Dietary quality & sustainability of EU-diets. The SHARP diet.

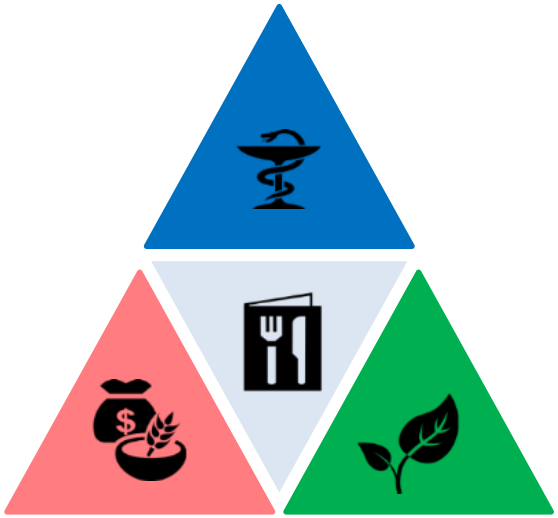
Anneleen Kuijsten, Marianne Geleijnse, Elly Mertens, Argyris Kanellopoulos, Gerdine Kaptijn, Joeri Kalter, Ellen Trolle, Marcela Dofková, Aida Turrini, Lorenza Mistura, Laura D'Addezio, Carine Dubuisson, Sabrina Havard and Pieter van 't Veer

7th March 2019

TiFN-funded research:
Grant AF-15505. *SHARP-BASIC*
Sustainable and Healthy diets

EU-funded research:
H2020 Grant no.
622693 *SUSFANS*

SHARP diets



Sustainable (environmental)

Healthy

Affordable

Reliable

Preferable

To derive **likely and realistic** dietary changes that improve the environmental and nutritional quality of diets

Diet diversity in EU represented by 4 countries: Indicators

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1. Diet quality (D2.2)

- Food Based Dietary Guidelines (FBDGs)
- Daily nutrient intake

2. Performance Metrics 'Balanced and sufficient diets' (D1.3)

- Food score (summarizes 5 food groups)
- NRD 9.3 (summarizes 12 nutrients)
- Energy balance (body mass index)

3. Environmental sustainability: (SHARP-BASIC)

- GHGE and LU

Diet diversity in EU represented by 4 countries: Design & Methods

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Population: n ≈ 8,000, men & women, aged 18-89 years

Dietary intake:

- Individual intake, diet records, 24-hr recalls (national surveys), >900 foods
- 2 non-consecutive days, FoodEx2, per 2000 kcal
- Food composition DBs (national) for 20-30 nutrients
- Common set of Food Based Dietary Guidelines (FBDGs)

Environmental sustainability (GHGe and LU):

- SHARP-Indicator DB, EU specific, attributional LCA
- Agri-footprint, Ecoinvent, CAPRI, peer-reviewed papers
- For 944 FoodEx2 codes (per kg food as eaten)

Common set of FBDGs

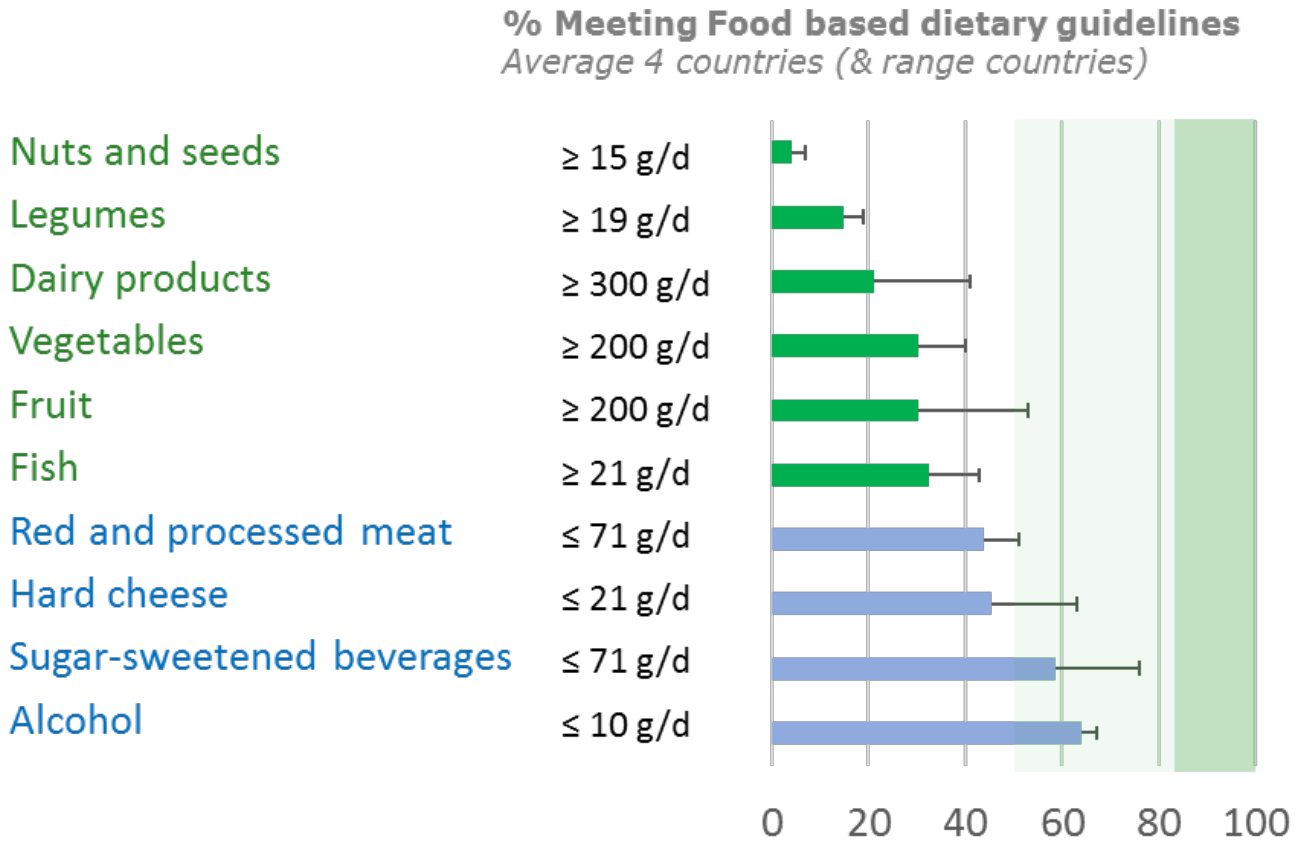
Foods to increase

• Vegetables	≥ 200 g/d
• Fruits	≥ 200 g/d
• Legumes	≥ 19 g/d
• (unsalted) nuts and seeds	≥ 15 g/d
• Fish	≥ 21 g/d *(once a week)*
• Dairy	≥ 300 g/d

Foods to decrease

• Red and processed meat	≤ 71 g/d
• Sugar sweetened beverages	≤ 71 mL/d
• Cheese	≤ 21 g/d
• Alcohol	≤ 13 mL/d
• Salt	≤ 6 g/d

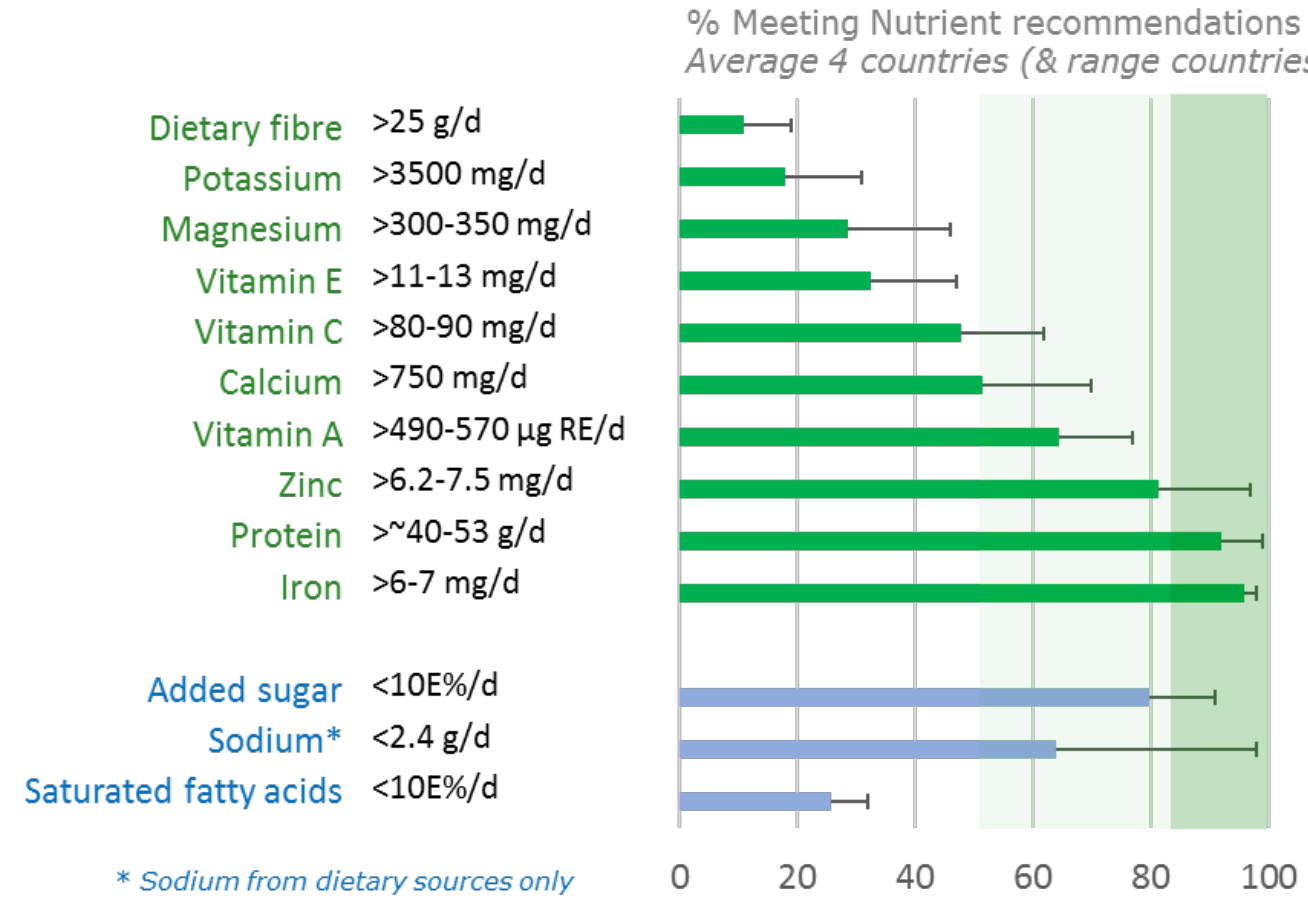
Results: Meeting food-based guidelines in 4 EU countries?



- **Low adherence to** food-based dietary guidelines **(FBDGs)**
- Foods to increase 4-33% adherence
- Foods to decrease 44-64% adherence
- Large differences between countries

Mertens et al (2018) *Geographic and socioeconomic diversity of food and nutrient intakes: a comparison of four European countries (Table 2)*

Results: Adequate intake of nutrients in 4 EU countries?



- EU population **not meeting** nutrient requirements
- Nutrient selection is based on NRD9.3
- Nutrients to increase 11-96% adherence
- Nutrients to limit 26-80% adherence

Mertens et al (2018) *Geographic and socioeconomic diversity of food and nutrient intakes: a comparison of four European countries (Table 2)*

Diet quality score FOODS

Five selected food items standardized for 2000 kcal/d.

	Food group	Food based Guideline	Max score (=1)*	Calculation score
1	Vegetables	eat at least 200 g/d	≥ 200 g/d	g/200
2	Fruits	eat at least 200 g/d	≥ 200 g/d	g/200
3	Fish	eat at least 20 g/d	≥ 20 g/d	g/20
4	Red & processed meat	eat at most 70 g/d	≤ 70 g/d	70/g
5	Sugar sweetened beverages (SSB)	drink at most 70 g/d	≤ 70 g/d	70/g

**Each food group max score =1; Max total score=5*

NRD 9.3 & 15.3

- Protein
- Fibre
- Calcium
- Iron
- ~~Magnesium~~
- Potassium
- Vitamin A, C and E
- Vitamin B1, B2, B12, D
- Folate
- Zinc
- Mono-unsaturated fat

- Sodium
- Saturated Fat
- Total sugar

$$NRD\ X.Y = \sum_{i}^{i=X} \frac{Nutrient\ i}{DRV\ i} x100 - \sum_{j}^{j=Y} \frac{Nutrient\ j}{MRV\ j} x100$$

*- Capped & standardized for **2000 kcal/d***
- Dietary reference values as set by EFSA

Dietary quality @ baseline (2010)

	Food score (5 food groups) *Max: 5*	Nutrient score (NRD9.3)* *Max: 900*	PM Foods *Range: 0-1*	PM Nutrients *Range: 0-1*
Denmark	3.7	495	0.74	0.66
Czech Republic	2.9	419	0.58	0.60
Italy	4.8	-	0.96	-
France	3.8	*393*	0.76	*0.58*

** For France total sugar used instead of added sugar; for Italy sodium, potassium and added sugar not available, so NRD9.3 not calculated*

LCA Foods as eaten

Production of material inputs, e.g., fertilizers & feed

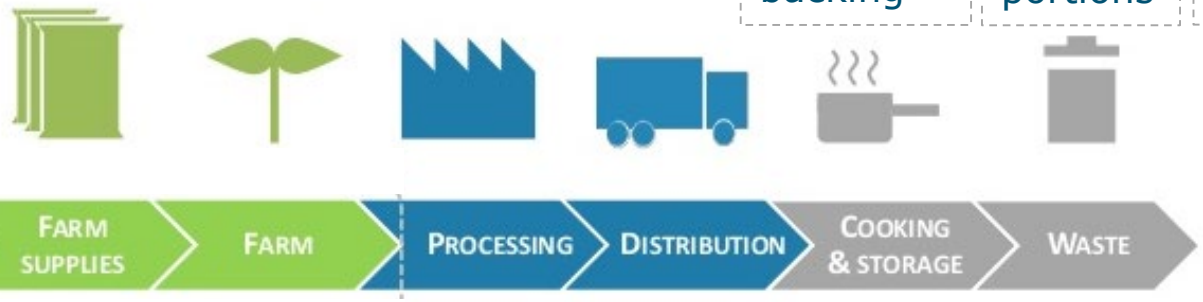
Primary production

Waste

Cooking & backing

Edible portions

Consumer travels



Packaging (primary) & transport

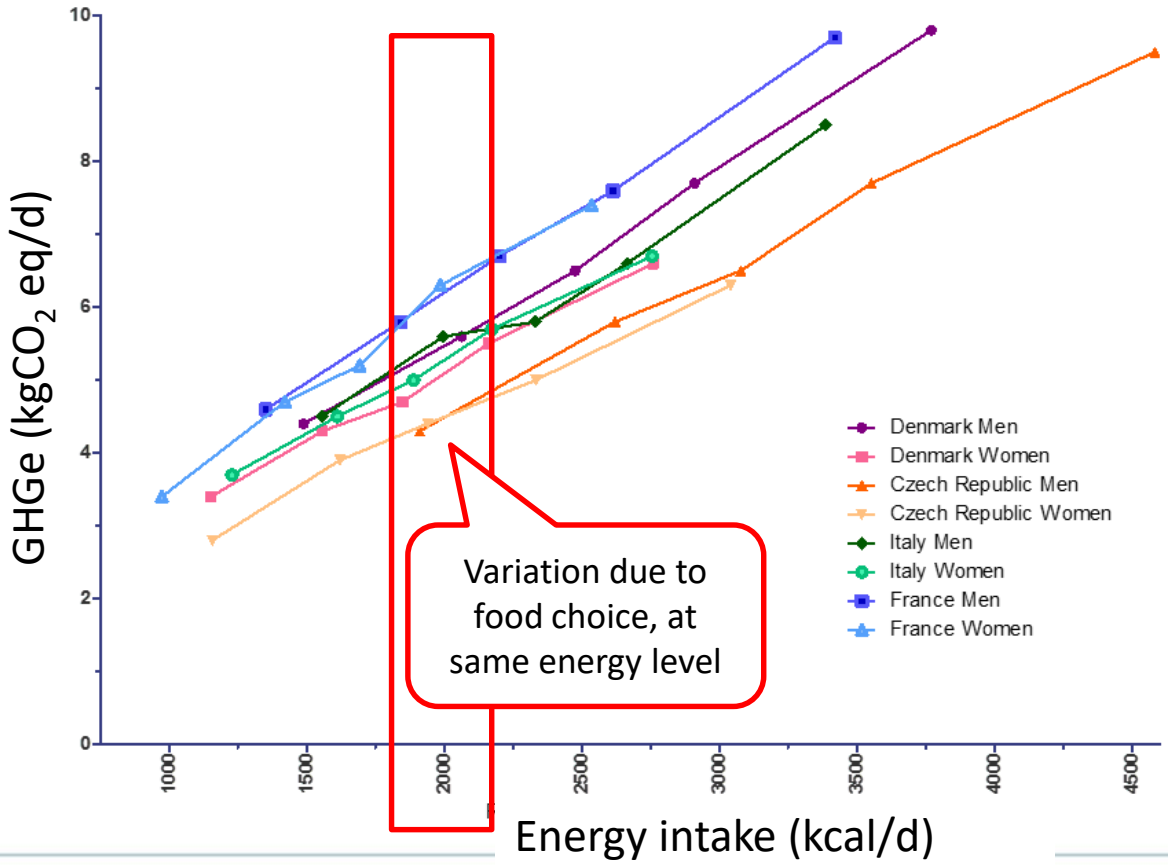
Food losses

Secondary & Tertiary packaging

SHARP-ID

- GHGe and LU
- Attributional LCA
- EU based
- 944 food items

Diet quantity: Excess of calories is not sustainable



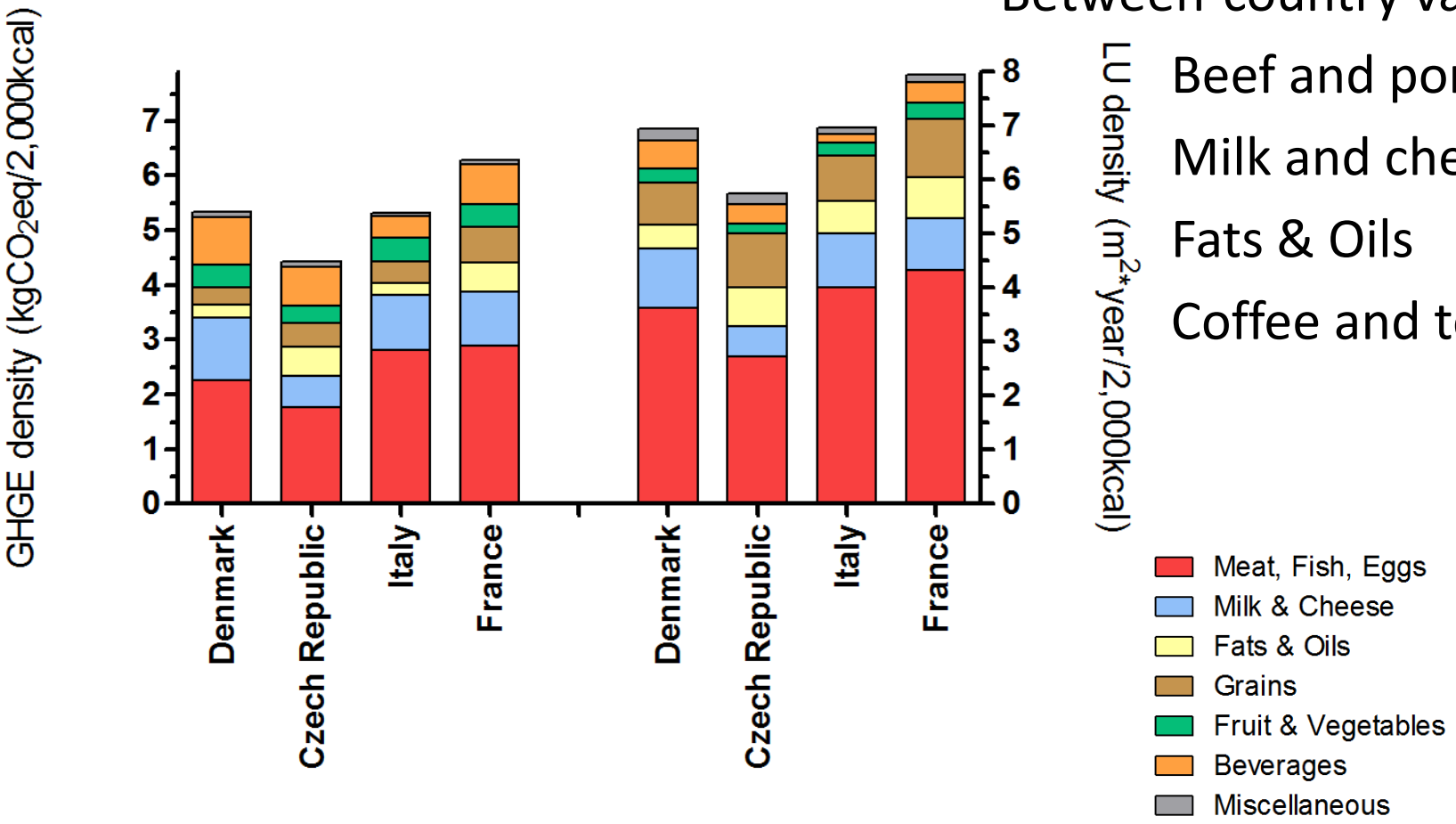
- Positive association between GHGE and total **energy** intake
- Total energy intake explained **38%** in absolute GHGE, given country and gender
- 4.4-6.4 kg CO2 eq/d per 2000 kcal → composition of the diet (**diet quality**)

Mertens et al (2019) - submitted

Diet quality & environmental sustainability

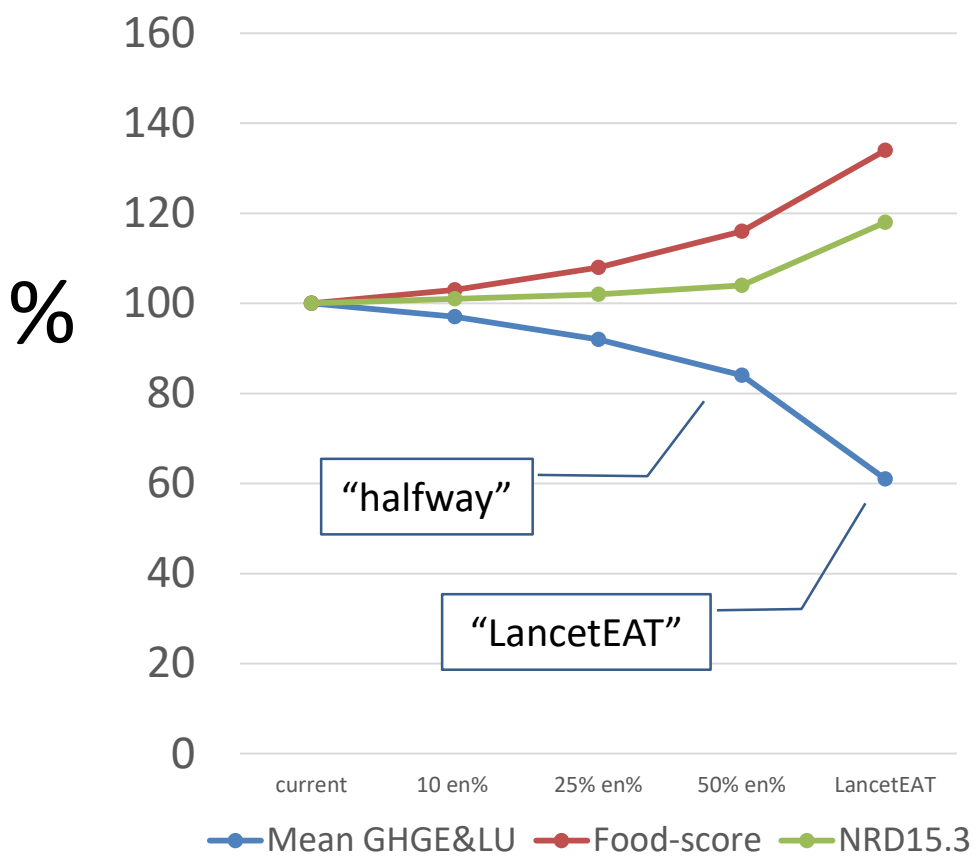
Between-country variation

- Beef and pork
- Milk and cheese
- Fats & Oils
- Coffee and tea



Mertens et al (2019) - submitted

Impact of isocaloric substitution of meat on H&S (predictions from regression analysis)



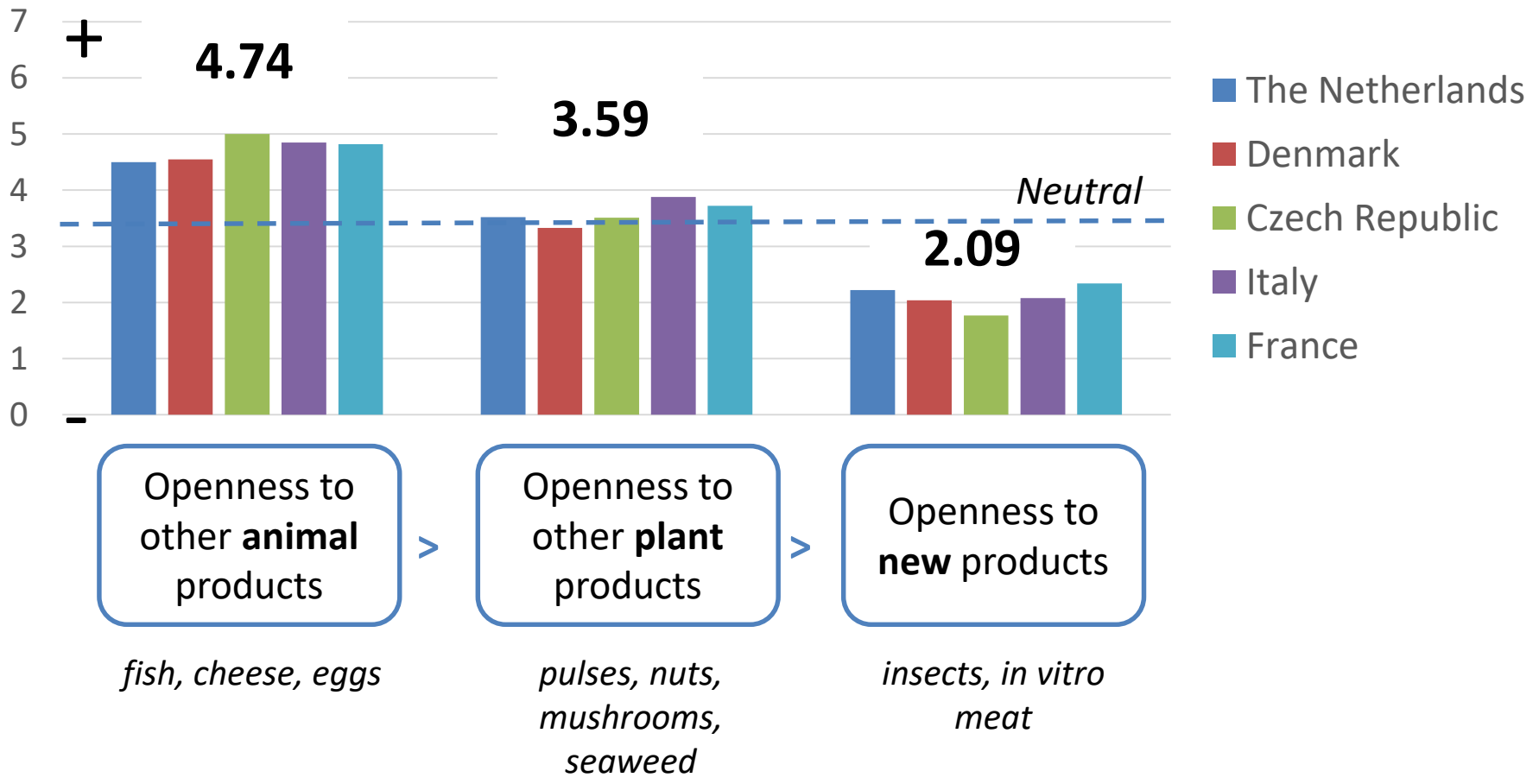
1. Meat replaced (10-50%) by fruits, vegetables, legumes & nuts (isocaloric)

2. LancetEAT reference diet

- **Food score**: Fruit, vegetables, fish, red and processed meat, sweetened beverages
- **NRD15.3**: Sum of 15 qualifying nutrients (capped) minus sum of 3 disqualifying nutrients
- **GHGe and LU**

Mertens et al (2019) - submitted

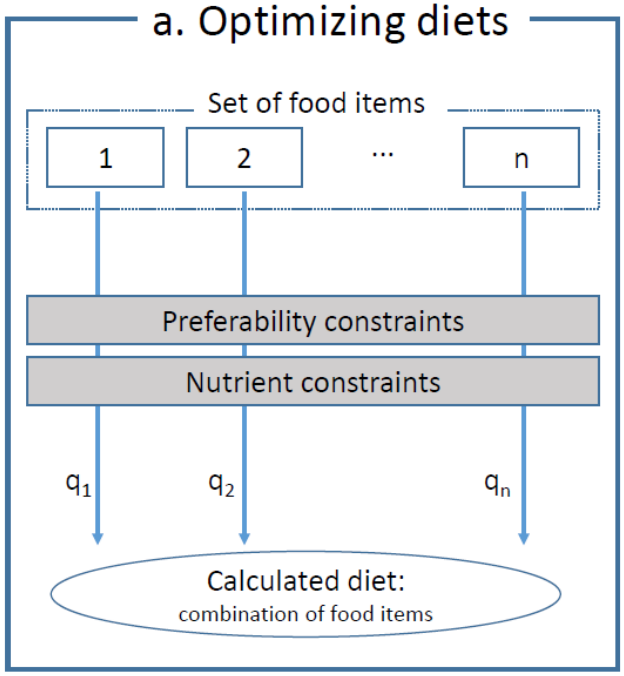
Openness to alternatives for meat



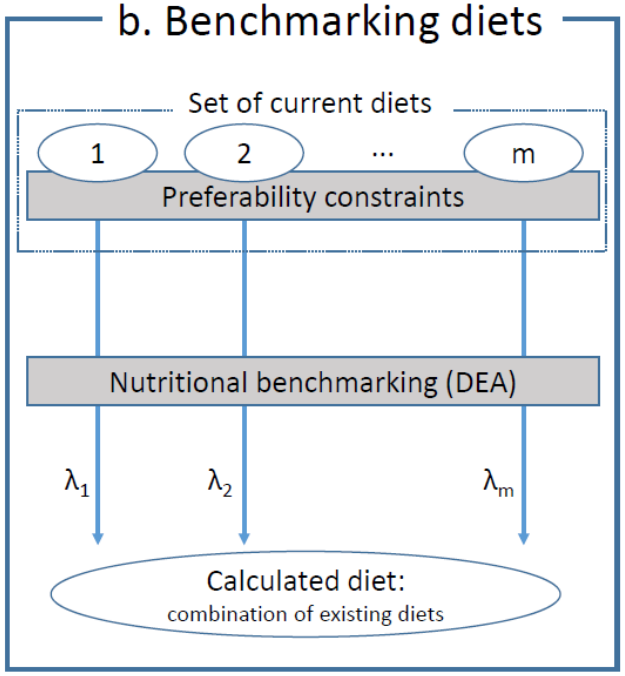
Bouwman, et al. (2016) SUSFANS report 2.1 *Consumers' knowledge about the determinants for a sustainable diet*

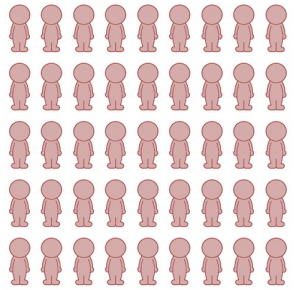
Benchmarking diets

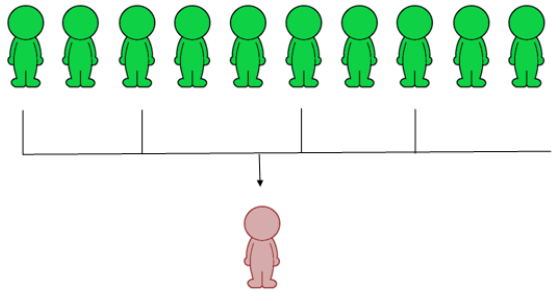
What has been done....



What we will do...



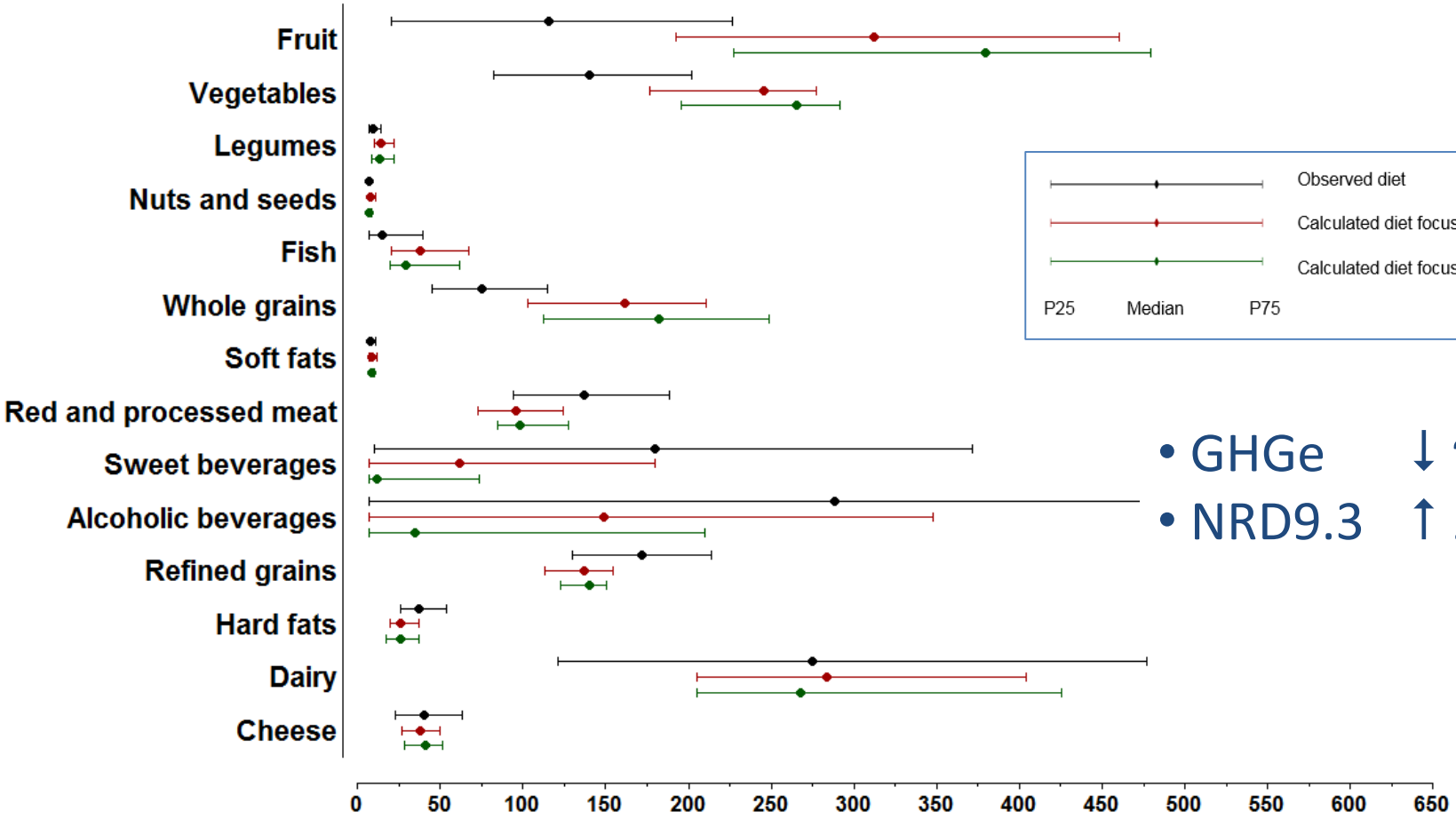




Kanellopouolos et al (2019, in prepapration)

Initial model solutions for SHARP diets

Preliminary results



- GHGe ↓ ~13%
- NRD9.3 ↑ 25-28%

Mertens, Kanellopouolos et al (2019, in preparation)

SHARP brings & what's next?

- **Individual** level data (~8000 subjects, 4 EU countries)
- Disaggregated **consumption data** (>900 foods)
- **Diet quality** in terms of foods and nutrients (20-30)
- **Harmonized** comparison countries, subgroups & individuals
- **Likely & realistic changes** within populations

- **Extrapolation** to EU28 requires standardized and harmonized (FoodEx2) intake data
- Monitor **nutrient adequacy**
- **Engaging consumer** and enabling sustainable and healthy choices.
- Consumer data on **food preferences** and behaviour (wearables, apps, citizen science)

Thank you

Partners in SUSFANS

Partners in SHARP

Stakeholders

Healthy and Sustainable Diets, Synergies & trade-offs
2nd international course, VLAG Graduate School, Wageningen
Tim Lang, Pieter van ’t Veer, Kasper Hettinga et al.
https://www.vlaggraduateschool.nl/en/courses/course/HSD19.htm