally.
- Books mention cooking impacts, but still use oven recipes and use beef/lamb.



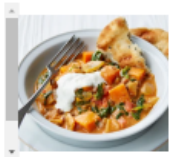
# What I had hoped to present in the rest of my talk…

I had hoped to present an analysis of how recipes from different sustainable cookbooks rate in terms of quantified sustainability impacts – e.g. Carbon footprint (kg of Co2e), water footprint etc.

However, our project's tool currently can only calculate the impacts of recipes from websites.

BBC goodfood

Coconut & squash dhansak



Prep: 5 mins
Cook: 15 mins
Easy
Serves 4

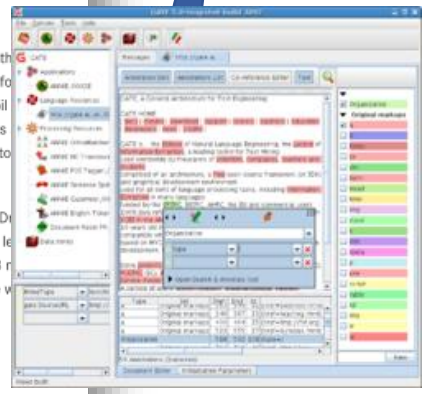
**Ingredients**

- 1 tbsp vegetable oil
- 500g butternut squash (about 1 small squash), peeled and chopped into bite-sized chunks (or buy a pack of ready-prepared to save time), see tip, below left
- 100g frozen chopped onions
- 4 heaped tbsp mild curry paste (we used korma)
- 400g can chopped tomatoes
- 400g can light coconut milk
- mini naan bread, to serve
- 400g can lentils, drained
- 200g bag baby spinach
- 150ml coconut yogurt (we used Rachel's Organic), plus extra to serve

**Method**

**Step 1** Heat the oil in a large pan. Put the squash in a bowl with of water. Cover with cling film and microwave on High fo or until tender. Meanwhile, add the onions to the hot oil for a few mins until soft. Add the curry paste, tomatoes coconut milk, and simmer for 10 mins until thickened to sauce.

**Step 2** Warm the naan breads in a low oven or in the toaster. D liquid from the squash, then add to the sauce with the le spinach and some seasoning. Simmer for a further 2-3 r wilt the spinach, then stir in the coconut yogurt. Serve w warm naan and a dollop of extra yogurt.



What recipe would you like to process?

URL https://www.bbcgoodfood.com/recipes/coconut-squash-dhansak PROCESS

Please be aware that some pages may be slow to process, especially if they contain multiple recipes.

Recipe for 'Coconut & squash dhansak recipe | BBC Good Food'

| | |
|---|---|
| Ingredients | 150ml coconut, butternut squash, coconut milk, lentils, onions, spinach, tomatoes, vegetable oil |
| GHGE | 1.74 kg CO2eq (-1.76 kg CO2eq to 12.4400015 kg CO2eq) |
| GHGE per Portion | 0.435 kg CO2eq (-0.44 kg CO2eq to 3.1100004 kg CO2eq) |
| Eutrophying Emissions | 17.84 g PO43-eq (4.84 g PO43-eq to 52.99 g PO43-eq) |
| Eutrophying Emissions per Portion | 4.46 g PO43-eq (1.21 g PO43-eq to 13.2475 g PO43-eq) |
| Acidifying Emissions | 39.66 g SO2eq (14.56 g SO2eq to 98.56 g SO2eq) |
| Acidifying Emissions per Portion | 9.915 g SO2eq (3.64 g SO2eq to 24.64 g SO2eq) |
| Freshwater Withdrawals | 2555.65 L (52.63 L to 7625.27 L) |
| Freshwater Withdrawals per Portion | 638.9125 L (13.1575 L to 1906.3175 L) |
| Stress Weighted Water Use | 135247.9 L (742.7 L to 474483.9 L) |
| Stress Weighted Water Use per Portion | 33811.977 L (185.675 L to 118620.98 L) |

THIS TOOL HAS BEEN DEVELOPED WITH A RESEARCH GRANT FROM THE ALPRO FOUNDATION

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# Results – high level

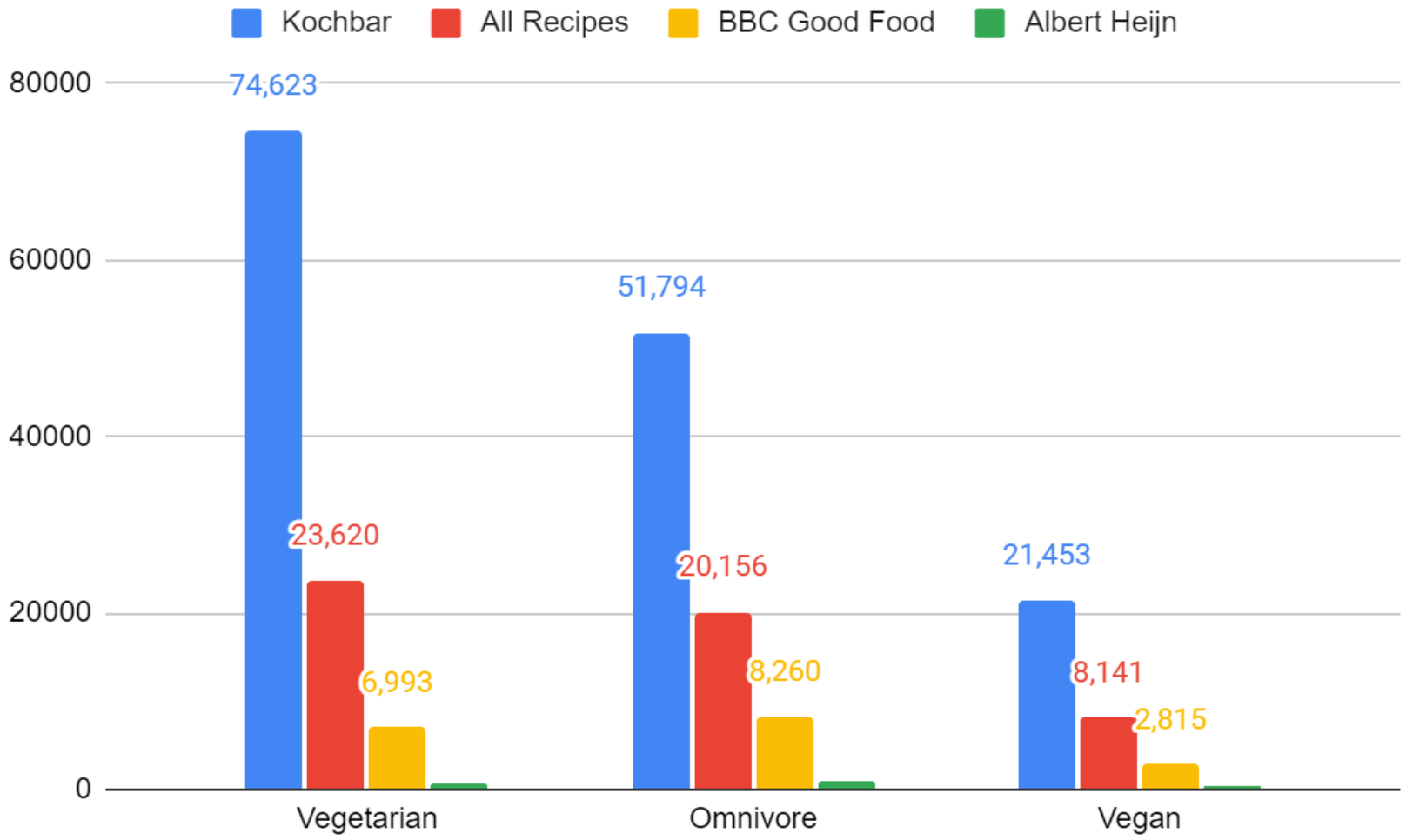


Figure 1. Number of Recipes per datasource, per diet

# Results – high level

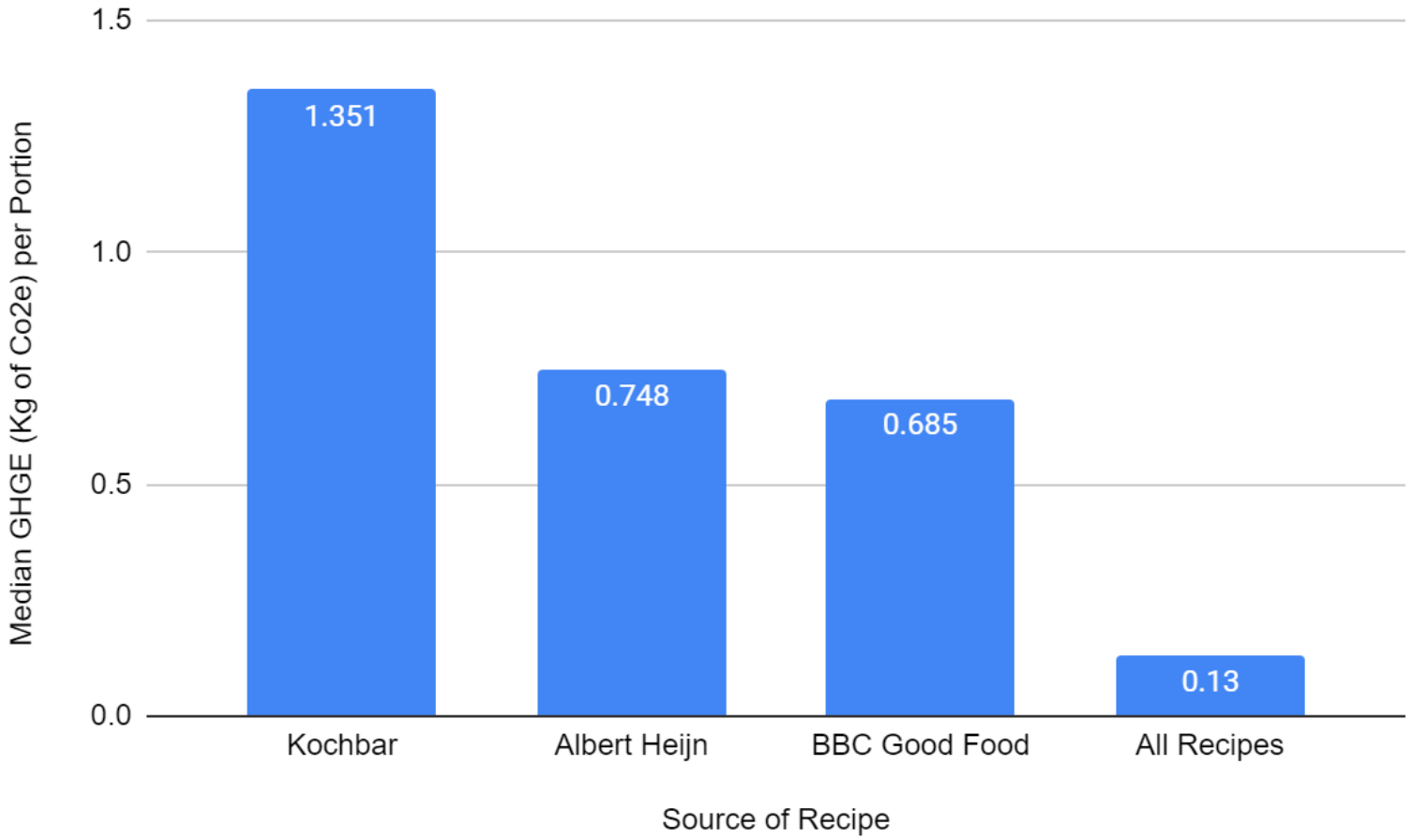


Figure 2. Median GHGE (Kg of Co2e) per Portion, per datasource

*Reminder the EAT-Lancet has a carbon budget of 1.78kg of CO2e per person per day – that's ~0.59kg of CO2e per main meal*

# Results – high level

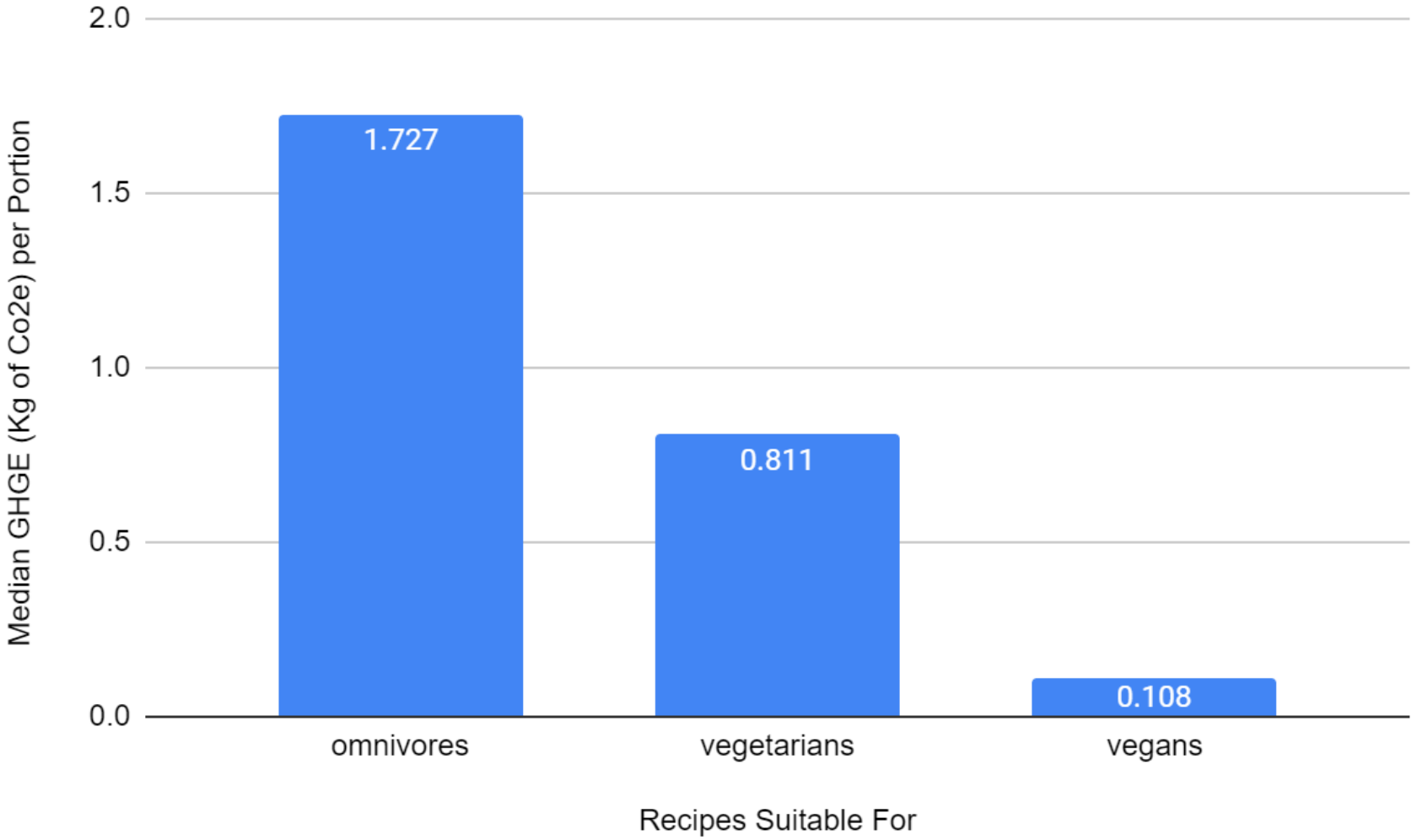


Figure 3. Median GHGE (Kg of Co2e) per Portion, per diet

*Reminder the EAT-Lancet has a carbon budget of 1.78kg of CO2e per person per day – that's ~0.59kg of CO2e per main meal*

# Results – high level

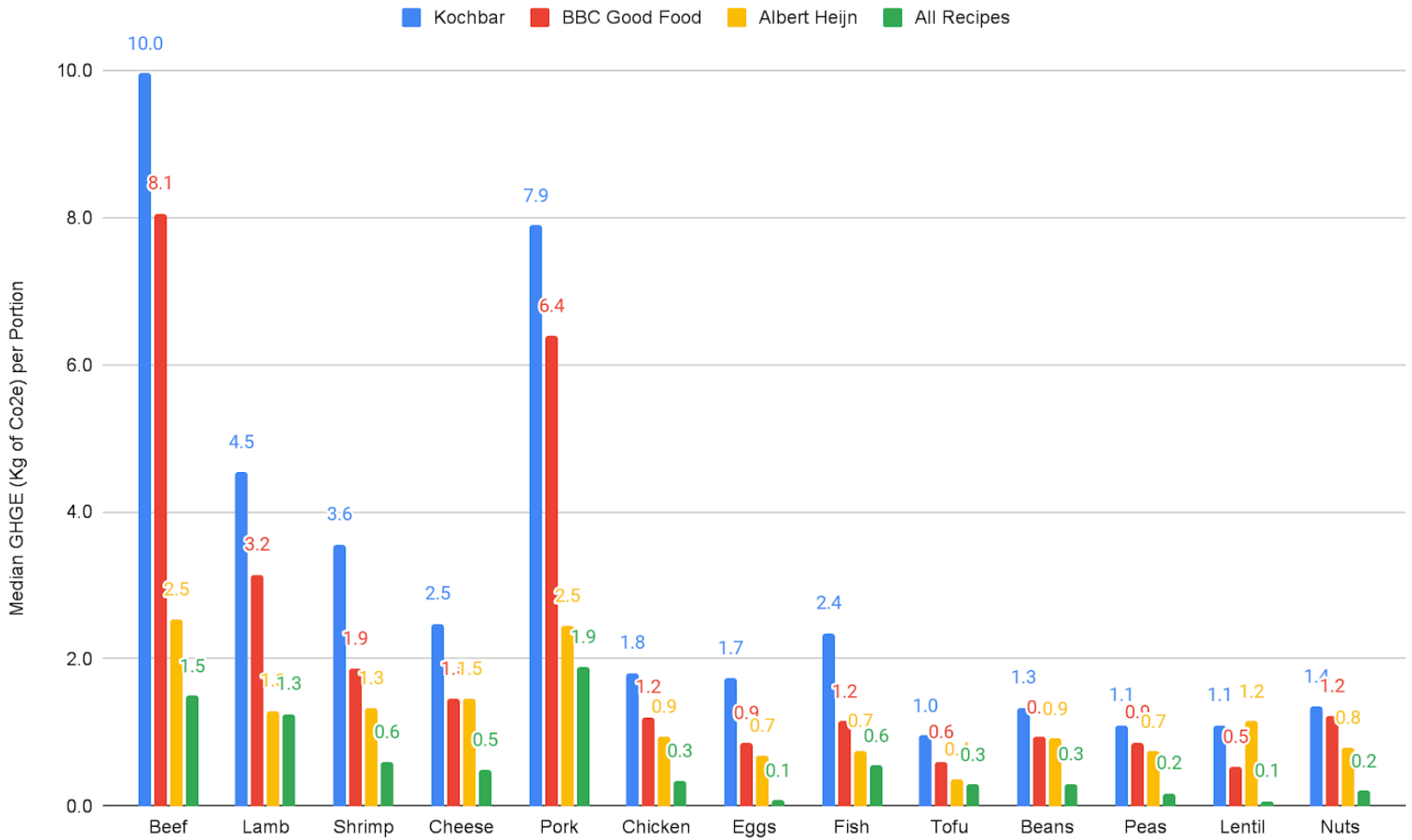


Figure 4. Median GHGE (Kg of Co2e) per Portion, Ingredient/Protein sources, and Datasource

*Reminder the EAT-Lancet has a carbon budget of 1.78kg of CO2e per person per day – that's ~0.59kg of CO2e per main meal*

# Results – high level

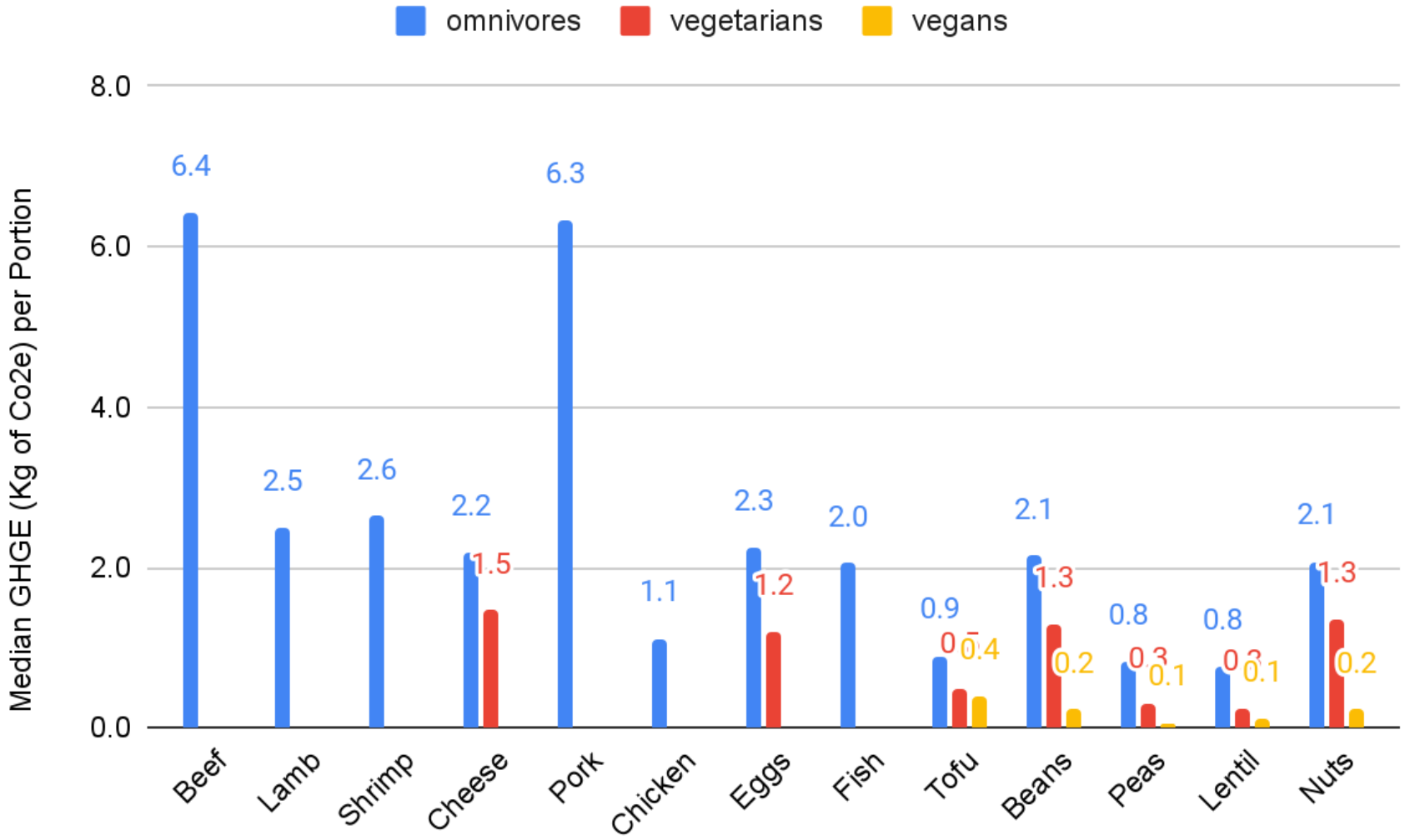


Figure 5. Median GHGE (Kg of Co2e) per Portion, Ingredient/Protein sources, and Diet

*Reminder the EAT-Lancet has a carbon budget of 1.78kg of CO2e per person per day – that's ~0.59kg of CO2e per main meal*

# Results – lets deep dive! Tofu vs Beef

| | GHG 5% CI | GHG Emissions (kg CO2eq/kg, IPCC 2013 incl. CC feedbacks) Mean | GHG Emissions 95% CI |
|---|---|---|---|
| Korean Tofu And Vegetable Soup | 0.97 | 2.23 | 4.99 |
| Mapo Tofu | 1.48 | 2.98 | 6.3 |
| Aarsis Tofu Curry | 0.93 | 2.63 | 9.41 |
| Crispy Tofu | 0.64 | 1.39 | 3.15 |
| Annas Scrambled Tofu | 0.6 | 1.33 | 2.96 |
| Limantro Tofu | 0.53 | 1.24 | 2.79 |
| Tofu Scramble | 0.53 | 1.3 | 3.67 |
| Barbecue Tofu Sandwiches | 1.12 | 2.95 | 9.59 |
| Sweet Sour Tofu | 0.26 | 0.74 | 2.43 |
| Salt Pepper Tofu | 0.83 | 2.25 | 7.79 |

| | GHG 5% CI | GHG Emissions (kg CO2eq/kg, IPCC 2013 incl. CC feedbacks) Mean | GHG Emissions 95% CI |
|---|---|---|---|
| Beef Curry | 19.39 | 51.59 | 141.96 |
| Beef Goulash | 28.31 | 75.05 | 205.83 |
| Beef Stroganoff | 20.48 | 53.7 | 144.17 |
| Beef Tips and Merlot Gravy with Beef and Onion Rice | 17.51 | 46.29 | 124.59 |
| Broccoli Beef I | 17.24 | 45.64 | 123.24 |
| Kellys Pressure Cooker Beef Stew | 21.57 | 57.11 | 153.83 |
| Beef Bourguignon | 63.81 | 166.58 | 446.88 |
| Creamed Beef | 18.74 | 48.65 | 129.81 |
| Slow Cooker Beef Stew | 34.18 | 90.42 | 244.22 |
| Coffee Crusted Beef Tenderloin Steak | 6.47 | 17.13 | 46.18 |

# Results – Cake VS Salads?

It becomes more complex with different dish types

| | GHG 5% CI | GHG Emissions (kg CO2eq/kg, IPCC 2013 incl. CC feedbacks) Mean | GHG Emissions 95% CI |
|---|---|---|---|
| Baked Fudge Cake | 0.73 | 6.37 | 23.48 |
| Carrot Cake | 3.74 | 9.92 | 22.18 |
| Chocolate Caramel Nut Cake | -0.95 | 12.64 | 67.39 |
| Easy Chocolate Cake | 0.87 | 16.50 | 74.04 |
| Chocolate Raspberry Birthday Layer Cake | 3.41 | 11.80 | 33.81 |
| Double Chocolate Cake Ii | -0.40 | 15.13 | 76.12 |
| Applesauce Cake Iii | 0.84 | 2.07 | 3.52 |
| Kaylas Southern Pecan Mist Cake | 0.89 | 4.94 | 12.18 |
| Vegan Lemon Cake | 0.64 | 2.01 | 3.65 |
| Easy Fruit Cobbler Cake | 0.38 | 1.04 | 1.96 |

| | GHG 5% CI | GHG Emissions (kg CO2eq/kg, IPCC 2013 incl. CC feedbacks) Mean | GHG Emissions 95% CI |
|---|---|---|---|
| 10minute Couscous Salad | -0.13 | 1.55 | 5.53 |
| Lentil Salad Tahini Dressing | 2.94 | 7.35 | 17.63 |
| Cilantro Avocado Tomato And Feta Salad | 1.85 | 5.63 | 19.91 |
| Epic Summer Salad | 2.67 | 6.96 | 20.40 |
| Greek Salad V | 1.90 | 4.80 | 13.40 |
| Taco Salad | 17.87 | 46.77 | 126.20 |
| Georgia Cracker Salad | 1.16 | 2.04 | 4.53 |
| Easy Broccoli Salad | 0.34 | 0.92 | 1.95 |
| Junked Up Kale Salad | -0.13 | 2.58 | 8.74 |
| Raw Vegan Broccoli Salad | 0.16 | 1.07 | 2.51 |

# Conclusions

- Sustainable cookbooks have emerged as their own unique (sub) field of cookbook since the 1970s (with 2008 being the turning point of accelerated publishing).
- However, there is limited differentiation of recipes (and cooking methods) found in sustainable cookbooks from other cookbooks
- Post 2008 cookbooks share similarities with contemporary vegetarian / vegan / wellness books.

- To meet the EAT-Lancet recommendations we need to redesign recipes to be less than ~0.59kg of CO2e per main meal
- Current recipes on websites have an average carbon impact per portion of 0.8 kg of Co2e (vegetarian) and 0.1 kg of Co2e (vegan)

# Please do get in touch

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