UNIVERSITY OF ABERDEEN

The Rowett Institute

The impact of changing diets on health and the environment - where do we need to go?

Jennie Macdiarmid

Italian Association of Agriculture and Applied Economics, 2019

Starting point: Unhealthy & environmentally damaging

Nutrition

- *Undernourishment (800 million*
- *Nutrient deficiency (2 billion)*
- *Obesity (600 million)*

Climate change

Paris agreement 2015

Holding the increase in the global well below 2°C above pre-industrial levels and to limit the temperature increase to 1.5°C.

The challenges we are facing today

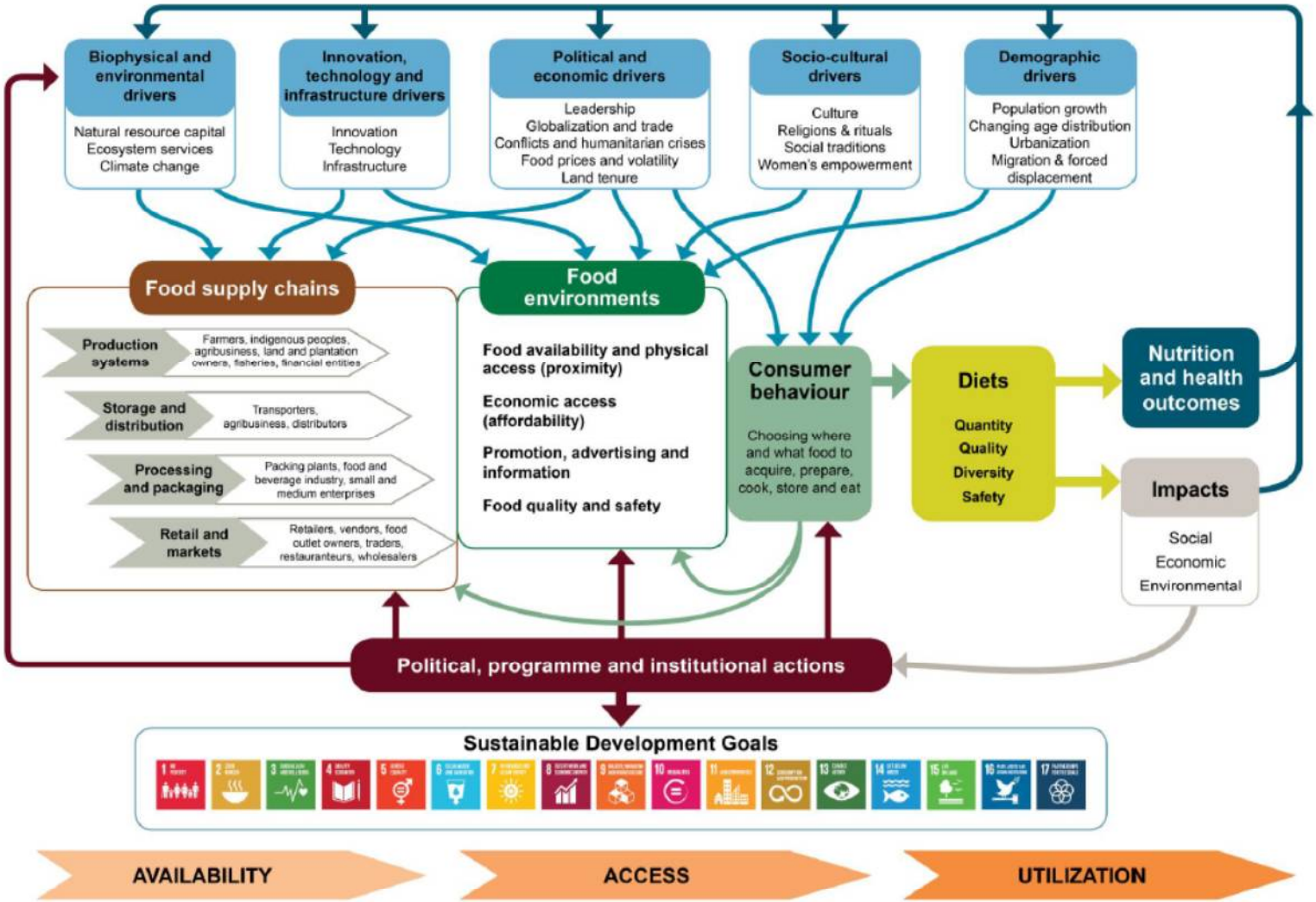
climate change

economics, politics

industry, resources

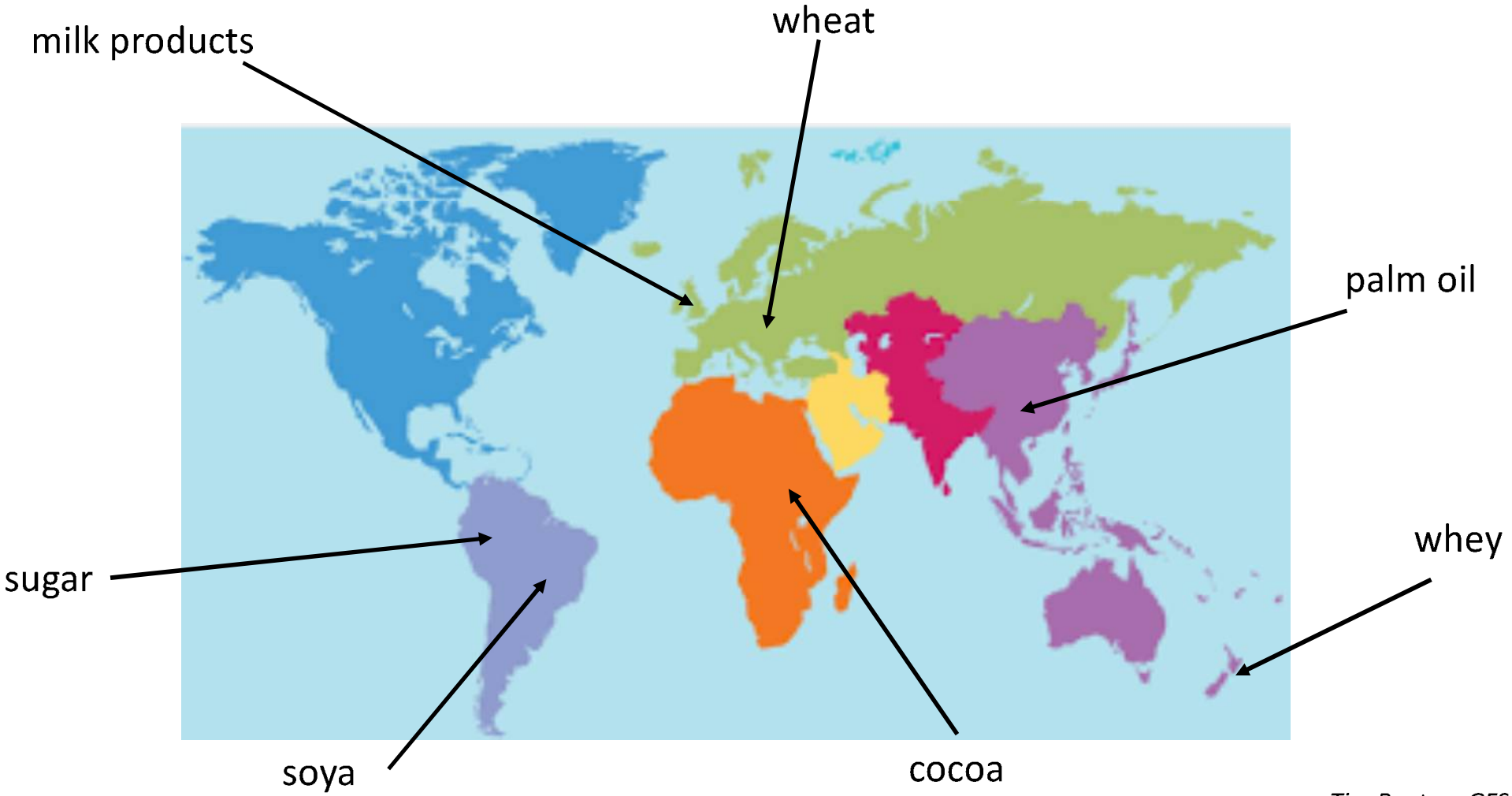
sustainable diets, culture

A whole food systems approach



Global food supply

Sugar, Wheat flour, Dried whole **Milk**, Cocoa mass, Cocoa butter, Vegetable fats (**Palm kernel), Whey** (from **Milk**), Whey powder (from milk), Emulsifiers (Sunflower lecithin, **Soya** lecithin), Butterfat (from **Milk**), Natural flavourings, Yeast, Skimmed **milk** powder, Raising agent (Sodium bicarbonate), Natural vanilla flavouring, Salt.



Tim Benton, GFS

Environmental damage

1. **Greenhouse gas emissions**
2. **Land use change/ deforestation**
3. **Water scarcity**
4.

   - loss of species
   - loss of cultivars/crops

   (i.e. maize, wheat and rice)

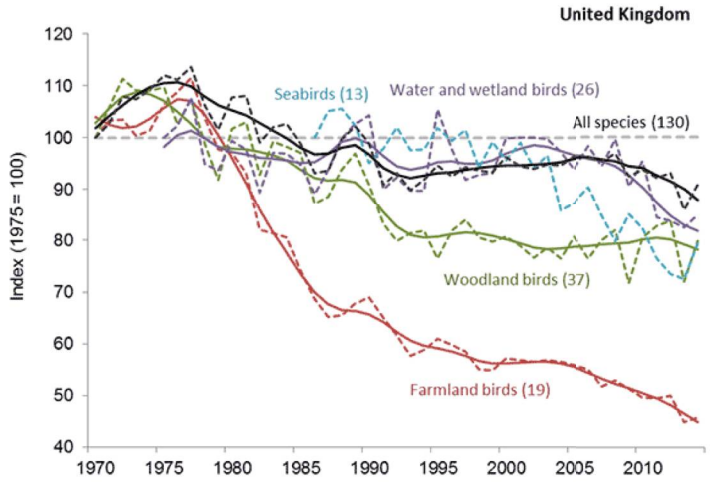
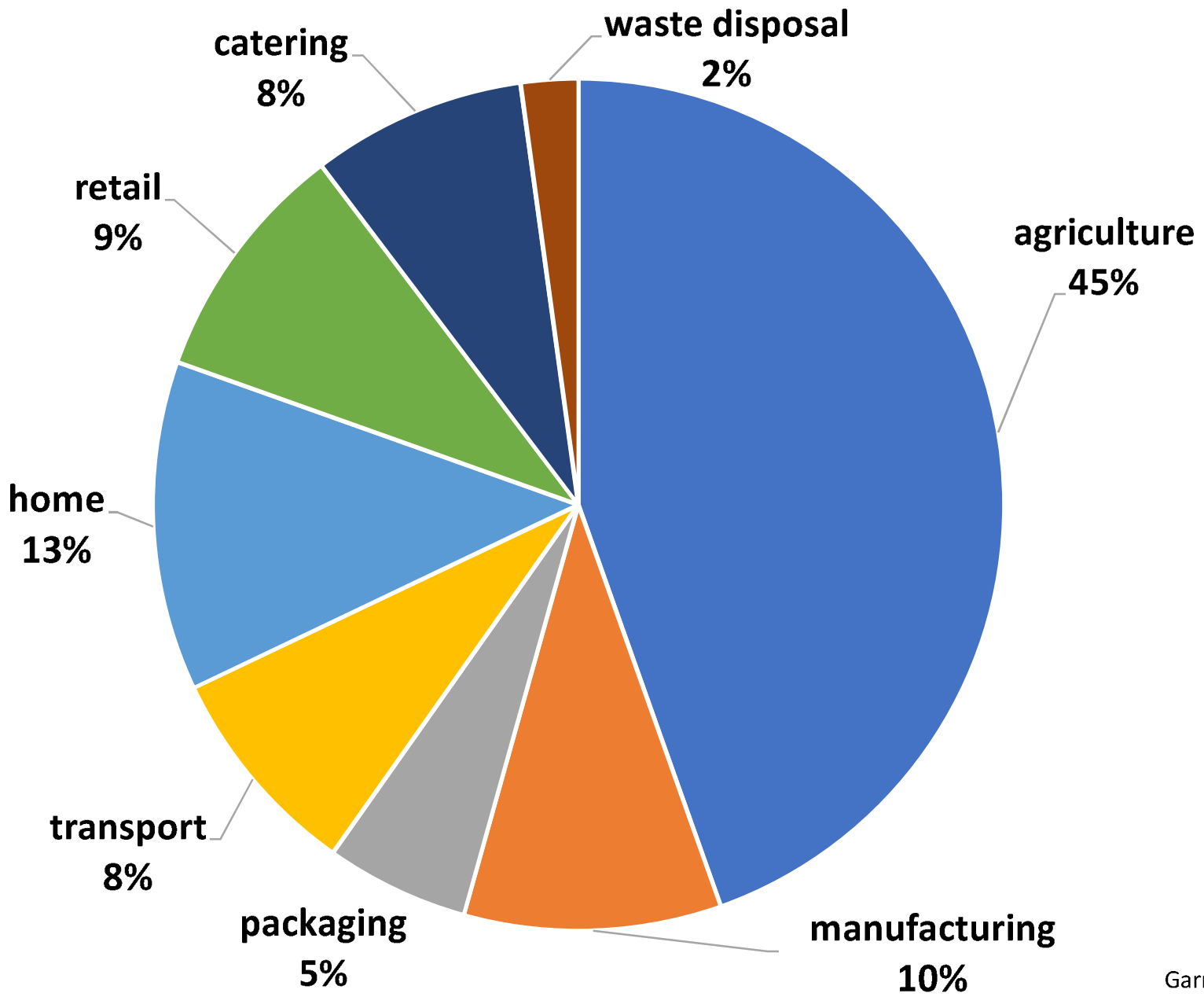


Figure 1. Populations of wild birds in the UK, by habitat, 1970 to 2014.

Source: BTO, Defra, JNCC, RSPB.

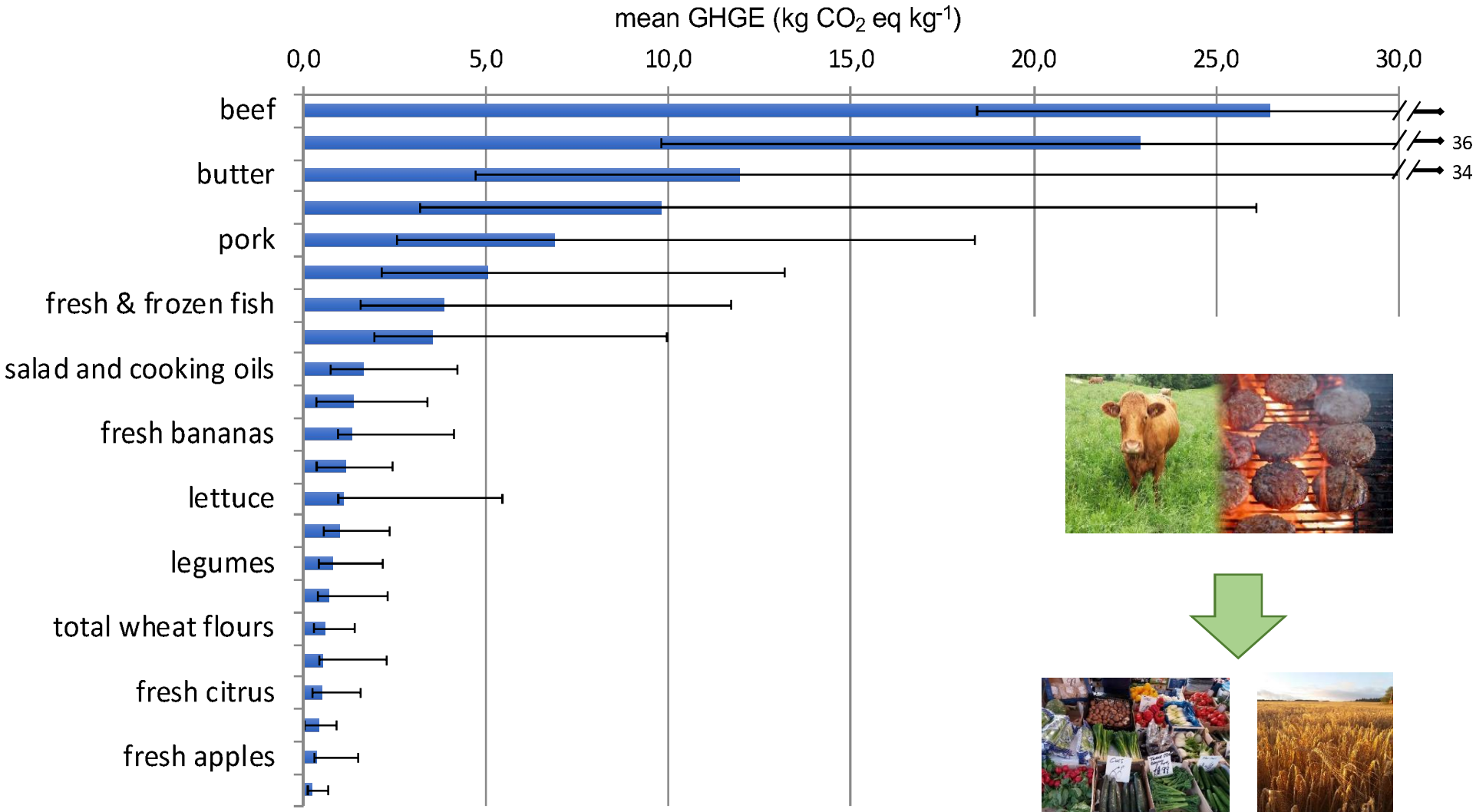
https://www.bto.org/science/monitoring/developing-bird-indicators

Global Warming: emissions in the food system



Garnett *et al* 2008

Greenhouse gas emissions associated with food



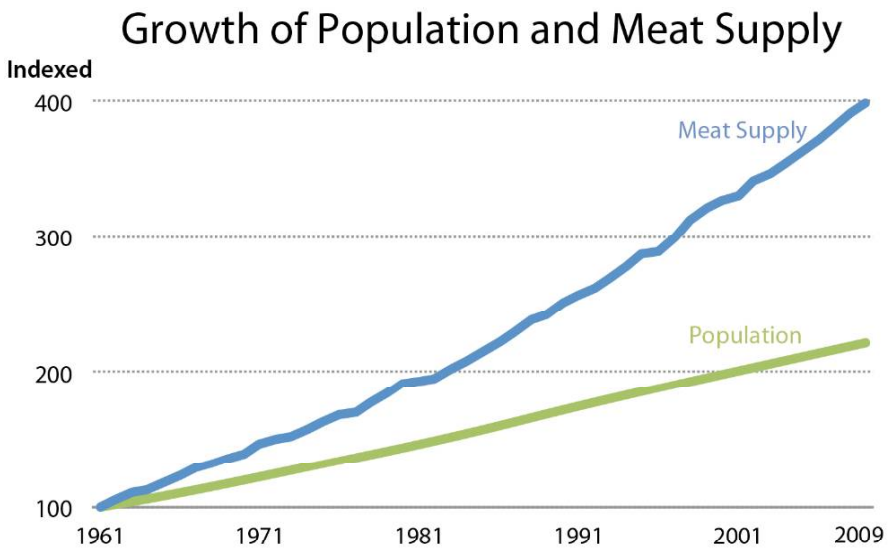
>200 food commodities sampled across range of geographic locations, with different production methods;

bars show min/max values

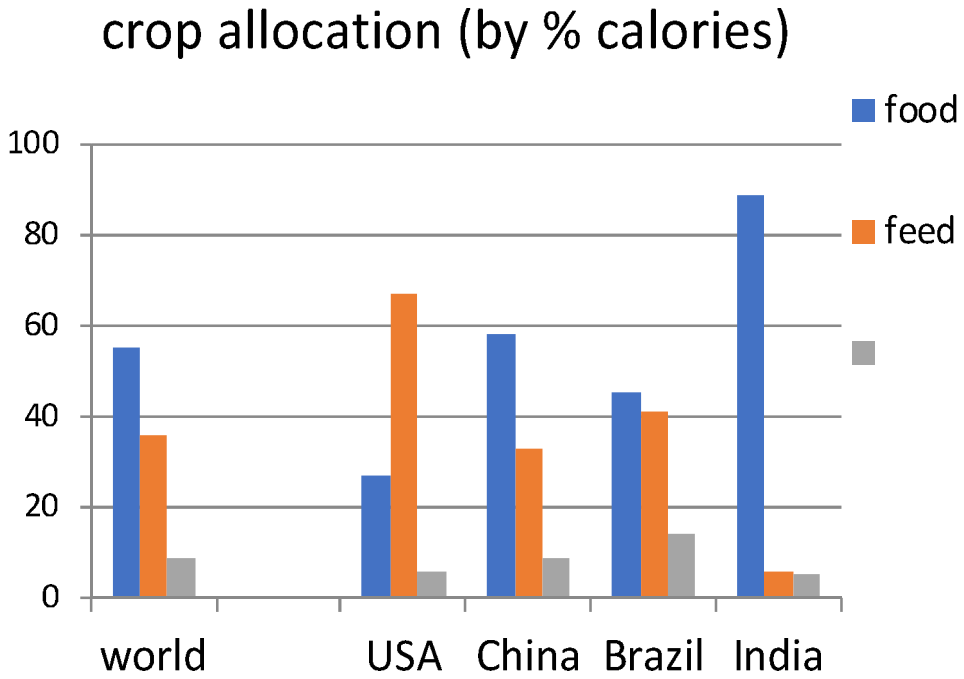
Heller MC, Keoleian GA (2015) *J Ind Ecol*

Slide: A. Jones (ICN 2017)

The issue with livestock production



Growth of population and meat supply,
Indexed 1961=100 (FAO 2012a, UN 2012)



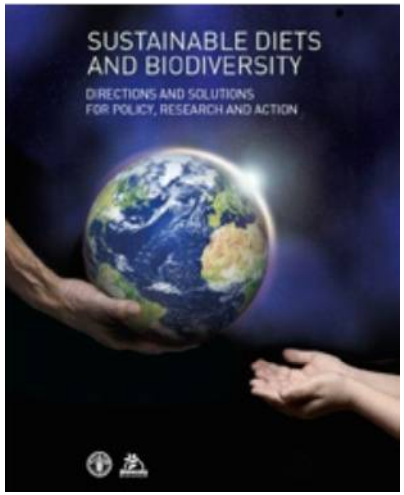
- **14.5% of global GHGE comes from livestock**
- **70% of global agricultural land is used for livestock**
- **methane production by ruminants**

Healthy and sustainable diets

Diets with **low environmental impacts** which contribute to **food and nutrition security** and to **healthy life** for present and future generations.

They are:

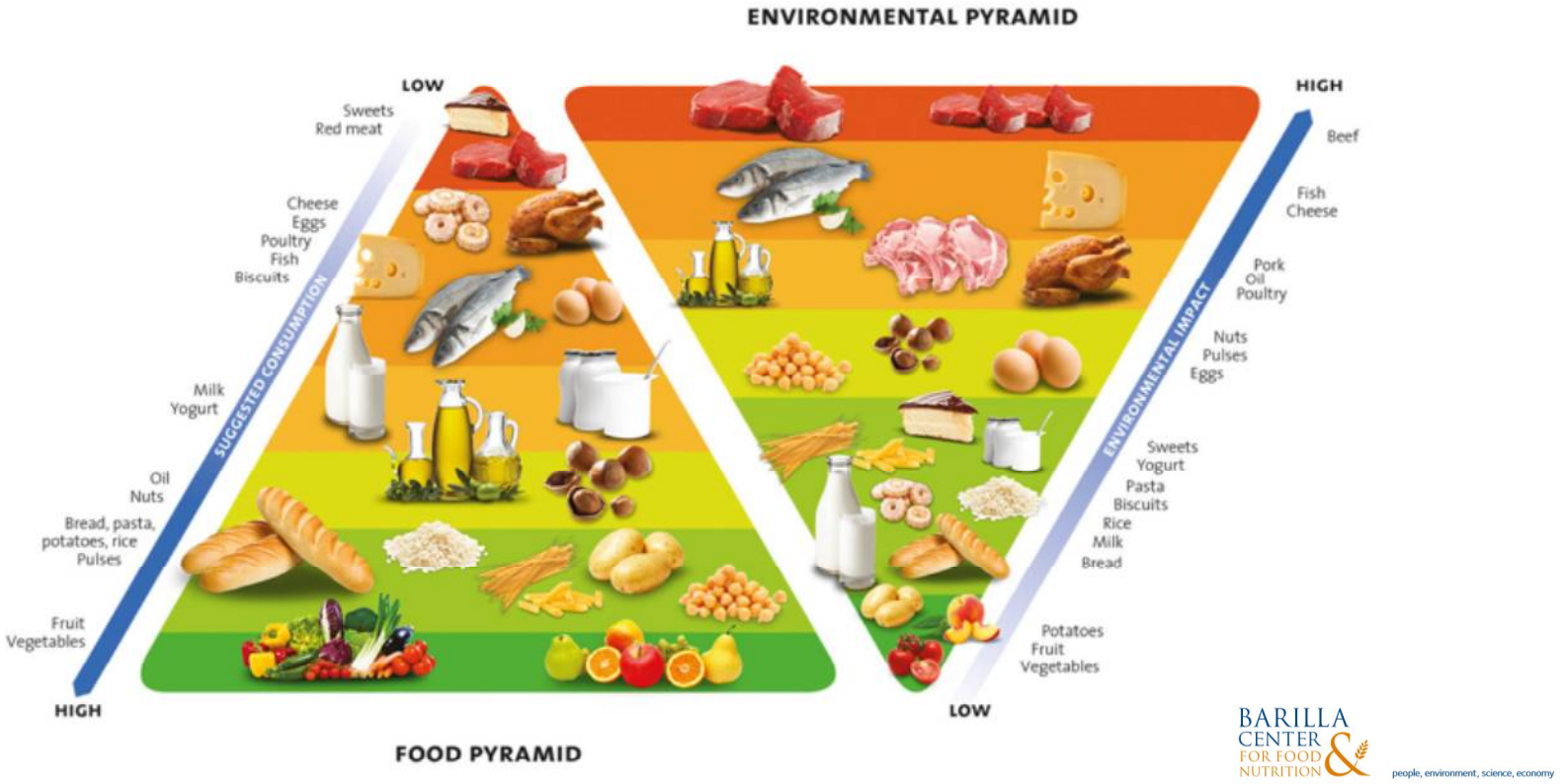
- protective and respective of biodiversity and
- culturally acceptable
-
- economically fair and affordable
- nutritionally adequate, safe and healthy



…… while optimizing natural and human resources.

Moving from unsustainable diets to sustainable diets

We know where we want to go …….



BARILLA CENTER FOR FOOD & NUTRITION
people, environment, science, economy

but how do we get there????

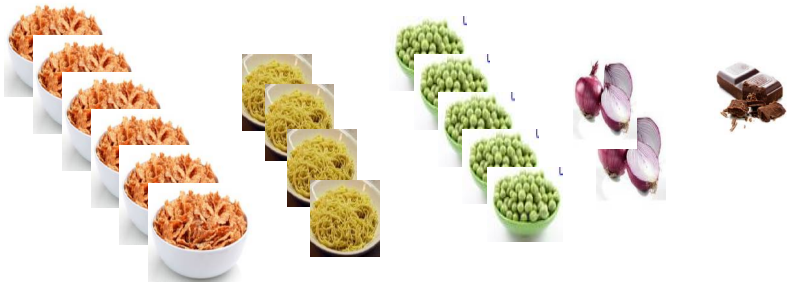
Define nutritionally adequate and low GHG emissions diet?

Computer solution

- no animal products

90% reduction in GHGE

limited food items



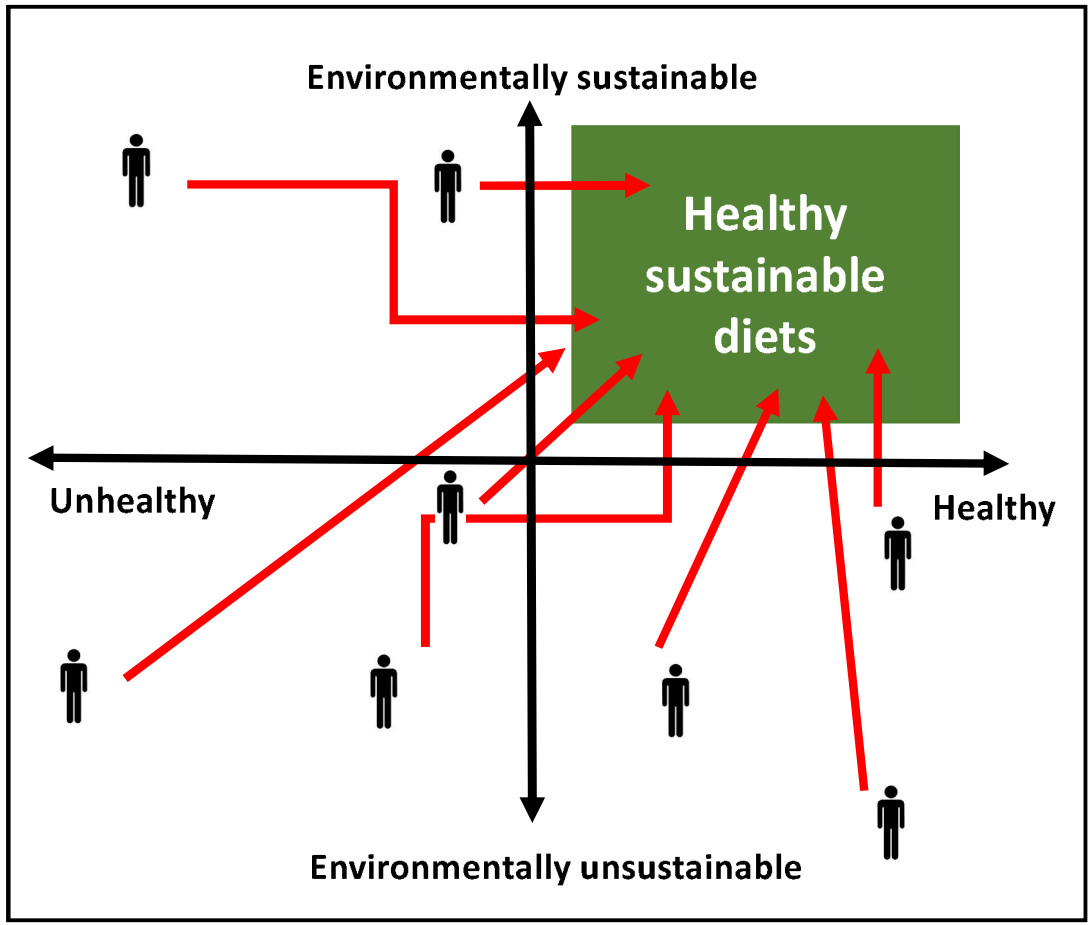
Human intervention

25% reduction in GHGE

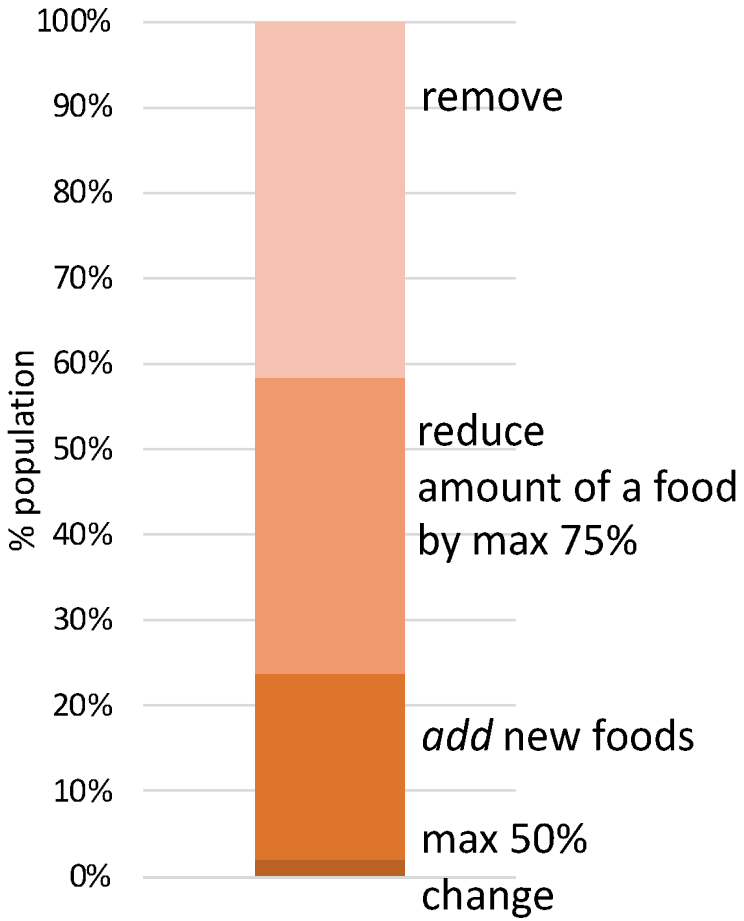
many food items

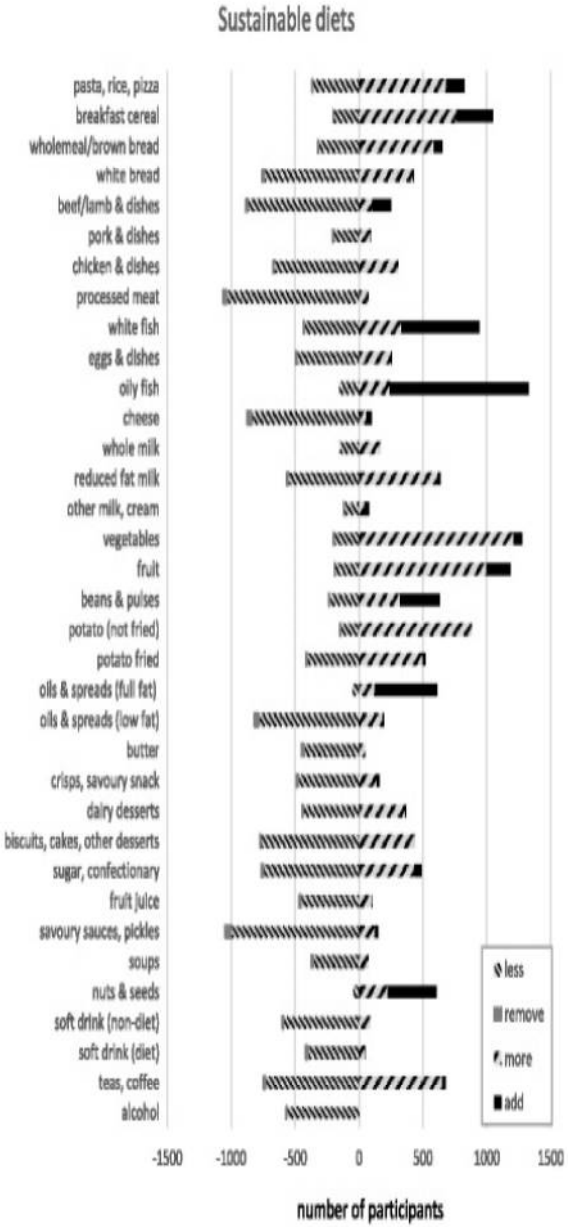
Macdiarmid *et al. (2012) AJCN*

Diets not diet!



No one size fits all: *minimise dietary change*





Horgan *et al.* (2016) IJBNPA

Sustainable diets in Italy

observed diet = current diet
optimises diet = nutritionally adequate & 30% reduction in GHG emissions

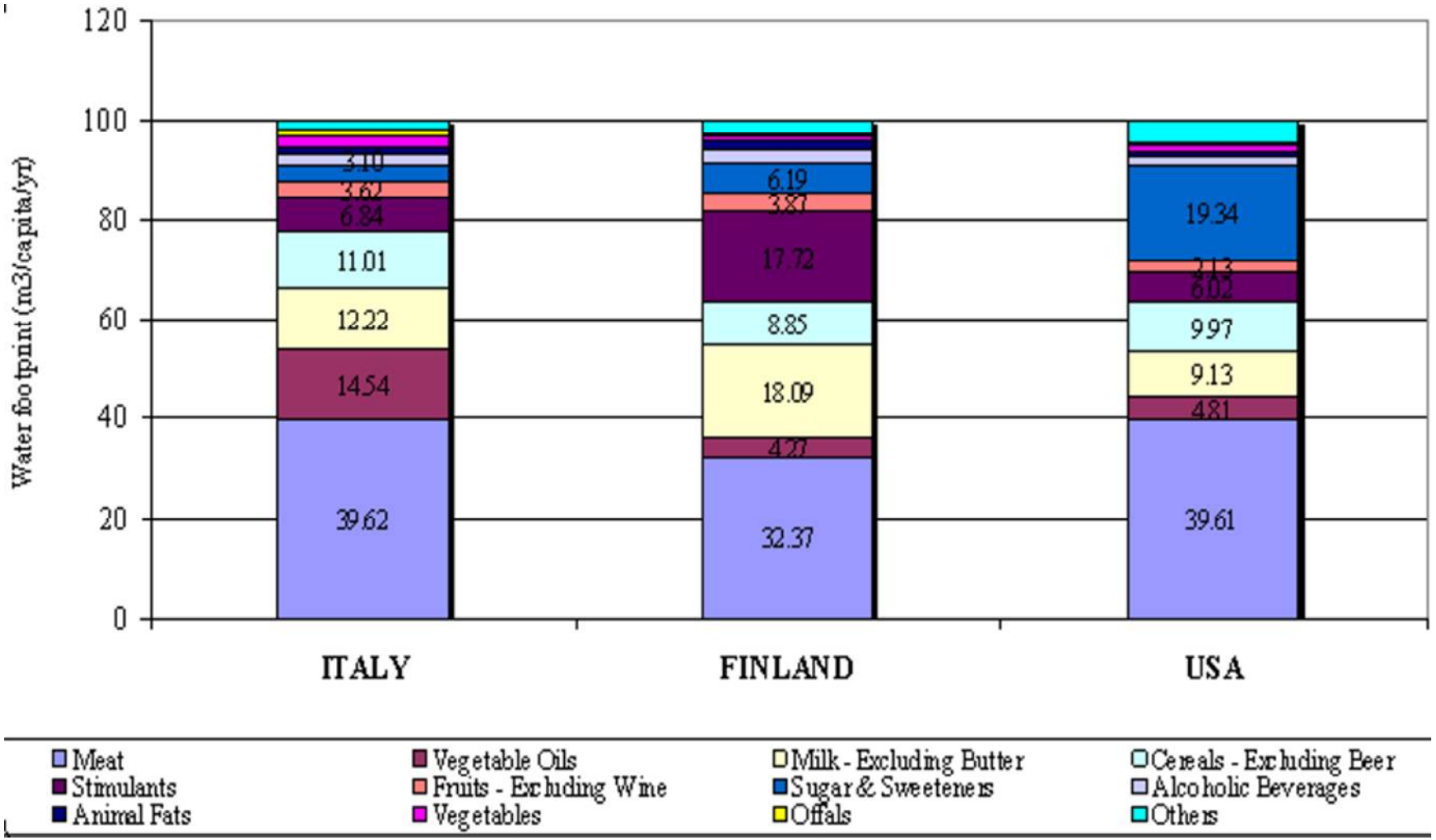
Energy (kcal/d)

GHG (gCO_2eq/d)

fruit & veg | starch | planted based dishes | dairy | fish | meat | animal based dishes | sugar, fat | tea, coffee

Vieux *et al.* (EJCN 2018)

The total water footprint of the food supply in Italy



Capone *et al*. JFNR (2013)

Achieve sustainable and healthy diets; production & technology or change our diets?

Production

efficient production methods

increase yields /genetics

reduce food waste

nutrition focused agriculture

Consumption

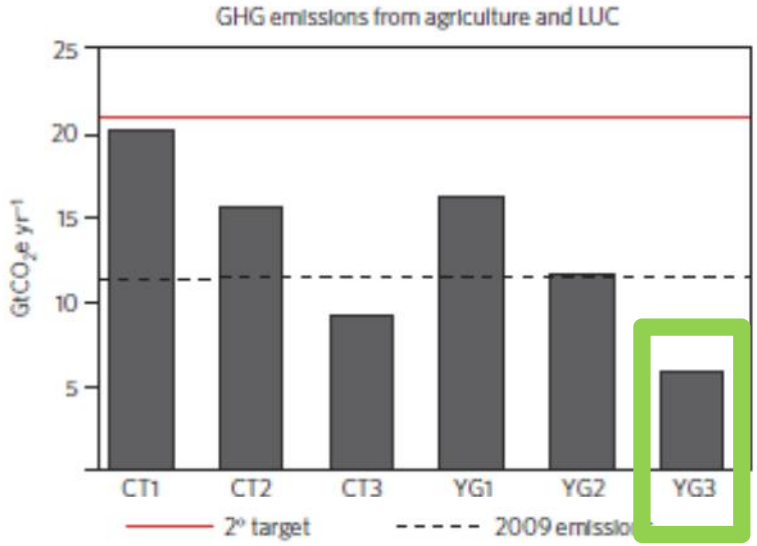
dietary patterns

food choices

reduce food waste

reduce overconsumption

Scenarios	Yields		Demand-side reductions	
	Current trends in yields	Yield gap closures (sustainable intensification)	50% food waste reduction	Healthy diets
CT1	×			
CT2	×		×	
CT3	×		×	×
YG1		×		
YG2		×	×	×
YG3		×	×	×



Bajzelj *et al.* Nature Climate Change 2014

Changing dietary patterns in the ‘real world’

Fore*sight:* Tackling Obesities - Future Choices 2007

Food is an emotive subject……

stigma

judgemental

beliefs

identity

culture

exclusion

inclusion

attitudes

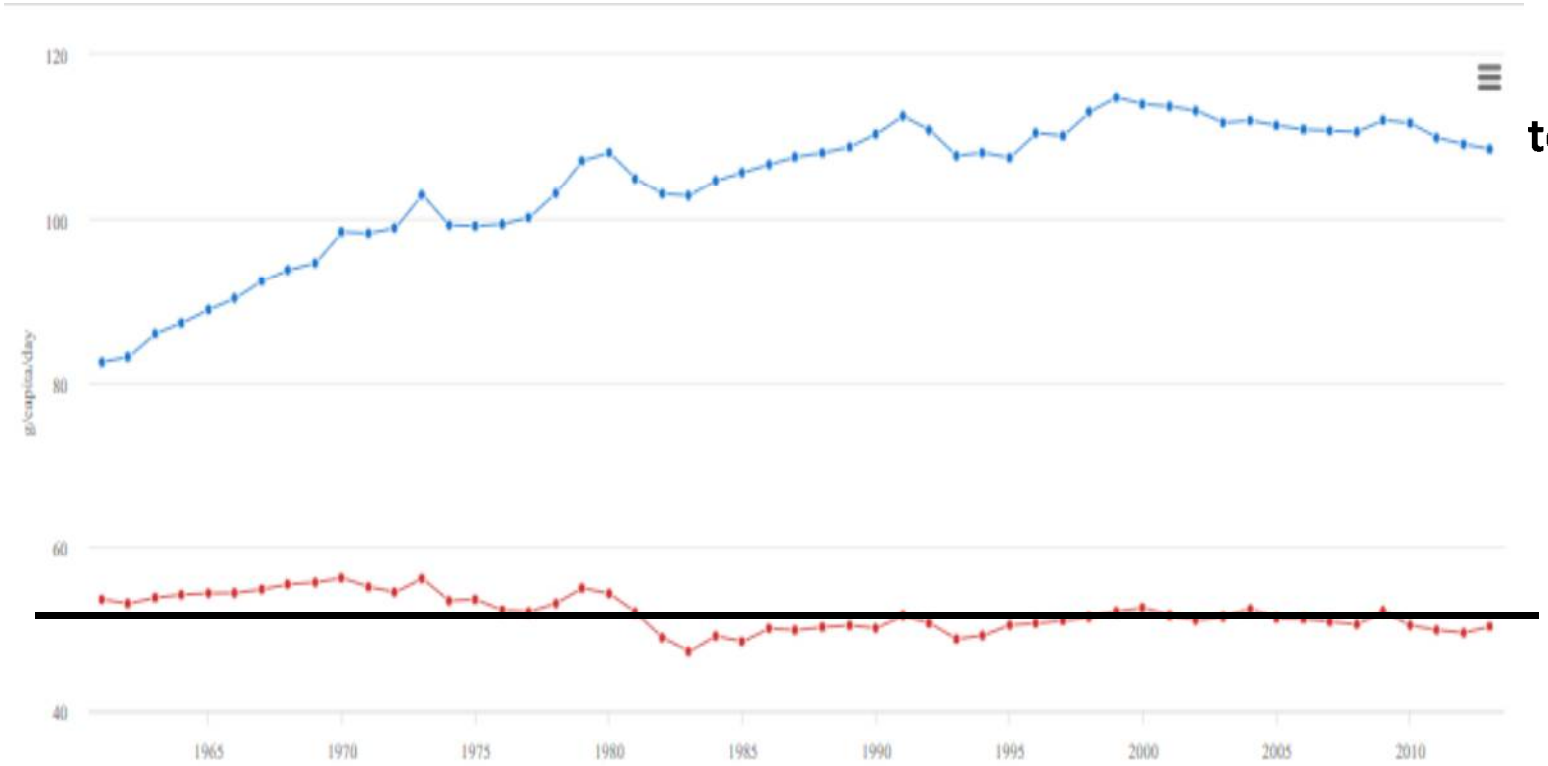
Meat: the perception is we all need to be vegan…..

Eating less meat: protein!!!

“Protein gap……”

“Protein deficiency??”

How worried should we be about protein?



total protein

plant protein

FAO Stats 2019

Identity and image: *what is in a name?*

vs.

"

Lea et al. 2006

"

Markowski & Roxburgh 2019

***Boys**: "outgoing, popular, physically impressive and attractive to girls."*

Girls:

Elliot 2014

Nutrition transition – food cultures are chnaging

"nutrition transition"

Framing information: choice architecture

Control Menu

Risotto primavera (v)
Peas, mushrooms, lemon 14.00

Lobster & crab roll
Avocado, lettuce, lemon mayonnaise 17.00

Sautéed king prawns
Chili, garlic & parsley, basmati rice 22.50

Deep fried haddock
Minted peas, hand cut chips, sauce tartar 15.50

Chicken cacciatora
Roasted chicken breast, mushrooms, tomato, olives 14.50

Steak frites
Rump pavé, hand cut chips, béarnaise sauce 19.50

Hamburger
Relish, hand cut chips 13.50

Ricotta & spinach ravioli (v)
Asparagus, butter & sage sauce 13.50

v – suitable for vegetarians

Descriptive Menu

Fresh seasonal risotto primavera (v)
Peas, mushrooms, lemon 14.00

Lobster & crab roll
Avocado, lettuce, lemon mayonnaise 17.00

Sautéed king prawns
Chili, garlic & parsley, basmati rice 22.50

Deep fried haddock
Minted peas, hand cut chips, sauce tartar 15.50

Chicken cacciatora
Roasted chicken breast, mushrooms, tomato, olives 14.50

Steak frites
Rump pavé, hand cut chips, béarnaise sauce 19.50

Hamburger
Relish, hand cut chips 13.50

Ricotta & spinach ravioli (v)
Asparagus, butter & sage sauce 13.50

v – suitable for vegetarians

Recommendation Menu

Chef's Recommendation

Risotto primavera (v)
Peas, mushrooms, lemon 14.00

Lobster & crab roll
Avocado, lettuce, lemon mayonnaise 17.00

Sautéed king prawns
Chili, garlic & parsley, basmati rice 22.50

Deep fried haddock
Minted peas, hand cut chips, sauce tartar 15.50

Chicken cacciatora
Roasted chicken breast, mushrooms, tomato, olives 14.50

Steak frites
Rump pavé, hand cut chips, béarnaise sauce 19.50

Hamburger
Relish, hand cut chips 13.50

Ricotta & spinach ravioli (v)
Asparagus, butter & sage sauce 13.50

v – suitable for vegetarians

Vegetarian Menu

Lobster & crab roll
Avocado, lettuce, lemon mayonnaise 17.00

Sautéed king prawns
Chili, garlic & parsley, basmati rice 22.50

Deep fried haddock
Minted peas, hand cut chips, sauce tartar 15.50

Chicken cacciatora
Roasted chicken breast, mushrooms, tomato, olives 14.50

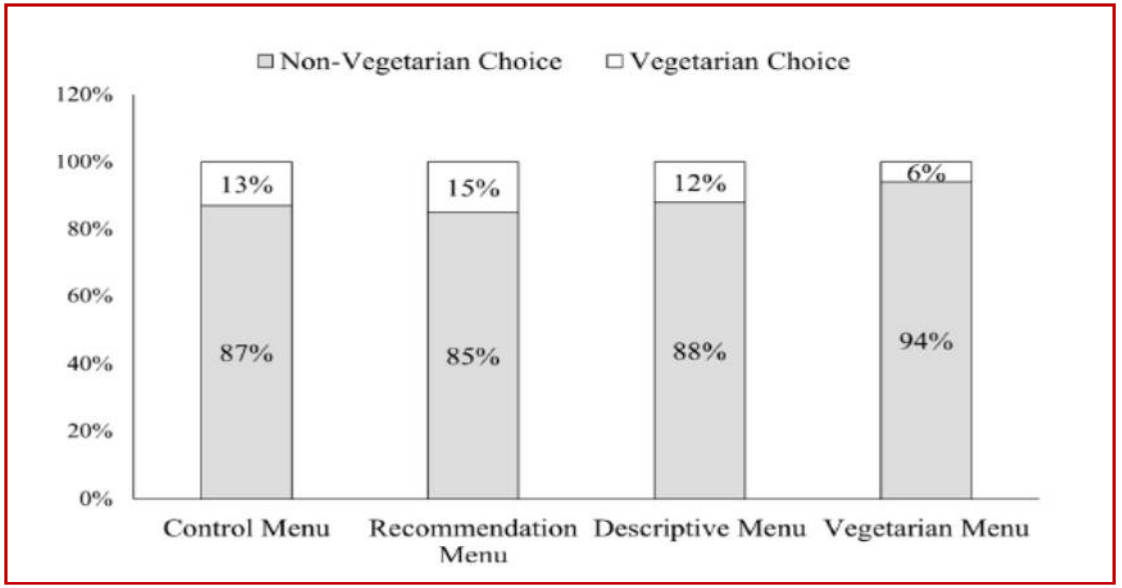
Steak frites
Rump pavé, hand cut chips, béarnaise sauce 19.50

Hamburger
Relish, hand cut chips 13.50

Vegetarian Dishes

Risotto primavera (v)
Peas, mushrooms, lemon 14.00

Ricotta & spinach ravioli (v)
Asparagus, butter & sage sauce 13.50



Bacon & Krpan 2018

awareness, hope, action!
or preaching?

Greta Thunberg, *the teenage Swedish activist at the head of a worldwide youth movement against climate change,* ***will lead a rally in Rome on Friday, April 19th.***

Students gather for the climate march in Rome. Photo: Andreas Solaro/AFP

Thousands of students across Italy walked out on Friday morning as part of a global school strike to demand action on climate change.

The Local
news@thelocal.it
@thelocalitaly

Climate activist Greta Thunberg meets Pope Francis at Saint Peter's Square at the Vatican, April 17, 2019. | Photo: Reuters

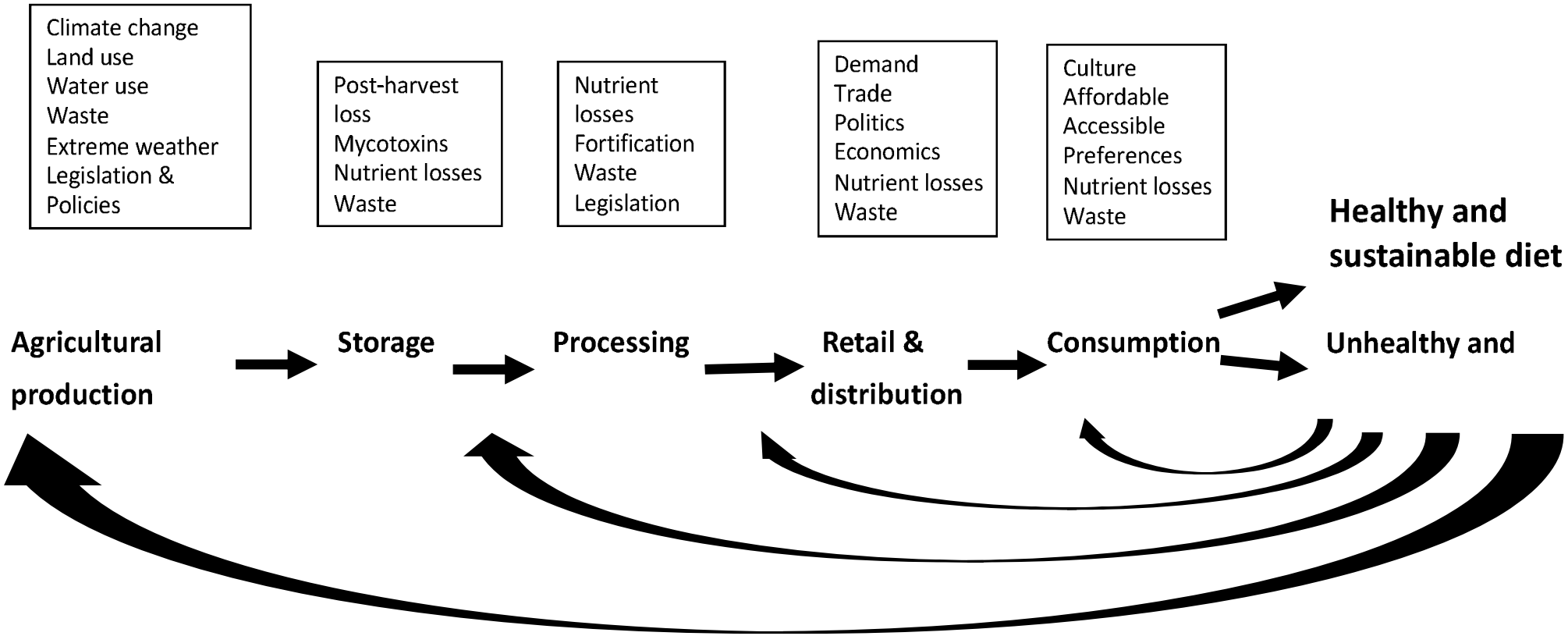
Willingness to change diets

"I am aware that ruminants cause a problem with methane, that wouldn't stop me eating meat."

"I probably won't eat less meat. I'm aware of the environment I take other steps, fine I do my bit, recycling, driving less but I probably wouldn't change my diet."

Macdiarmid et al. (2016) Appetite

We need a Food Systems Approach



impact of processing for health

The challenge is to join up sectors

climate change

economics, politics

HARD!

trade-offs
tensions
priorities

industry, resources

sustainable diets, people

Acknowledgements – interdisciplinary teams

Dr Simone Cerroni
Dr Stephen Whybrow
Dr Graham Horgan
Dr Henri de Ruiter
Prof Geraldine McNeill
Dr Janet Kyle
Dr Christian Reynolds
Dr Flora Douglas
Prof Pete Smith
Dr Nuala Fitton
Jennifer Loe
Heather Clark
Jonina Campbell

- *Nutrition*
- *Sociology*
- *Psychology*
- *Public health*
- *Climate change*
- *Land use*
- *Economics*
- *Agriculture*
- *Statistics*