

The importance of vegetables in the UK

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Conference: **'Celebrating 70 years of research on vegetables at Wellesbourne'**

School of Life Sciences, University of Warwick, Warwick Conference Centre,
Wellesbourne, Warwickshire

December 18 2019



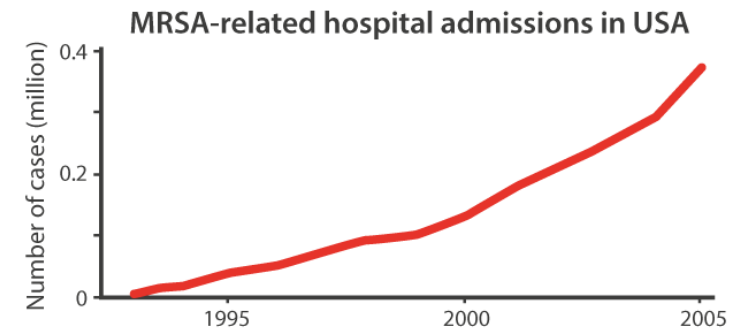
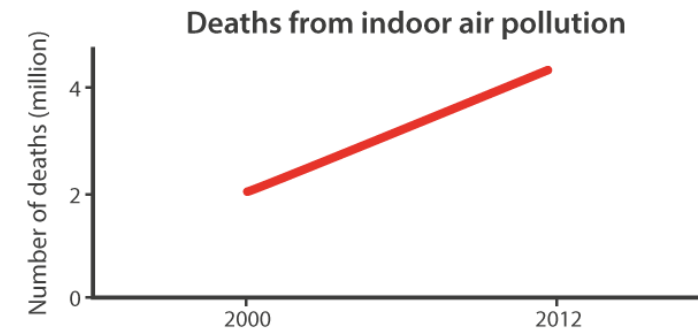
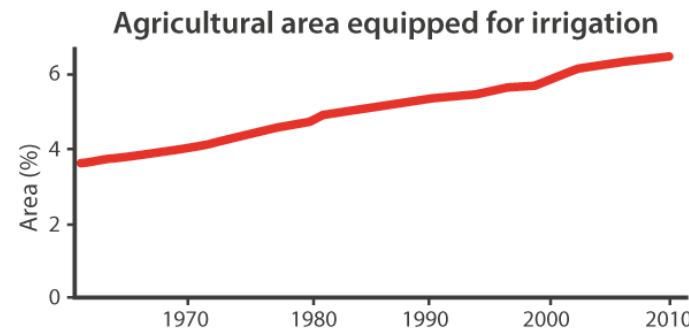
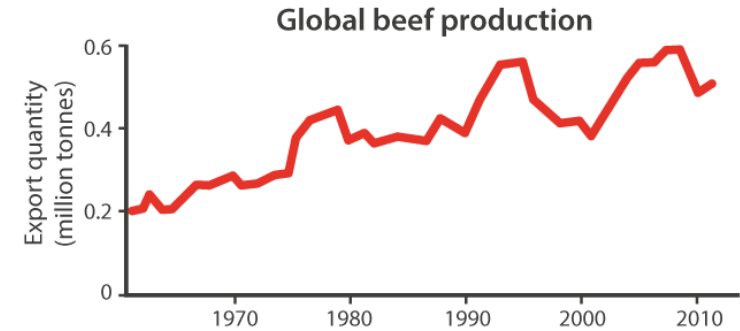
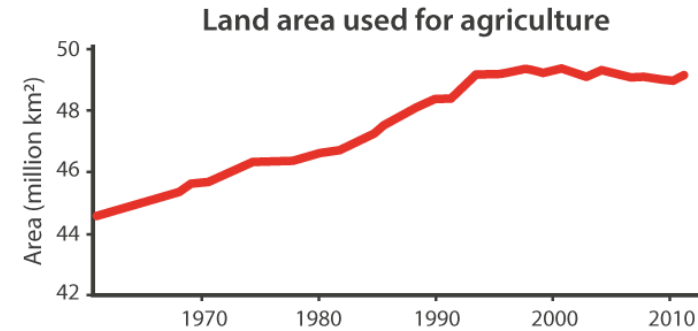
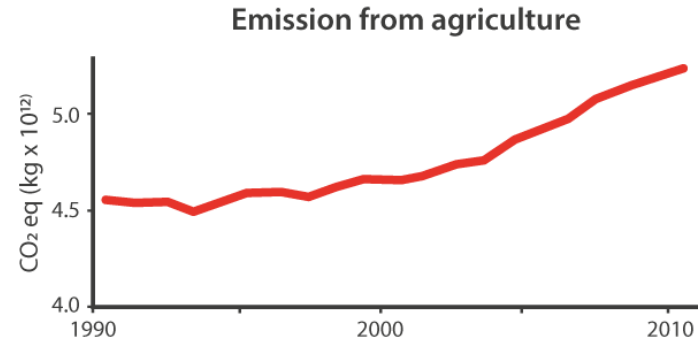
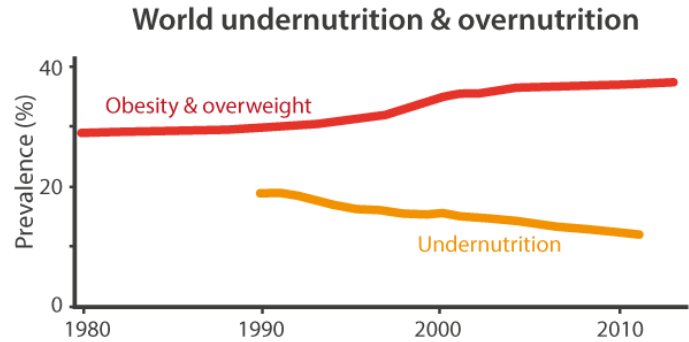
1. Overview

Main thoughts

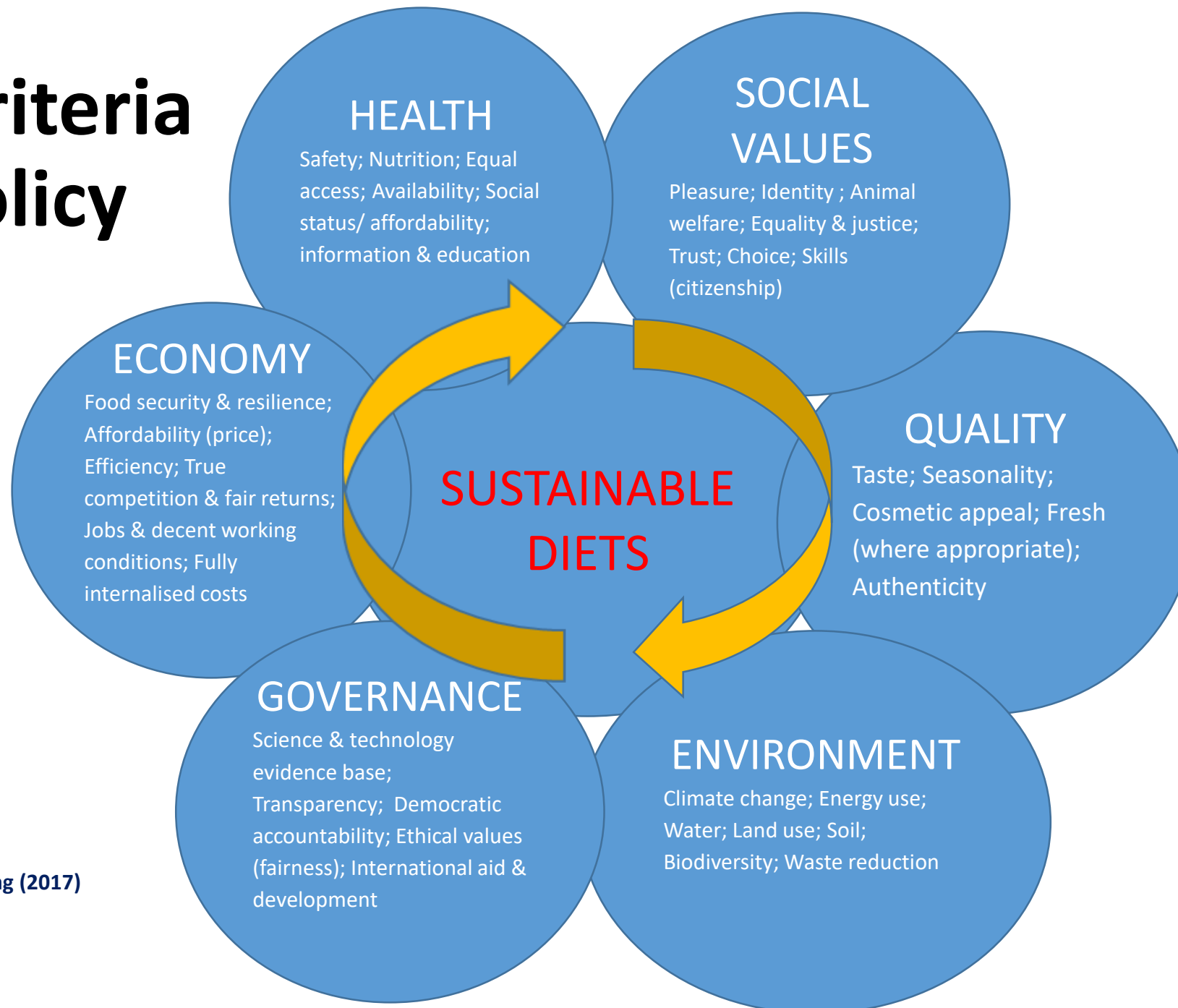
My thoughts for debate

- Brexit politics are messy but now a policy opportunity (NFS)
- UK doesn't feed itself
- I think this does matter: food imperialism, security, sustainability
- UK & world under-consume fruit and vegetables
- Plant-based diets are good news for health + land use
- Horticulture needs to be stronger in the field + policy table
- Social sciences not just life sciences are needed
- = time for UK veg scientists to be more active outside!

A Great Acceleration in the Global Food System



Multi-criteria Food Policy



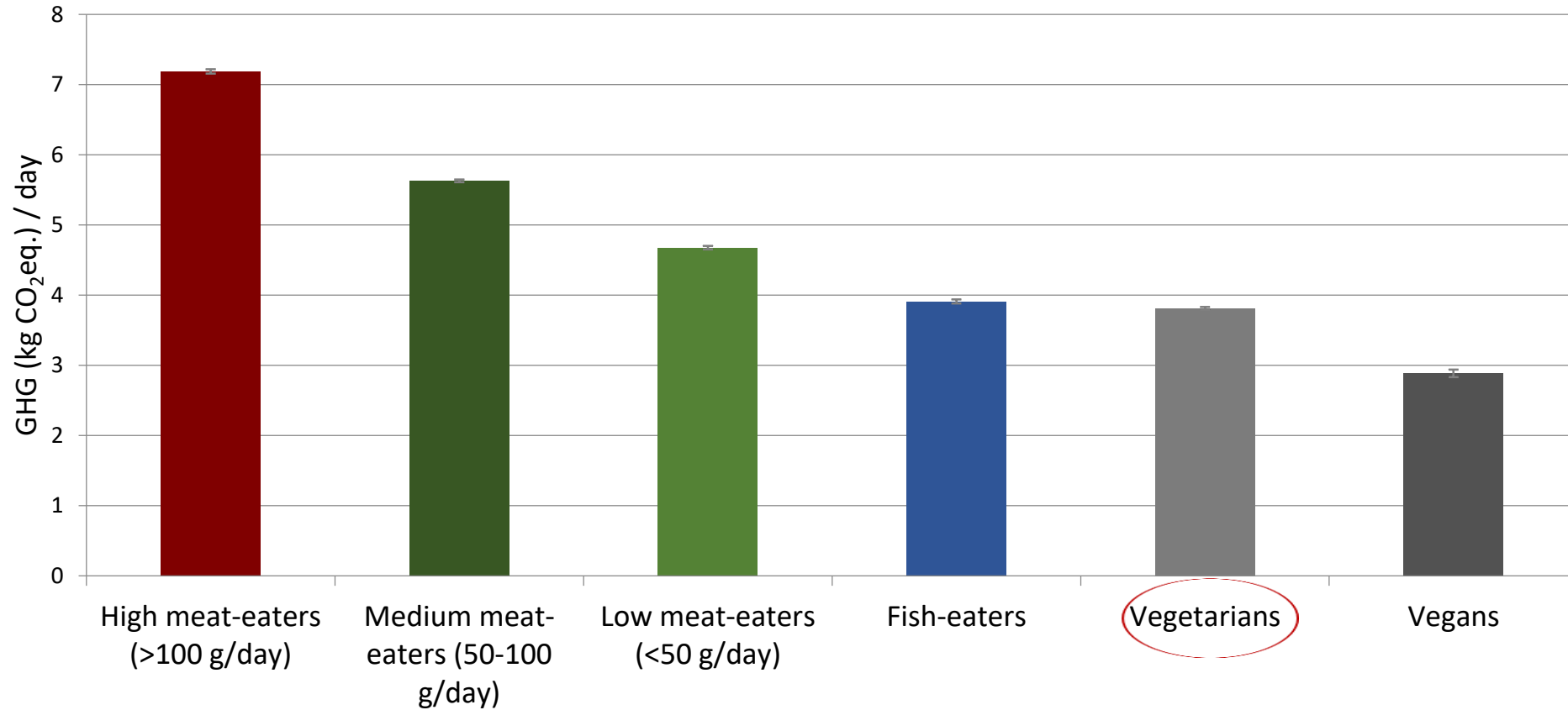
Source: Mason P & T Lang (2017)
Sustainable Diets
Routledge

2. F & V become ever more central to C 21st diets

Modelling studies of different dietary patterns and their impacts

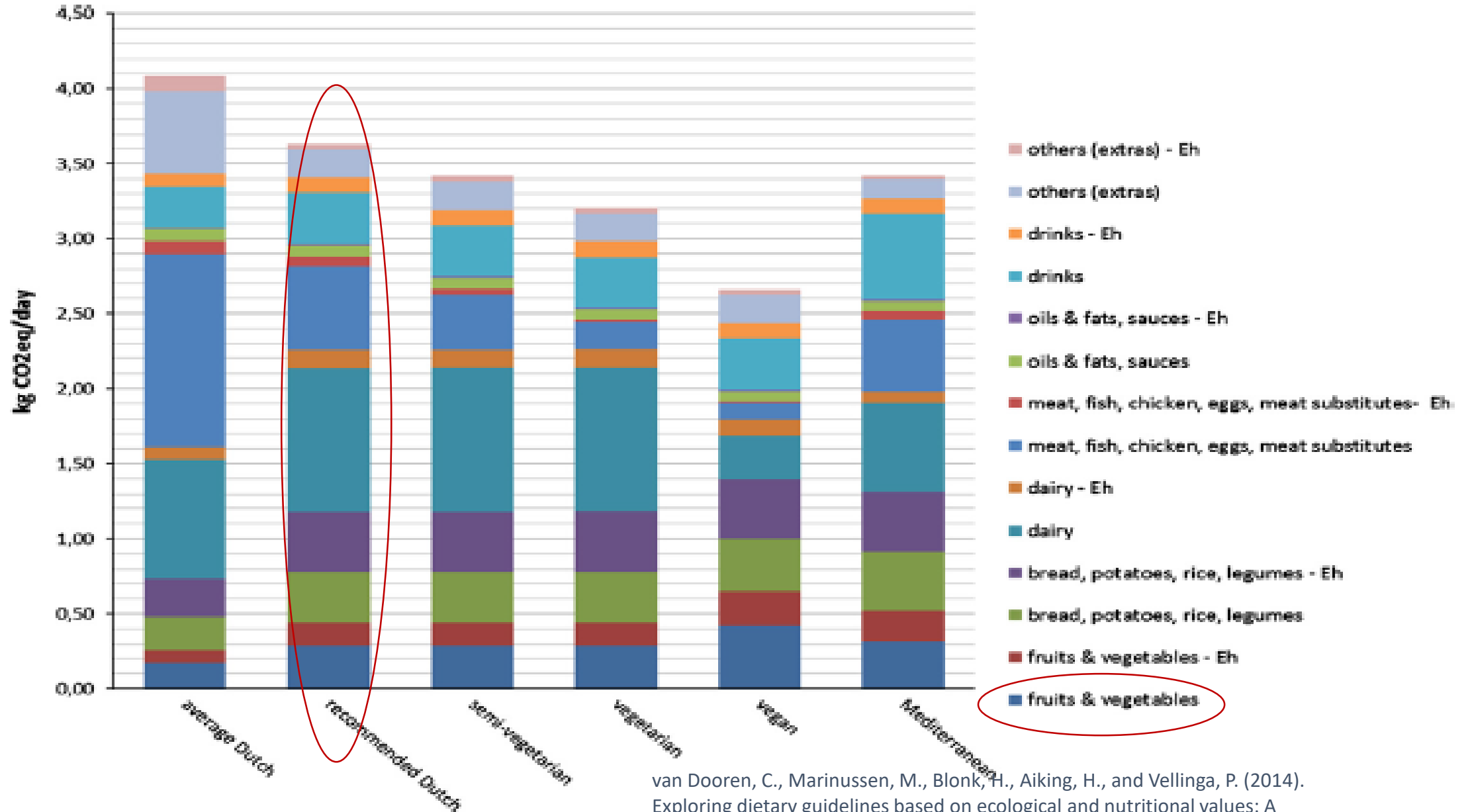
This ruffles feathers (meat industry & culture) but.....

Real life non-meat diets have lower GHGs than various meat-based diets (UK example)



Scarborough, P., Appleby, P.N., Mizdrak, A., Briggs, A.D.M., Travis, R.C., Bradbury, K.E., and Key, T.J. (2014) Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic Change*, 125(2), 179-192

UK is not alone: the Recommended Dutch diets have lower GHGs than average Dutch diets, but higher GHGs than balanced vegetarian, vegan or Mediterranean diets



van Dooren, C., Marinussen, M., Blonk, H., Aiking, H., and Vellinga, P. (2014). Exploring dietary guidelines based on ecological and nutritional values: A comparison of six dietary patterns. Food Policy 44, 36–46

LIVEWELL 2020

35%
FRUIT AND VEGETABLES



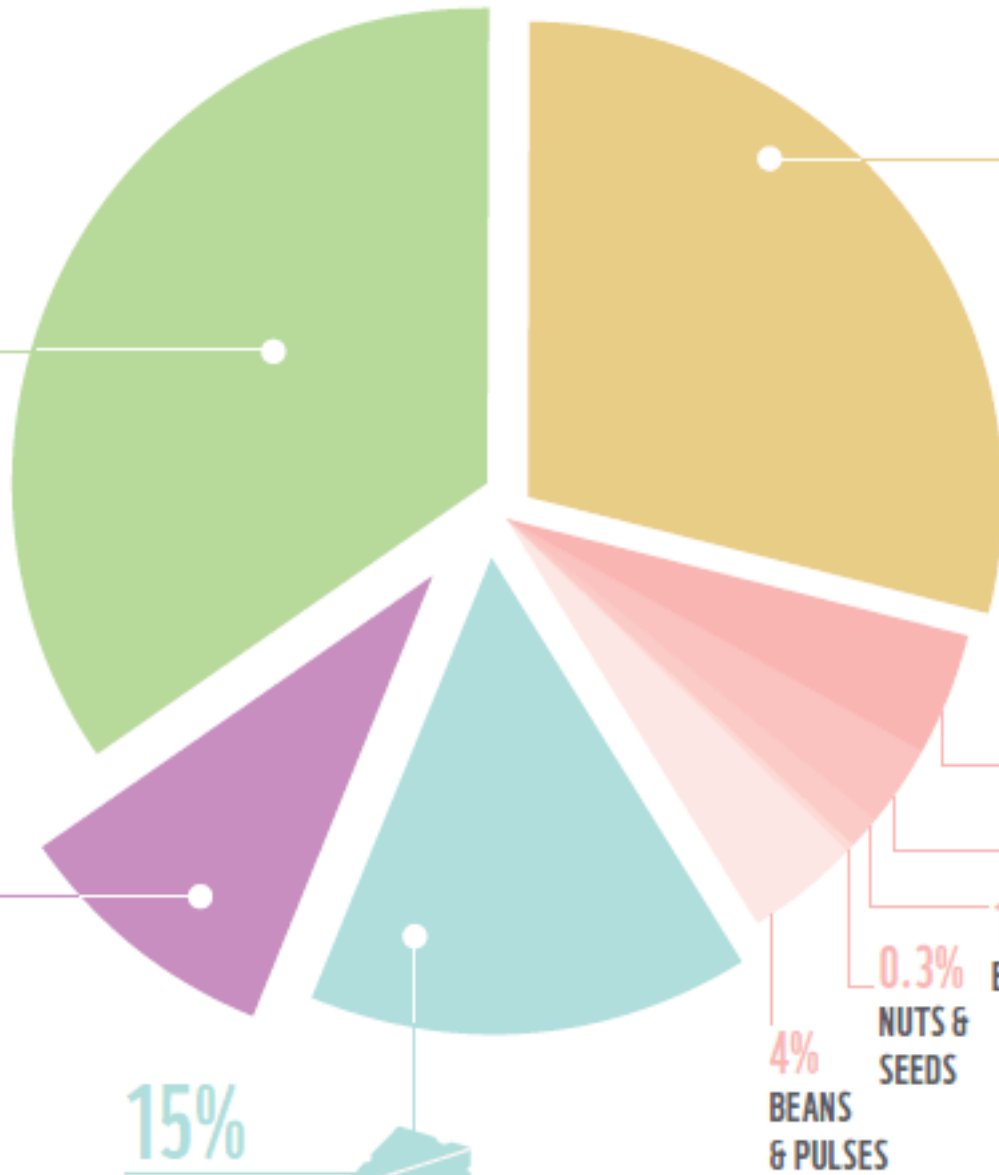
9%
FOOD & DRINKS
HIGH IN FAT
& / OR
SUGAR



15%
MILK & DAIRY
FOODS



29%
BREAD, RICE,
POTATO, PASTA &
OTHER STARCHY
FOODS



Source: WWF Livewell 2020 report

3. Big changes called for by the EAT-Lancet Commission (January 2019)

Willett, Rockström, Loken, Springmann, Lang et al (2019) 'Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems', *The Lancet*, 393, 1017, 447-492

<https://www.thelancet.com/commissions/EAT>

EAT-Lancet Commission Approach

Define a healthy reference diet using the best available evidence (controlled feeding studies, long-term cohort studies, randomized trials).

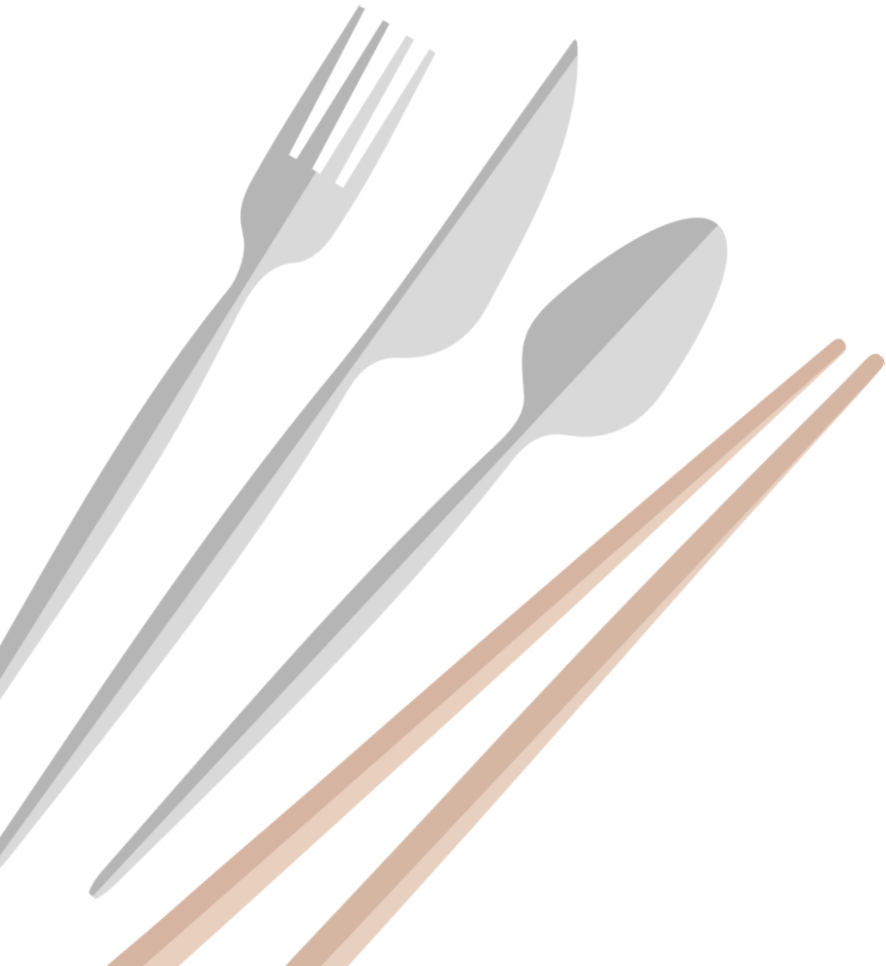
Define planetary boundaries for 6 key environmental systems and processes (GHG, cropland use, water use, nitrogen and phosphorus application, extinction rate).










Apply a global food systems modeling framework to analyze what combinations of readily implementable measures are needed to stay within food production boundaries while still delivering healthy diets by 2050.

Outline Strategies to achieve the changes needed to meet the goal of healthy diets from sustainable food systems for all by 2050.

Target 1 - Healthy Diets

2500 kcal/day



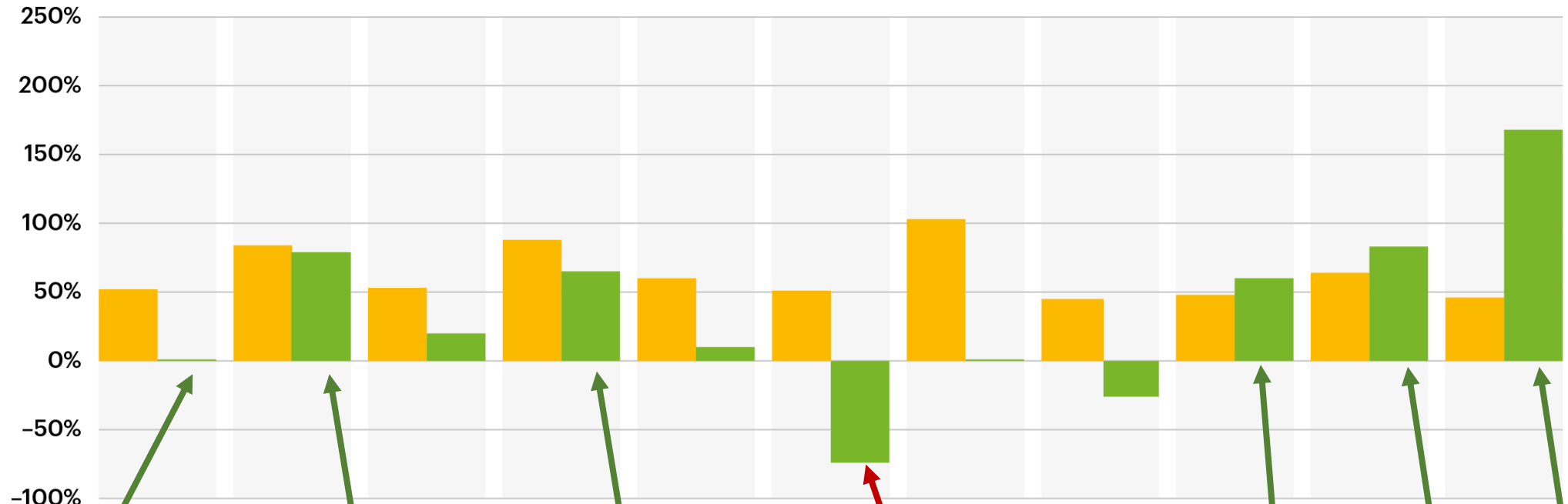
	Macronutrient intake grams per day (possible range)	Caloric intake kcal per day	
 Whole grains Rice, wheat, corn and other	232	811	
 Tubers or starchy vegetables Potatoes and cassava	50 (0-100)	39	
 Vegetables All vegetables	300 (200-600)	78	
 Fruits All fruits	200 (100-300)	126	
 Dairy foods Whole milk or equivalents	250 (0-500)	153	
 Protein sources	Beef, lamb and pork	14 (0-28)	30
	Chicken and other poultry	29 (0-58)	62
	Eggs	13 (0-25)	19
	Fish	28 (0-100)	40
	 Legumes Nuts	75 (0-100) 50 (0-75)	284 291
 Added fats	Unsaturated oils	40 (20-80)	354
	Saturated oils	11.8 (0-11.8)	96
 Added sugars All sugars	31 (0-31)	120	

Samples of Planetary Health Plates



Change in Food Production needed

2050 BAU + full waste 2050 planetary health diet + halve waste



Almost no increase in cereal production

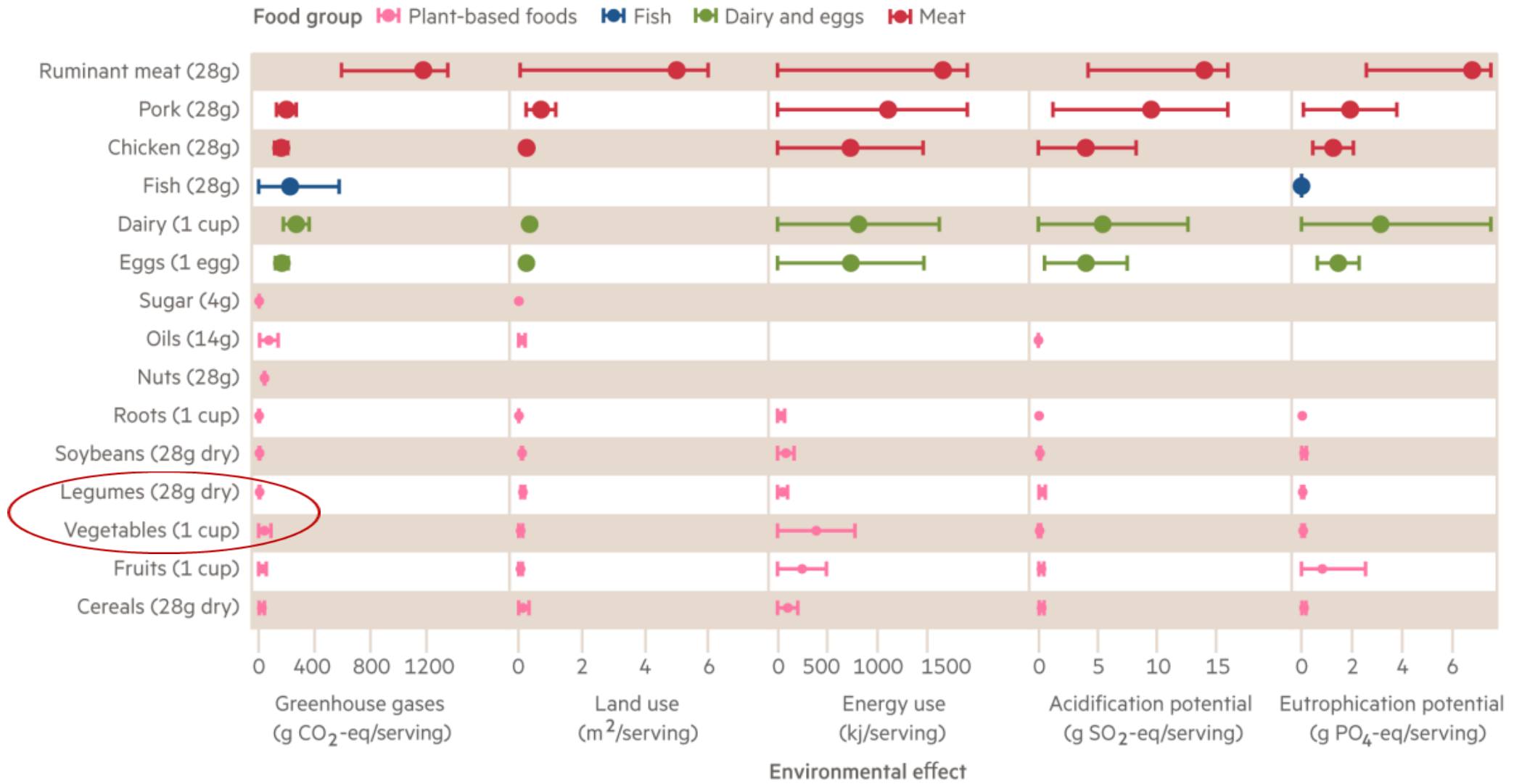
Vegetables +75%

Fruits >50%

Red meat production >65%

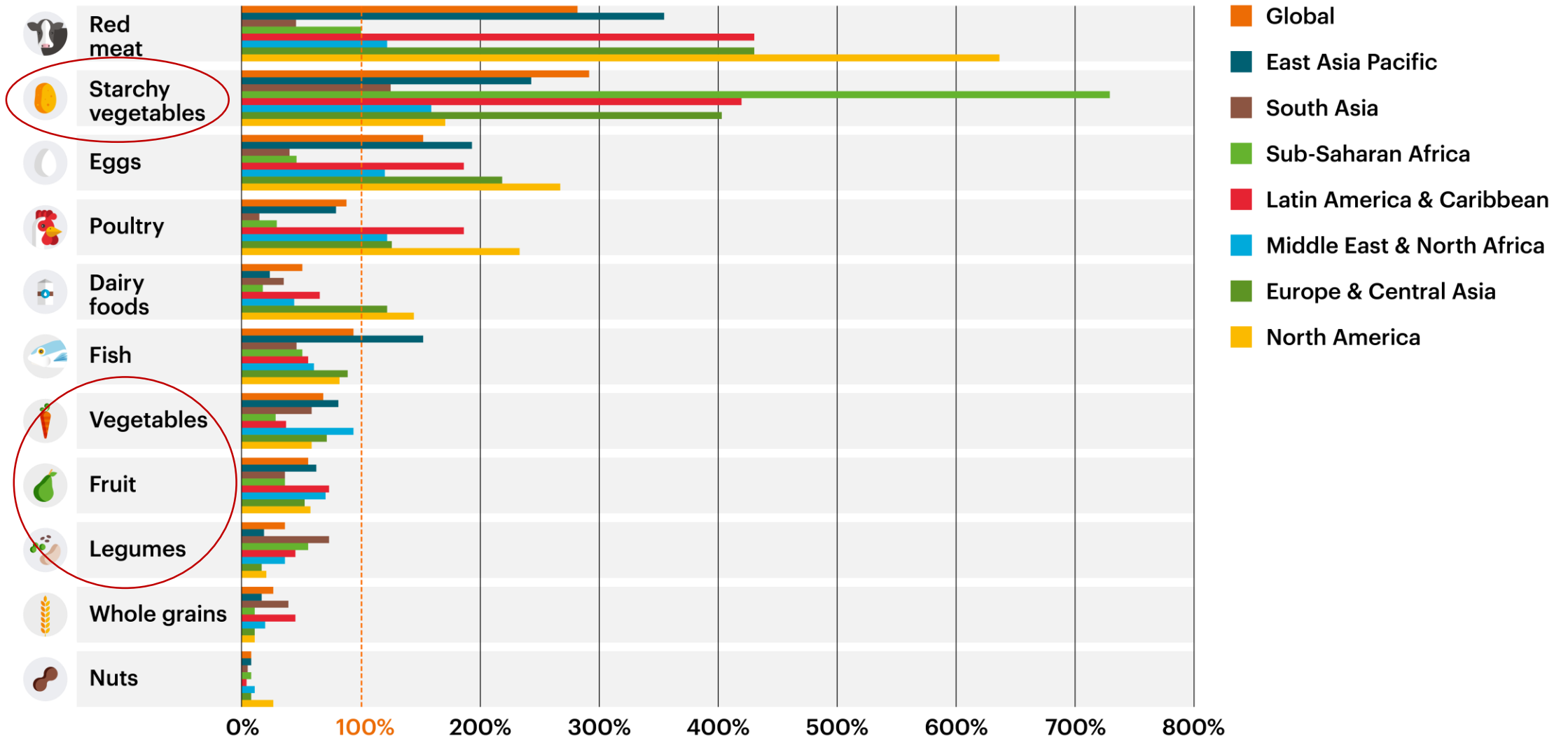
Protein sources
Fish >50%
Legumes >75%
Nuts >150%

Environmental effects per serving of food produced

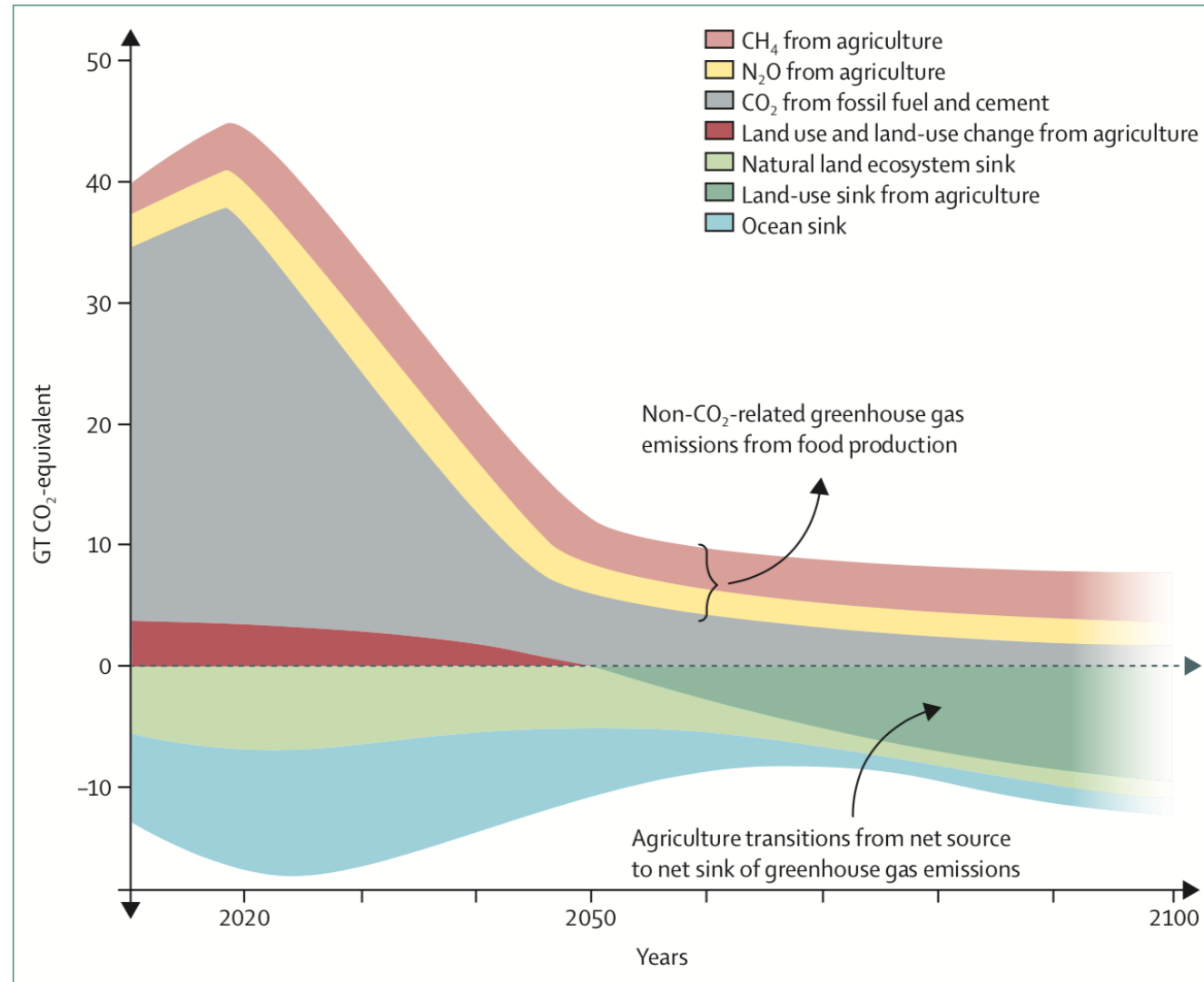


Source: The Lancet Commission
© FT

Current Intakes vs Planetary Health Diet



Food Production with Safe Operating Space for Climate



Achieving Planetary Health Diets

Actions	Description
Dietary shift Planetary health diet	Planetary health diet – as outlined in Table 1.
Halve waste Reduced food loss and waste	Food losses and waste reduced by half, in line with SDG target 12.3.
PROD Improved production practices Standard level of ambition	Closing yield gaps to about 75%; rebalancing N and P application; improving water management; implementation of agricultural mitigation options; and land is expanded first into secondary habitat and then to intact forests to minimize impacts on biodiversity.
PROD+ Improved production practices High level of ambition	Closing yield gaps to 90%; a 30% increase in N use efficiency and 50% recycling rates of P; phase-out of first-generation biofuels; implementation of available bottom-up options for mitigating GHG emissions; and optimizing land-use across regions to minimize impacts on biodiversity.

Yield gap – difference between actual and attainable yields

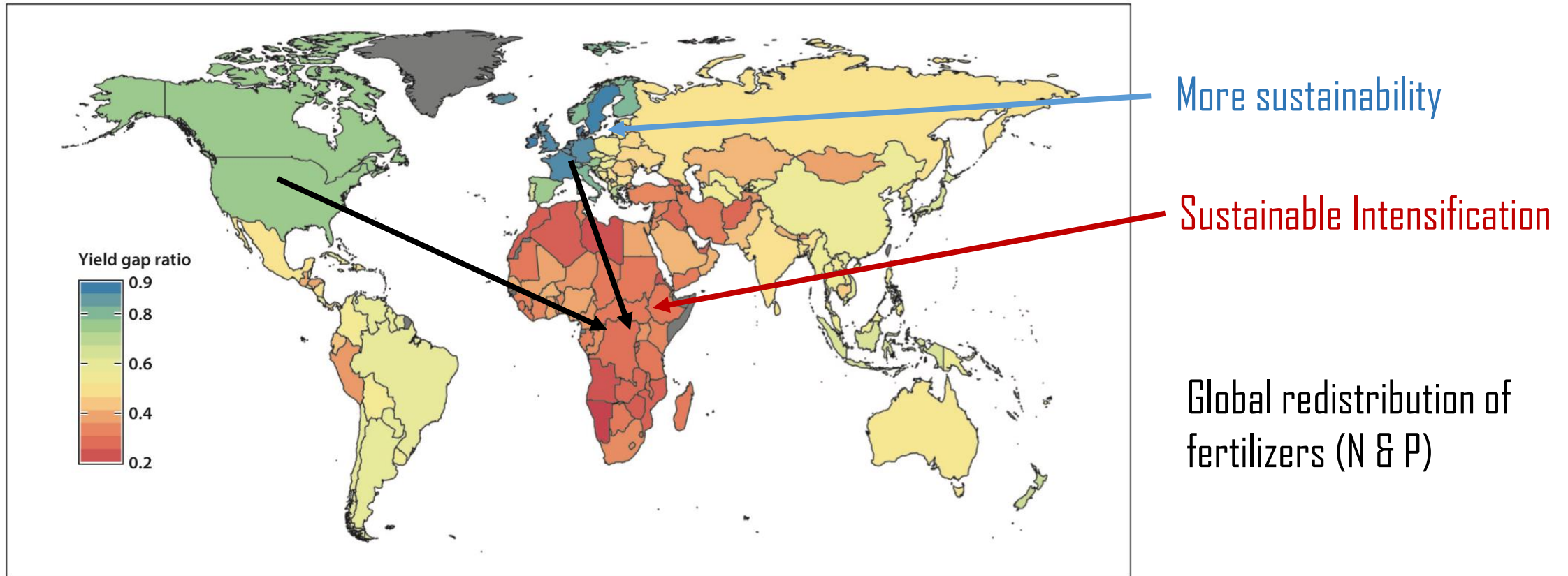


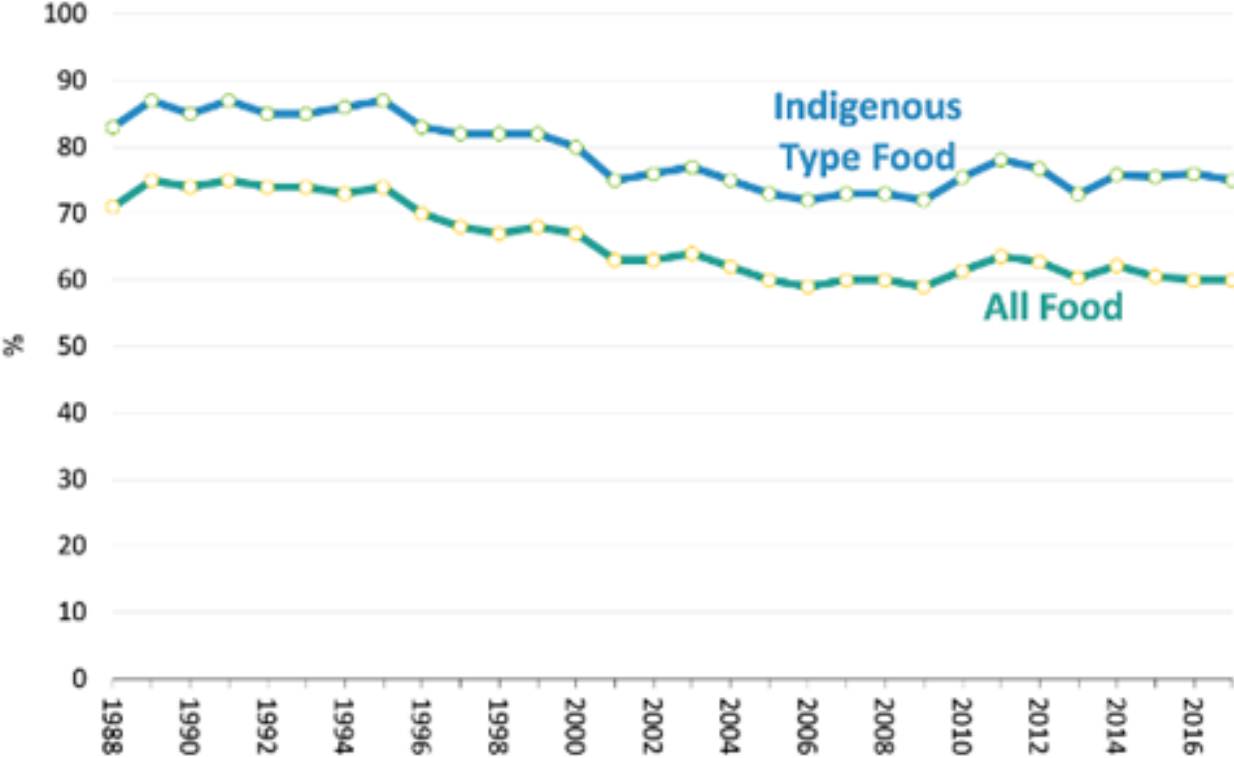
Figure 5

Existing crop yield gaps. Shown is the ratio of current yields to potential yields, as estimated by 92 (see also <http://www.yieldgap.org/water-productivity>). A ratio of 0.2 indicates that a nation, on average, has crop yields 20% of what that nation is capable of yielding. Low ratios indicate large yield gaps, or the difference between current yields and potential yields. Countries in gray are missing data on either current yields or potential yields.

4. Current source of UK food

What is currently grown
Imports by place & route
embedded content

UK Food production to supply ratio, 1988-2017



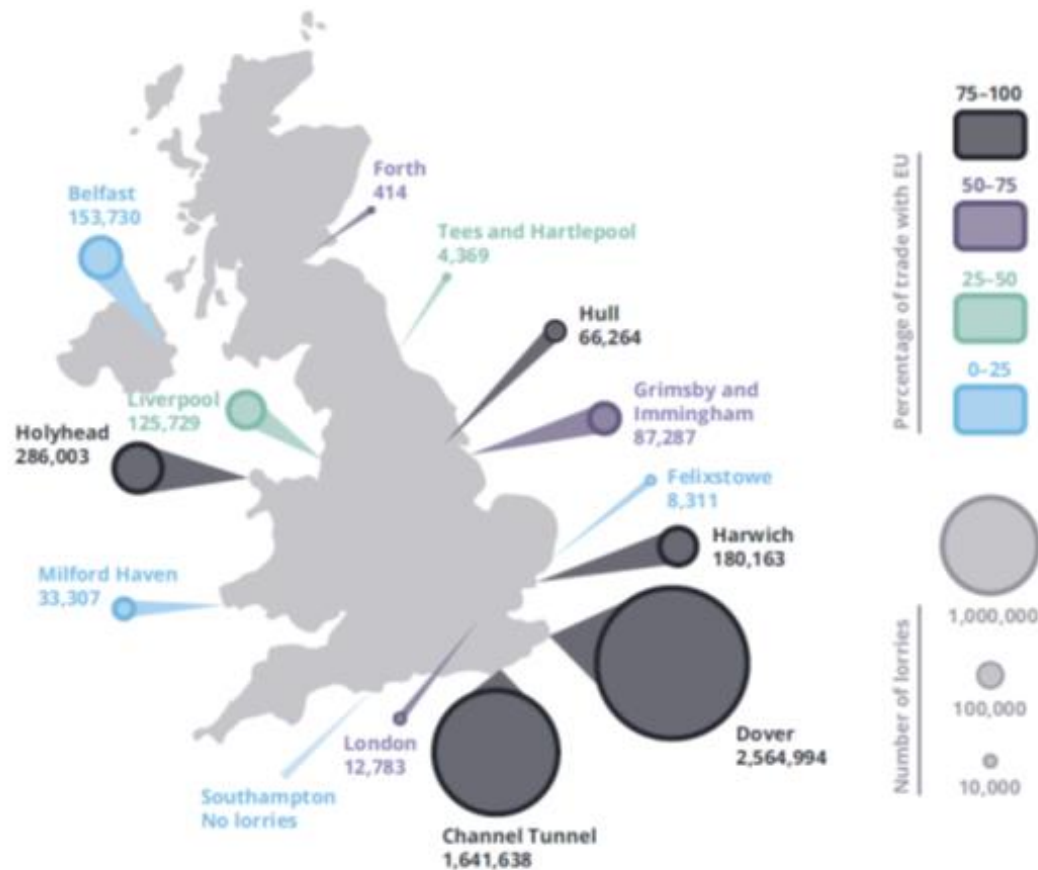
Defra (2018)

Source of Britain's food, 2017

Source region	% supplied to UK
UK	50%
European Union	30%
Africa	4%
North America	4%
South America	4%
Asia	4%
Rest of Europe	2%
Australasia	1%

Flows of lorries into ports

Source: Institute for Government 2017



Top 10 'containerised' UK imports of food (2014) source: Morgan 2016

Rank	Region	Exporting Country	Commodity	tonnes
1. 1.	Sub-Saharan Africa	S Africa	Fruit & nuts	315,289
1. 2.	Asia Pacific	Australia	Wine	252,132
1. 3.	Asia Pacific	Thailand	Meat & fish	144,189
1. 4.	North America	USA	Beer, wine & spirits	139,075
1. 5.	South America	Chile	Fruit & nuts	125,101
1. 6.	South America	Brazil	Fruit & nuts	118,242
1. 7.	Sub-Saharan Africa	South Africa	Wine	111,463
1. 8.	South America	Chile	Wine & Beverages	106,000
1. 9.	Mediterranean	Turkey	Citrus & grapes	100,011
1. 10.	North America	Canada	Vegetables	92,011
	TOTAL			1,503,513

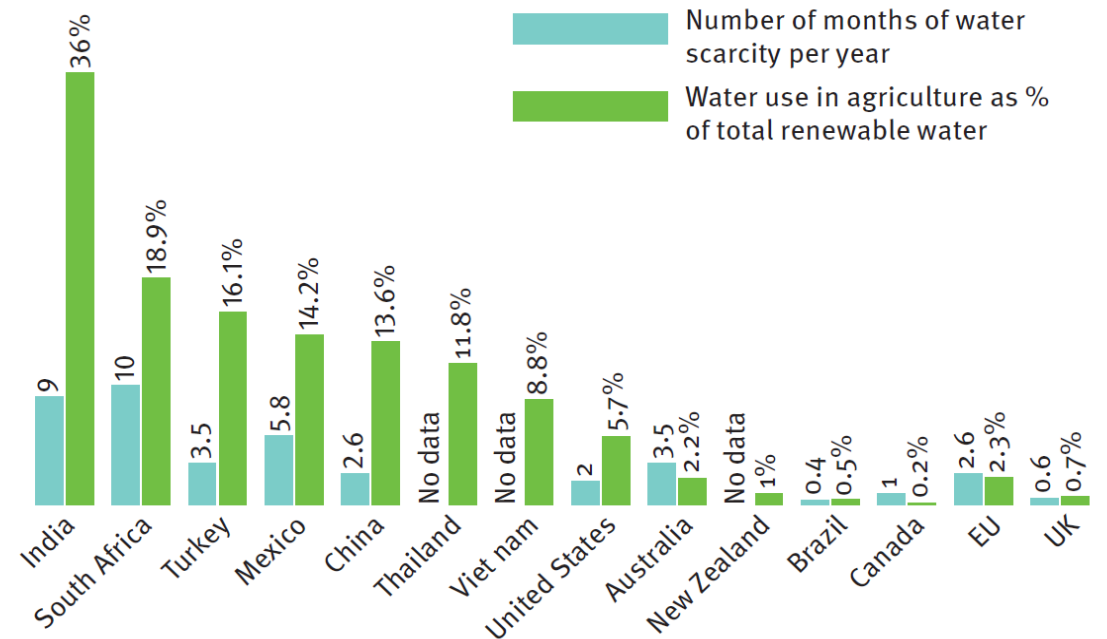
UK water Importation in fruit & veg

source: Hess & Sutcliffe, Cranfield University, 2018

- UK imports 13.5 bn kg of fresh fruit & veg p.a.
- = 560 million m³ of freshwater p.a.
- = 211 kg/capita/year
- 74% of this is from countries with water vulnerabilities
- **increased by 36% in 1996 – 2015**

Water Stress in non-EU countries exporting food to the UK

source: Elliott & Tipper 2018



5. Where is UK horticulture in all this? - *Marginally at present!*

Following stats are mostly from Defra (2018) *UK Horticulture statistics 2017*, May 31 and from Defra (2019) *Agriculture in UK 2018*

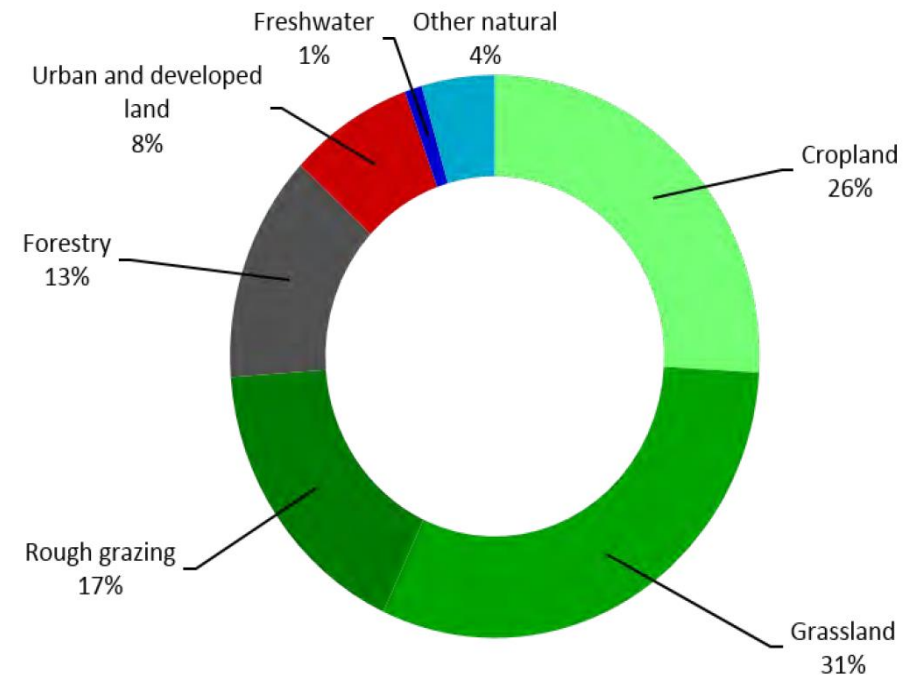
Land use in the UK, by crop - Horticulture is tiny!

source: Defra (2019) Agriculture in UK Table 2.1

- **Total agricultural area** 18,703,000 ha
- **Croppable area** 6,084,000 ha
 - Arable 4,502,000 ha
 - Cereals 3,106,000 ha
 - Oilseeds 609,000 ha
 - Potatoes 140,000 ha
 - Other crops 647,000 ha
 - Horticulture 165,000 ha
 - Uncropped 265,000 ha
- **Grassland** 11,224,000 ha
 - Rough grazing 1,195,000 ha
- **Woodland** 1,016,000 ha
- **Pigs** 10,000 ha

UK land use

Source: Committee on Climate Change (2019) Land Use



Land use for crops in UK, 2018

Defra (2019) *Agriculture in UK 2018*

Crop	Hectares in UK	Approx % total crop ha
Wheat	1,748,000	40.9
Barley	1,138,000	26.6
Oats	171,000	4.0
Oilseed rape	583,000	13.7
Linseed	25,000	0.6
Sugar beet	110,000	2.6
Peas for dry	38,000	0.9
Field beans	155,000	2.7
Plants & flowers	12,000	0.3
Fresh vegetables	117,000	2.7
Potatoes	140,000	3.3
Fresh fruit (orchard ~24k; soft ~11k)	34,000	0.8
TOTAL	4,271,000	

Whom are we feeding - people or animals?

Defra *Agriculture in UK 2018 and 2017*

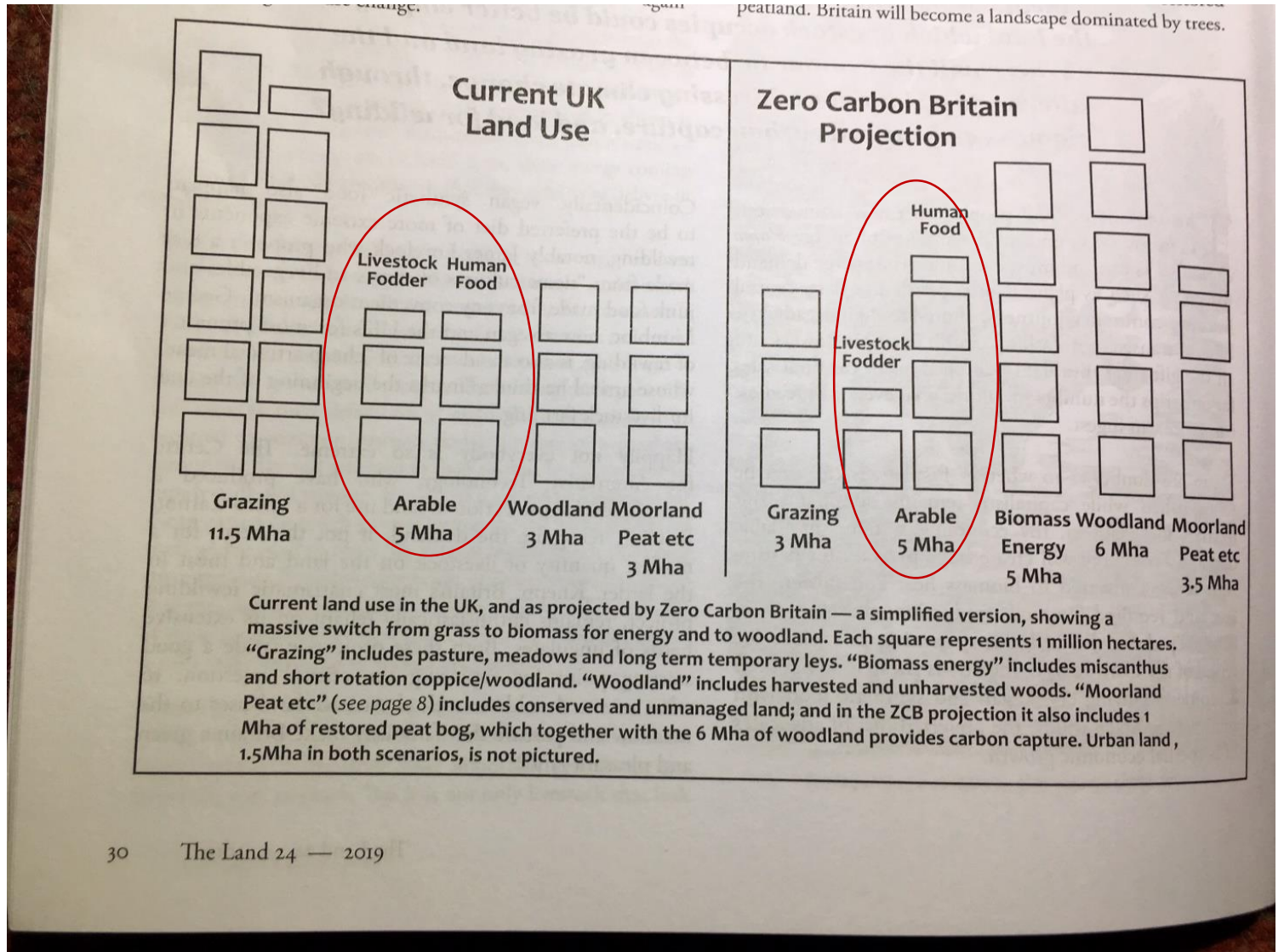
e.g. PEAS

- 90k tonnes harvested for animal feed
 - Value £18m
- 17k tonnes harvested for human consumption
 - Value £3m

Livestock category	Stage	Numbers (in June)
Cattle		10,004,000
	Cows in dairy herd	1,891,000
	Cows in beef herd	1,589,000
Sheep		34,832,000
	Female breeding flock	16,669,000
	Lambs under 1 year old	17,340,000
Pigs		4,969,000
	Sows in pig and other sows for breeding	361,000
	Gilts in pig	55,000
Poultry		181,818,000
	Table fowl	117,619,000
	Laying flock incl. pullets	39,510,000
	Breeding flock	13,429,000
	Turkeys, ducks, geese and all other poultry	11,260,000

What could we be doing?

Britain's Land Use Projected by Zero Carbon Britain (Peter Harper, Paul Allen et al @ CAT)



Each week this would allow for: one large portion of red meat; two smaller portions of pork or chicken; a fillet of fish; 2 eggs; a small portion of cheese and yogurt, enough milk to cover breakfast cereal and hot beverages

HUGE DEFICIT in UK import / export of Fruit & Veg

£ billions of imports but only £ millions exports

Figure 12 Imports of fruit and vegetables

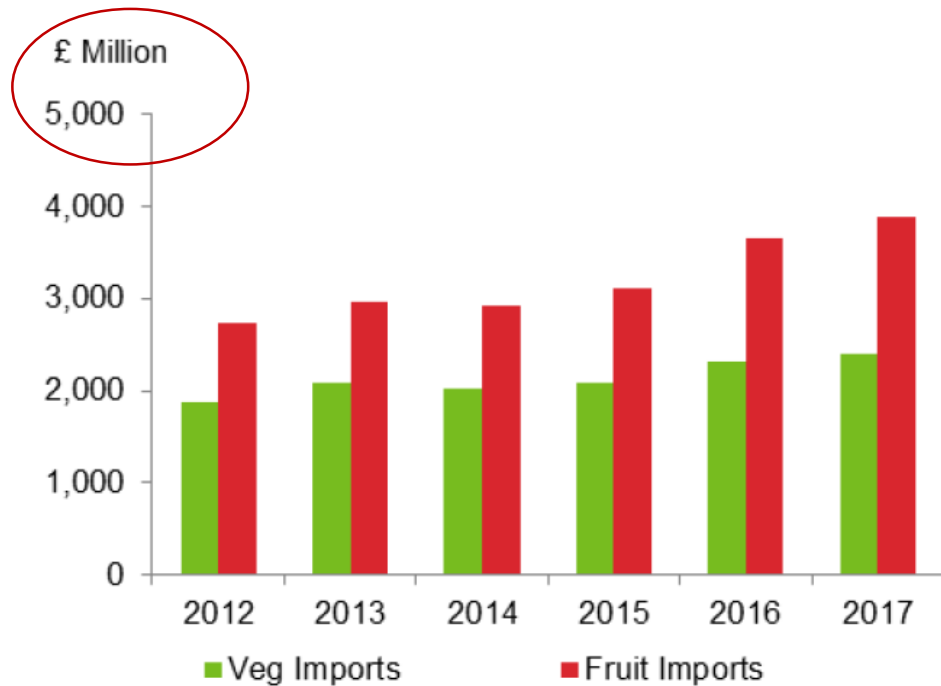
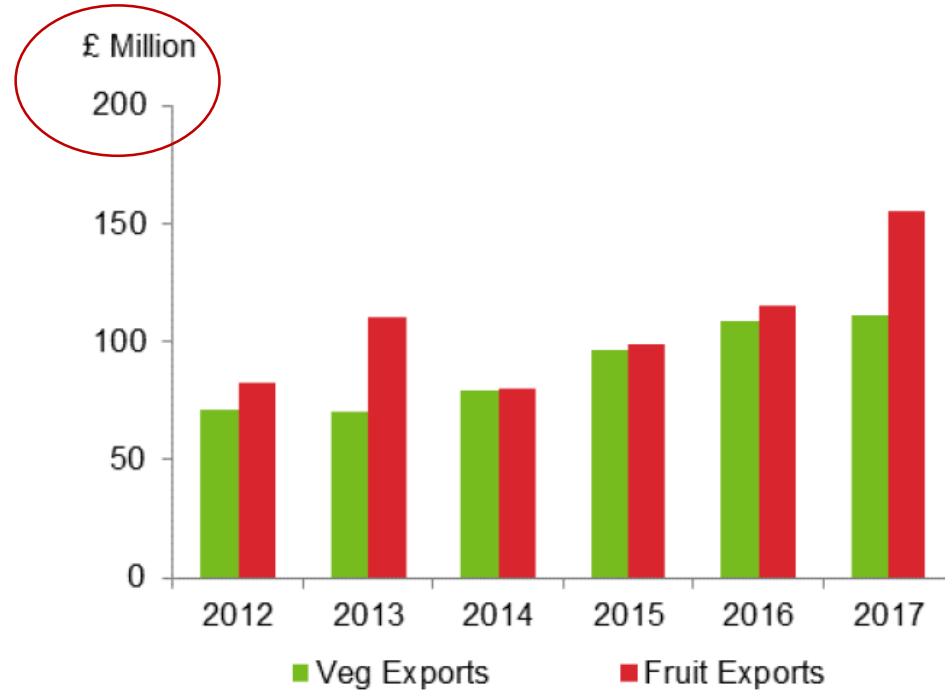
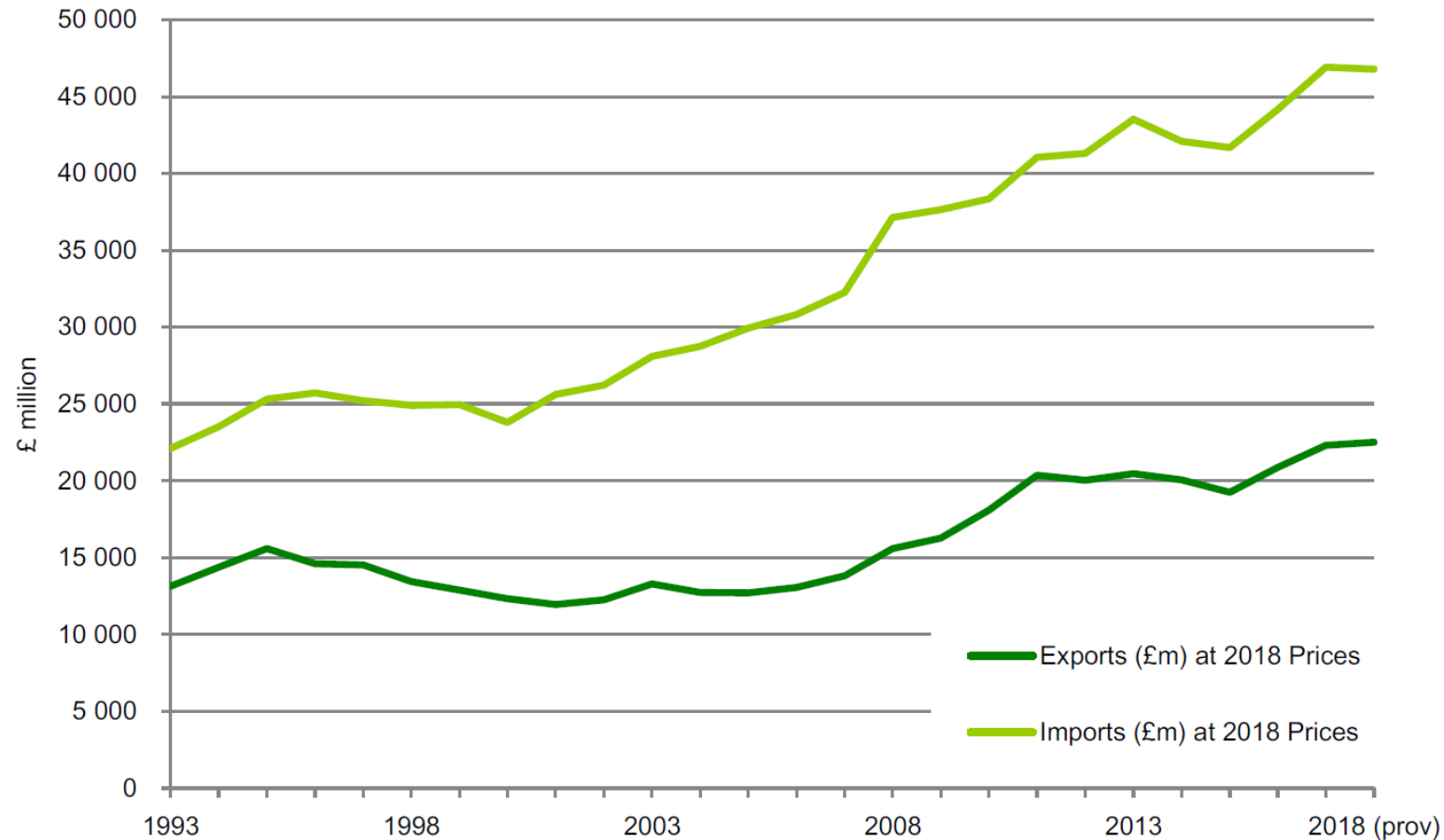


Figure 13 Exports of fruit and vegetables



widening UK Food Trade Gap: value of imports and exports food, feed and drink, 1993-2018

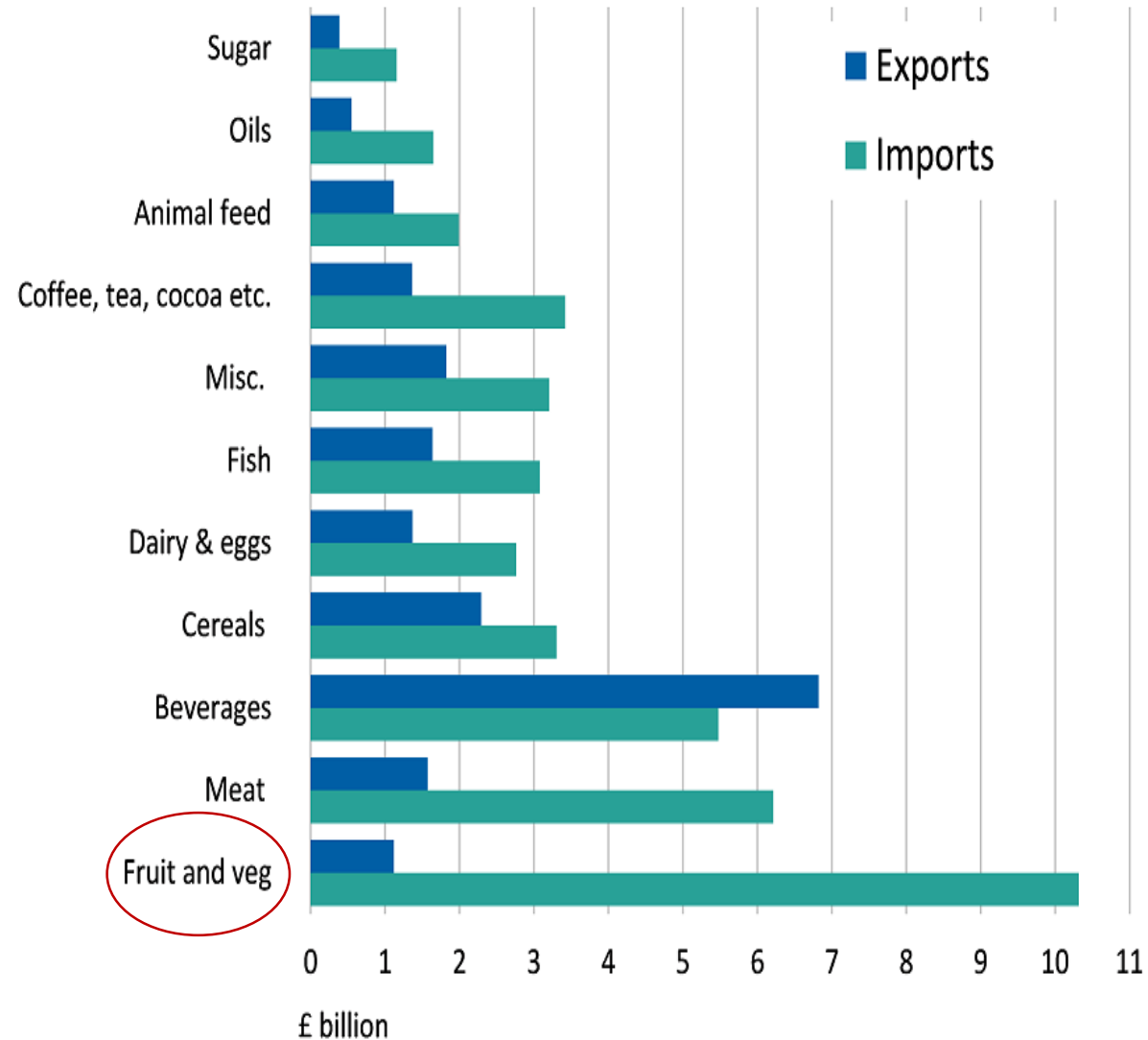


UK Food Trade Gap, 2018: imports and exports, by major commodity group, EU & non-EU, £bn

source: Defra, 2019, charts 13.1a & b

Food group	Exports to EU, £bn	Imports from EU, £bn	Exports to non-EU, £bn	Imports from non-EU, £bn	Total exports, £bn	Total Imports, £bn	Food trade gap EU + non-EU, £bn
Fruit & veg + preps	0.99	7.02	0.27	4.09	1.26	11.11	-9.85
Meat & meat preps	1.52	5.59	0.36	1.21	1.88	6.80	-4.92
Beverages	2.87	4.21	4.77	1.62	7.64	5.83	1.81
Cereals + preps	1.52	3.30	0.62	0.80	2.14	4.10	-1.96
Dairy & eggs	1.48	3.34	0.41	0.05	1.89	3.39	-1.50
Fish + fish preps	1.28	1.08	0.52	2.10	1.80	3.18	-1.38
Miscellaneous edible preps	1.38	2.66	0.72	0.61	2.10	3.27	-1.17
Coffee, tea, etc.	1.12	2.56	0.42	1.18	1.54	3.74	-2.20
Animal feed	0.83	1.33	0.36	1.04	1.19	2.37	-1.18
Oils, fats & oil seeds	0.54	1.04	0.08	0.82	0.62	1.86	-1.24
Sugar + preps	0.33	0.81	0.12	0.37	0.45	1.18	-0.73

UK Imports & Exports, by commodity, £bn



source: (HMRC data) in Defra *Food Statistics Pocketbook 2017*

Fig 3.4

<https://www.gov.uk/government/publications/food-statistics-pocketbook-2017/food-statistics-in-your-pocket-2017-global-and-uk-supply>

More detail on F & V sector

Defra Horticulture stats

F & V Imports, by country

Figure 15 Vegetable imports by country as percentage of total value

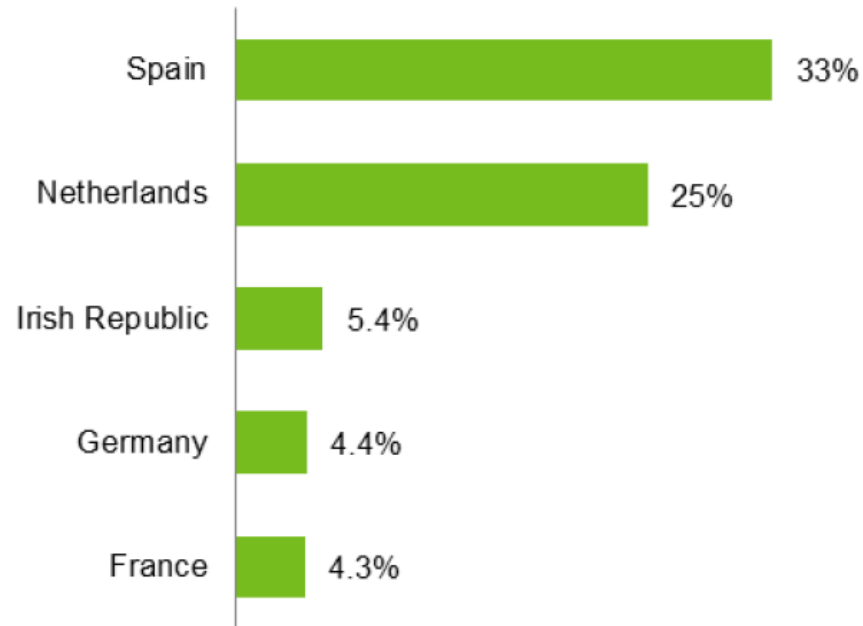
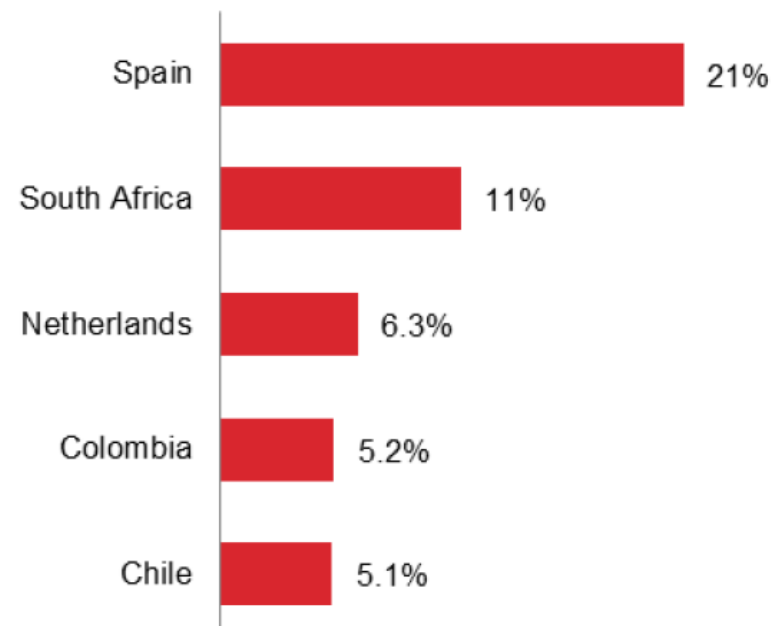
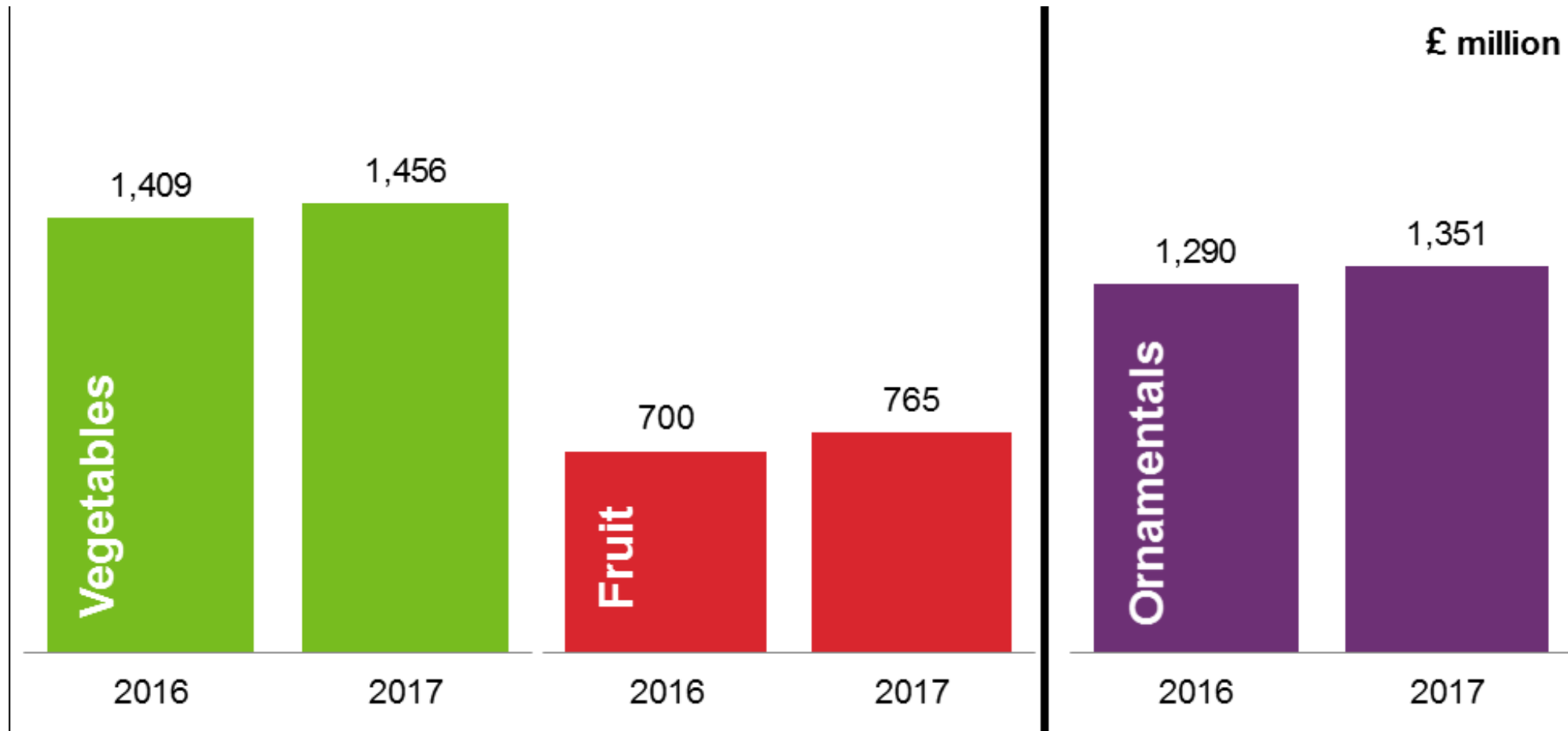


Figure 16 Fruit imports by country as percentage of total value



Source: Defra (2018) UK Horticulture Statistics 2017

The Value of UK fresh fruit, vegetables and ornamentals 2016-2017



Source: Defra (2018) UK Horticulture Statistics 2017

Vegetables – home production & total supply

Figure 2 Home produced vegetables as percentage of total supply

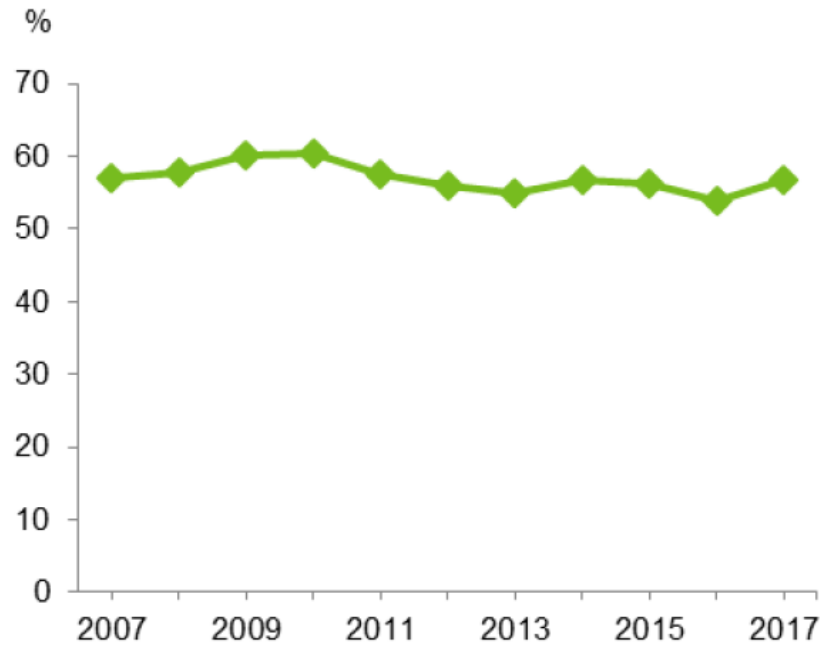
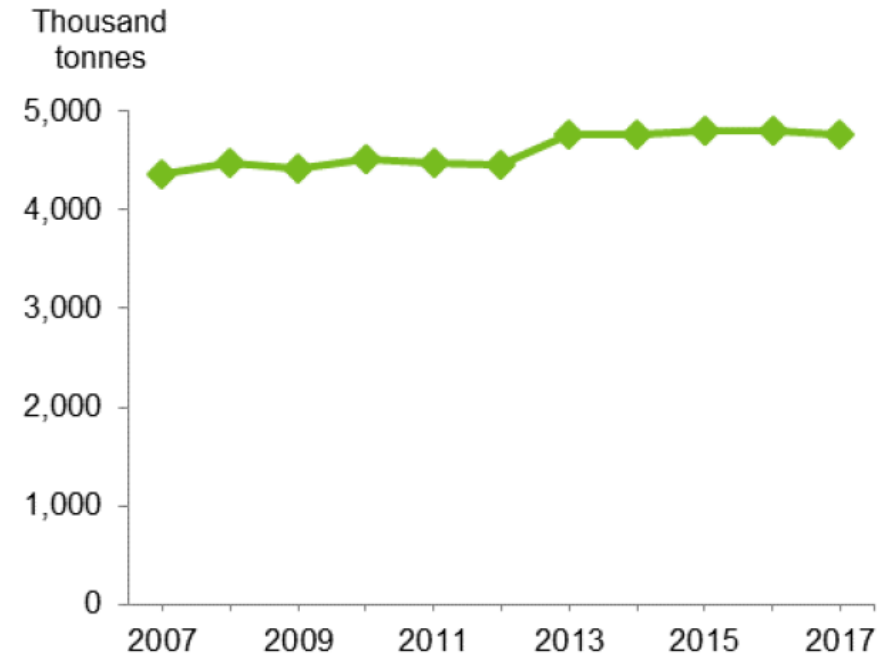


Figure 3 Total supply of vegetables



Source: Defra (2018) UK Horticulture Statistics 2017

Field Vegetables: value and production

Figure 4 Value of field vegetables

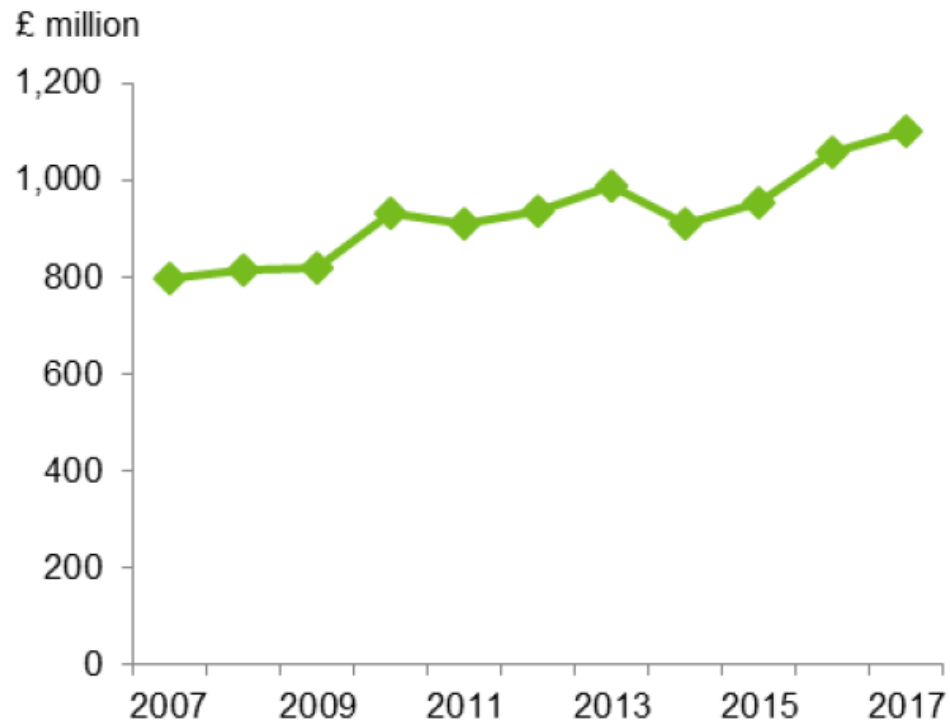


Figure 5 Production of field vegetables



Source: Defra (2018) UK Horticulture Statistics 2017

Protected vegetables

Figure 6 Value of protected vegetables

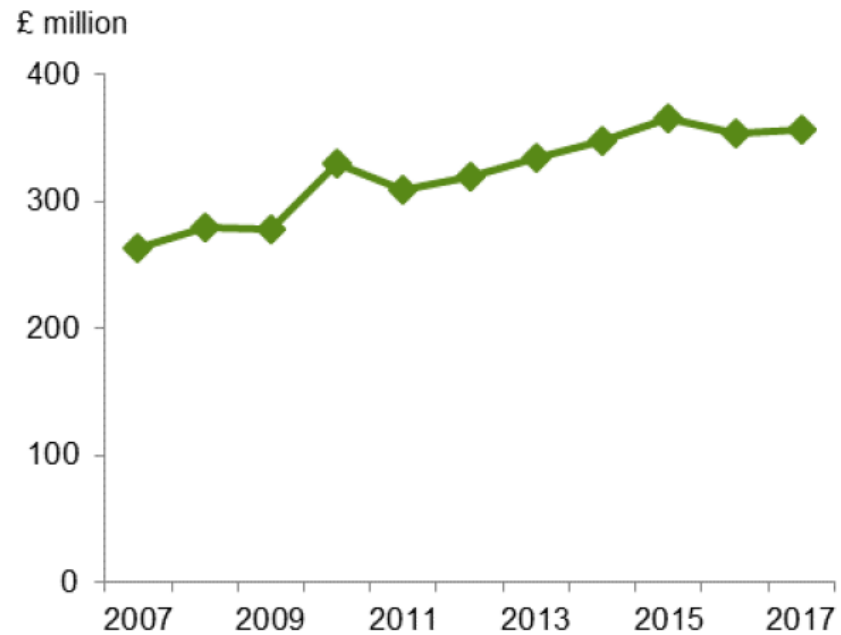


Figure 7 Production of protected vegetables



Source: Defra (2018) UK Horticulture Statistics 2017

Fruit: home produced and total supply

Figure 8 Home produced fruit as percentage of total supply

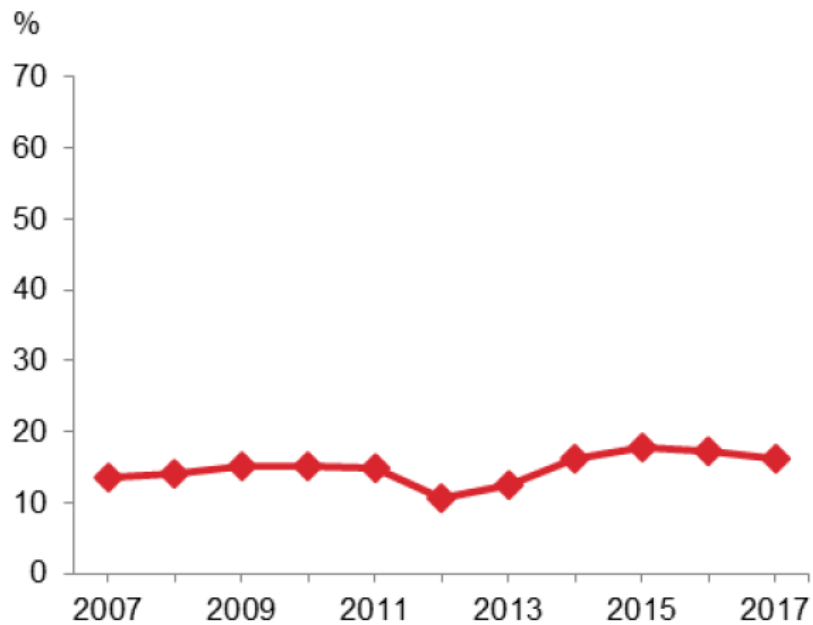
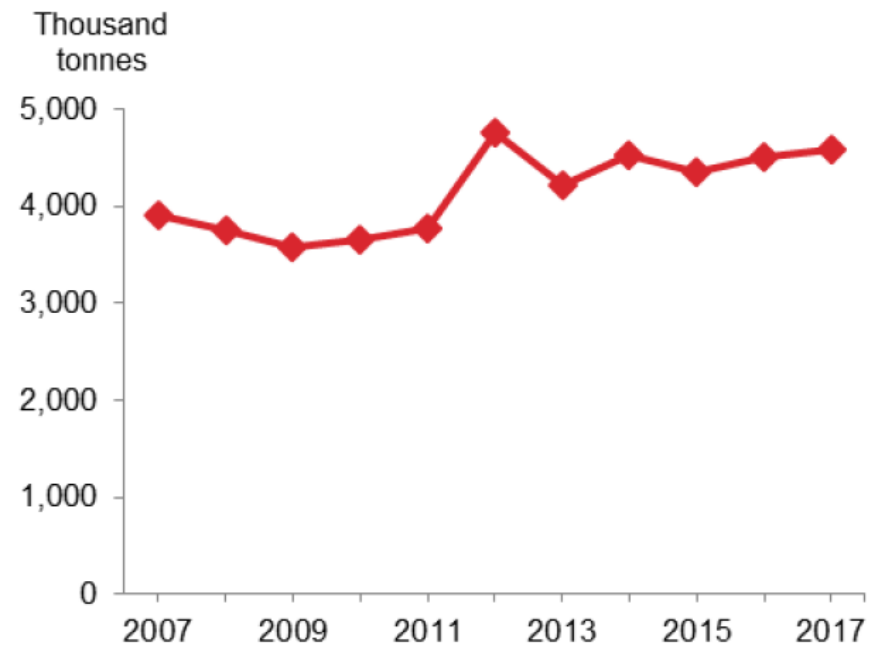


Figure 9 Total supply of fruit



Source: Defra (2018) UK Horticulture Statistics 2017

Fruit: value (£) and production (1000 tonnes)

Figure 10 Value of fruit

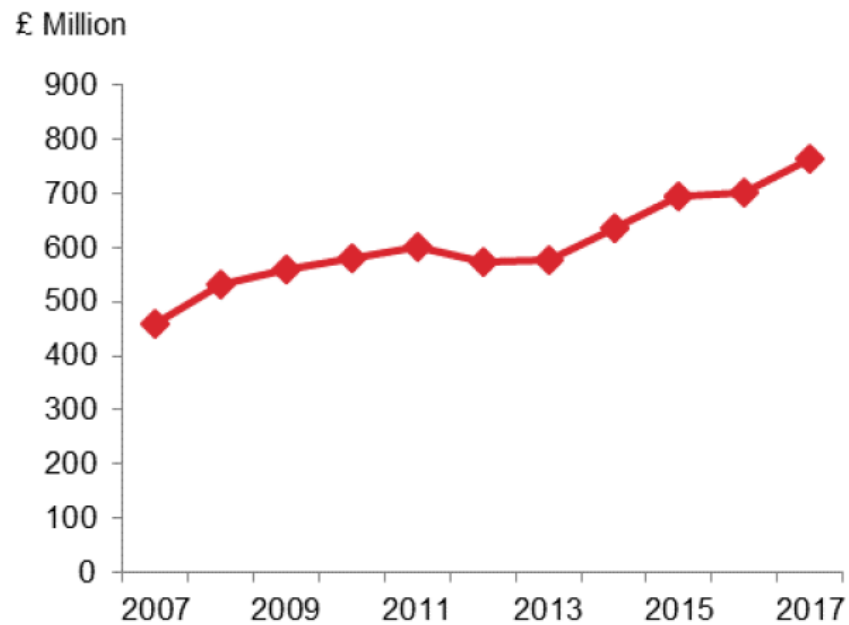
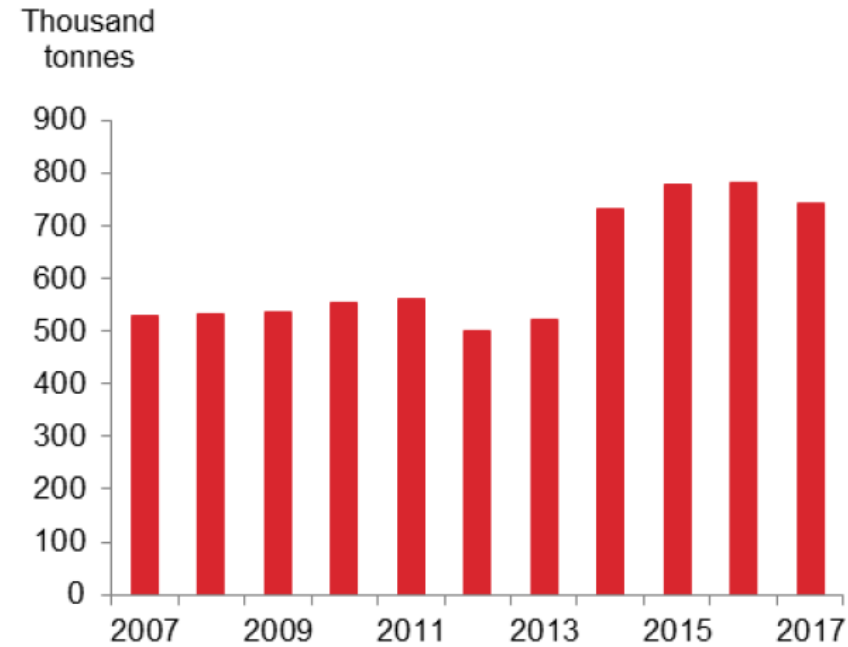


Figure 11 Production of fruit



Source: Defra (2018) UK Horticulture Statistics 2017

6. What should the UK do?

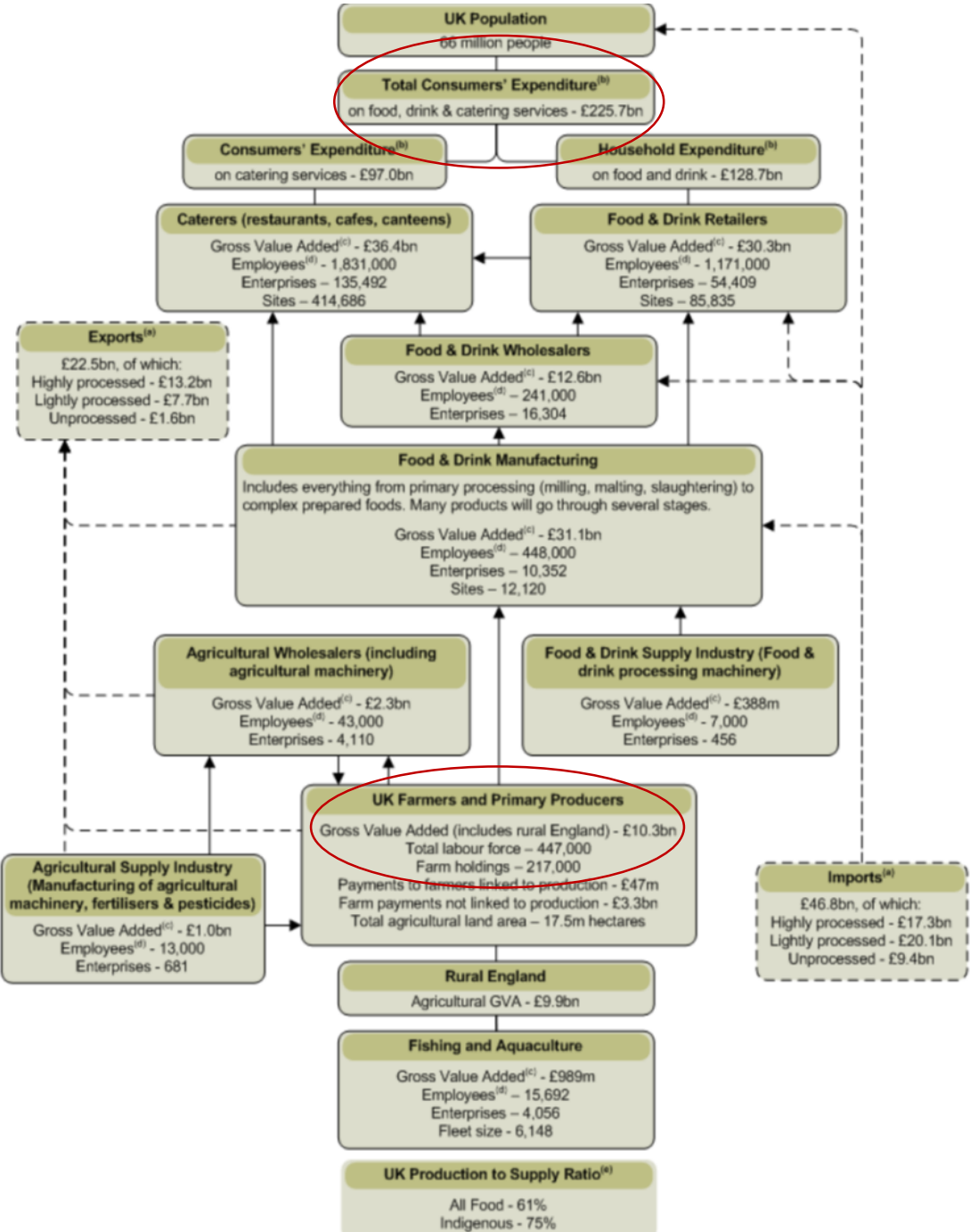
It is time to discuss the Why? How? Who? When?

It's time to sort out UK Food Trade vision

Concept	Source emphasis	Implied values
Atlanticist	N America / USA	51 st state ahoy; intensive production; burgers, spam + tinned peaches?
Globalist	Anywhere, everywhere	Food as fuel; food within wider trade deals
Imperialist	'Commonwealth'?	Food as history
Outer European	EU-lite	EU on the cheap
Neo-EU	Reformed EU	Reform and remain; but what about already leaving
Nationalist	UK first	Self-reliance
Not thought about it	??	Food is assumed; not a priority

Current UK food system

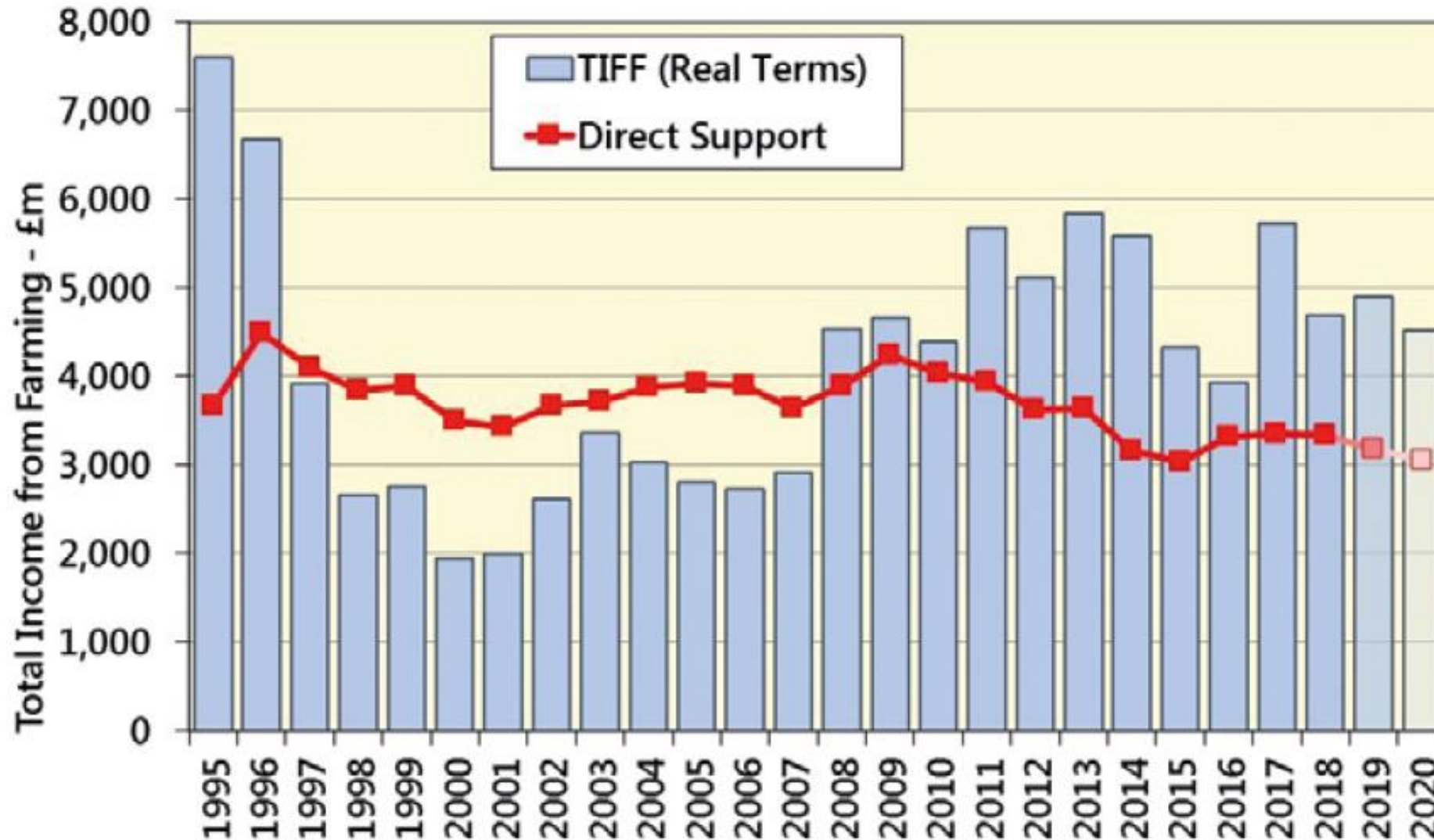
Source: Defra 2019, chart 14.2, p.99



Implications for UK Horticulture:

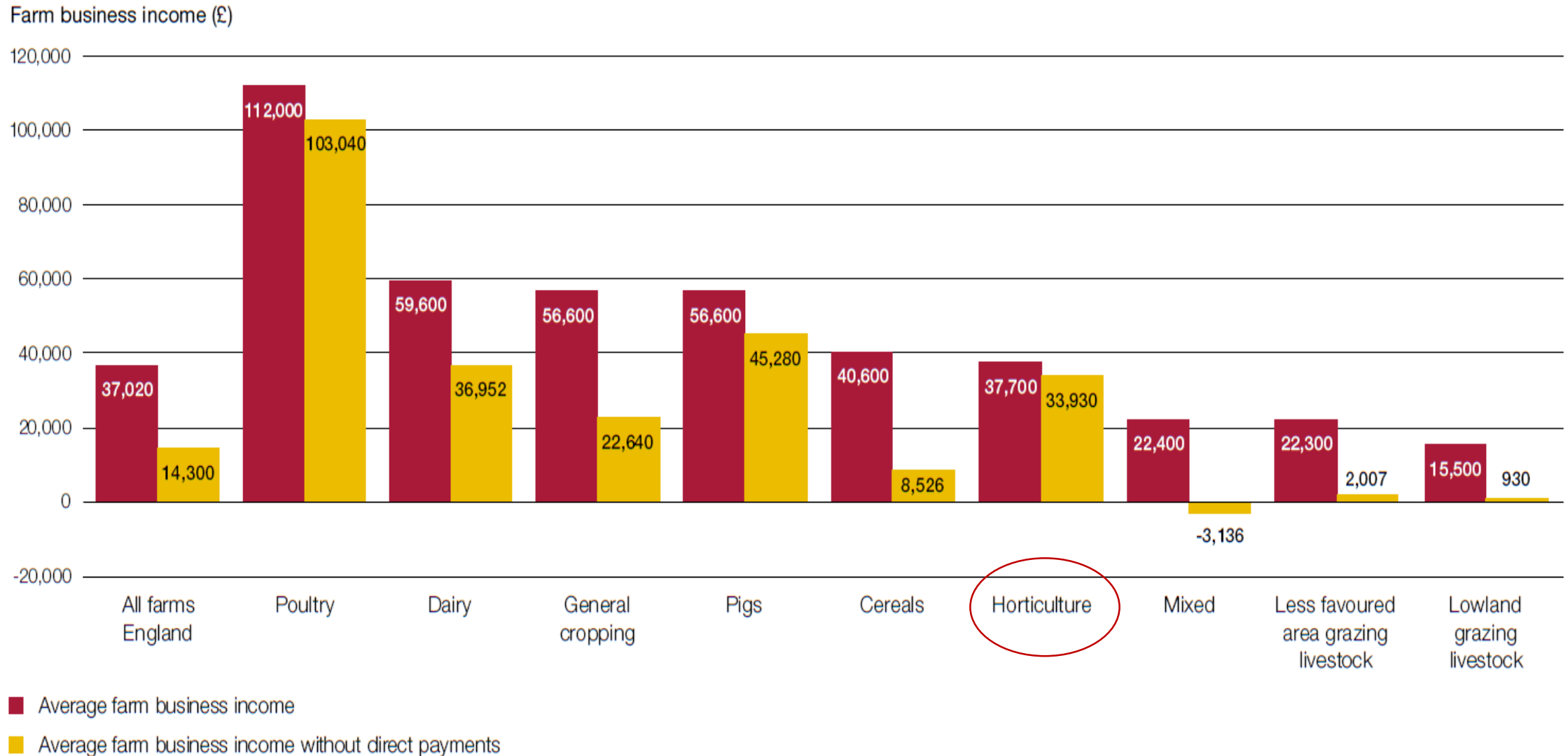
- Primary producers = tiny GVA
- Value goes off the land
- Long chains
- Labour force
- Power battles
- Concentrated markets

Total Income from Farming (TIFF), 1993-2017, plus direct support (subsidy) source: Andersons Outlook 2020



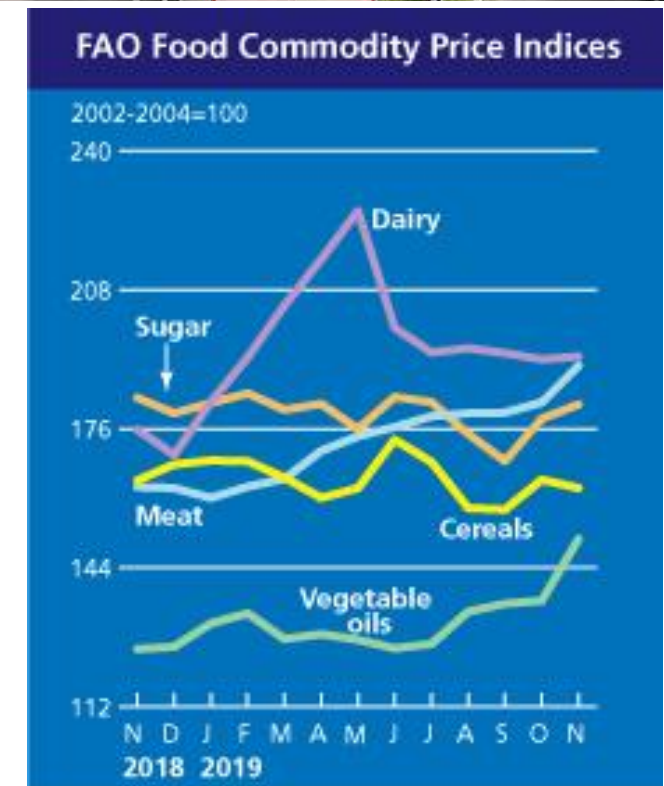
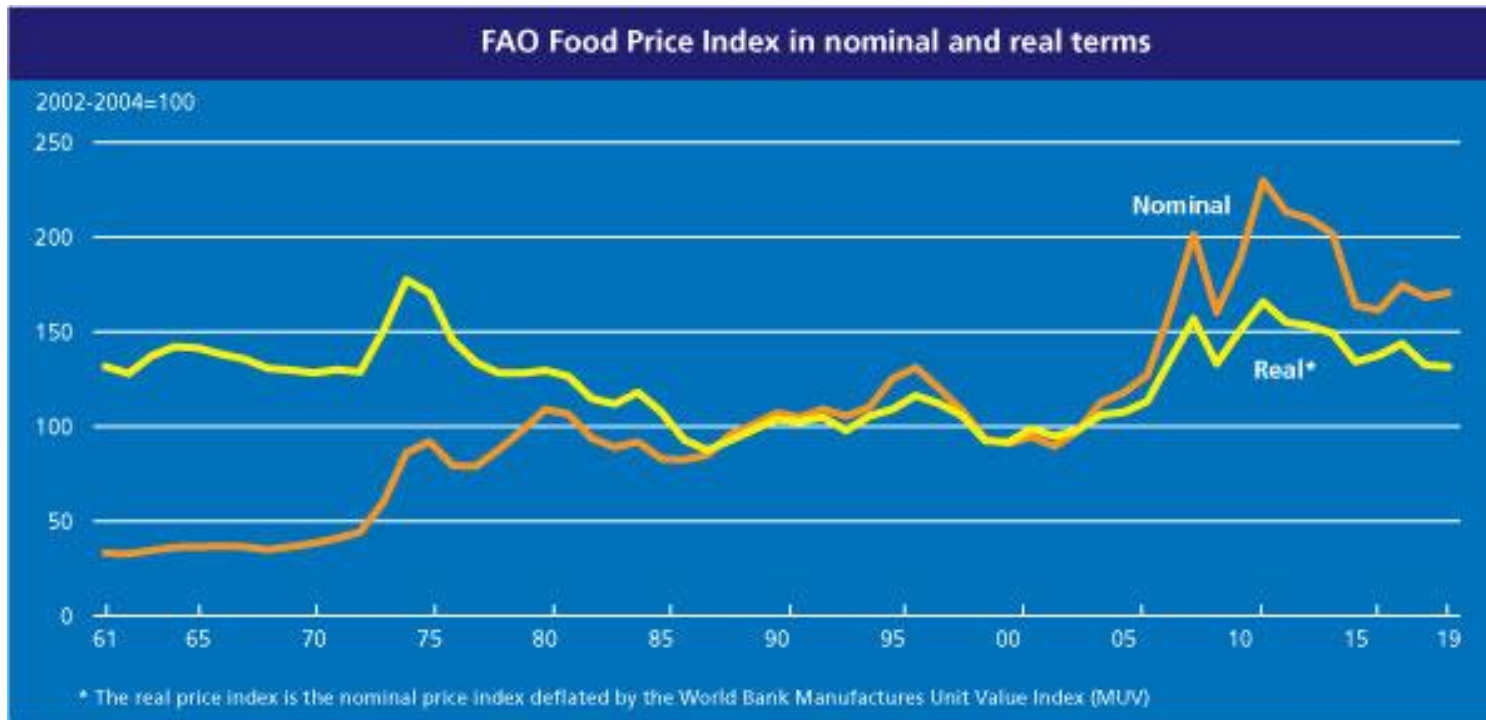
Farm income in England 2017, with and without subsidy, by type of farm business

source: NAO 2019



Brexit is a signal to grow more just-in-time food flows

- Food trade flows are vulnerable
- Global food price volatility is the new norms



Source: FAO Food Price Index <http://www.fao.org/worldfoodsituation/foodpricesindex/en/> [Dec 15 2019]

7. CONCLUSIONS

‘We are where we are’ but can push for better

- Tricky times
- Vegetable sector symbolic of wider problems
- Horticulture should and could be the good news
- Stronger political voice is needed (Parliament + Public)
- The Great Food Transformation would be better if planned than forced on us by crisis

THE LANCET

January, 2019

www.thelancet.com

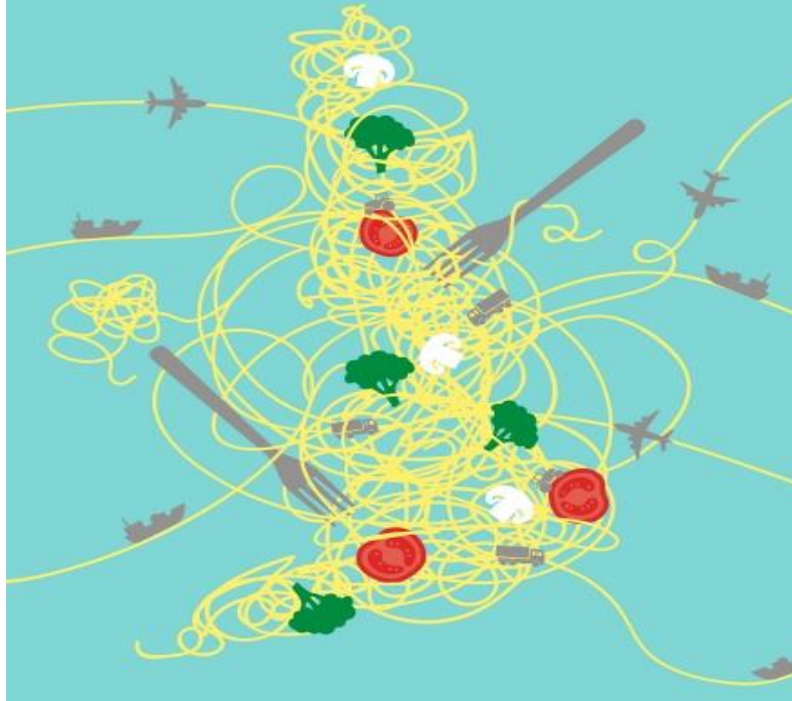
Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems



“Food in the Anthropocene represents one of the greatest health and environmental challenges of the 21st century.”

A PELICAN BOOK

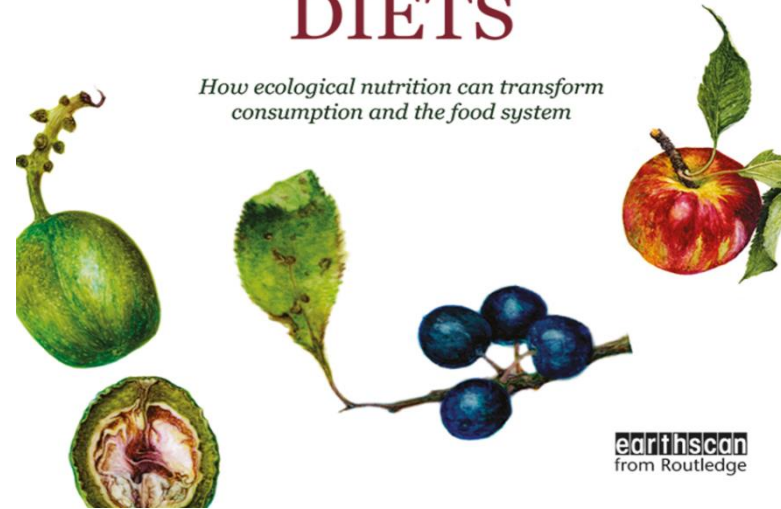
Feeding Britain Our Food Problems and How to Fix Them Tim Lang



PAMELA MASON AND TIM LANG

SUSTAINABLE DIETS

*How ecological nutrition can transform
consumption and the food system*



edrihscon
from Routledge