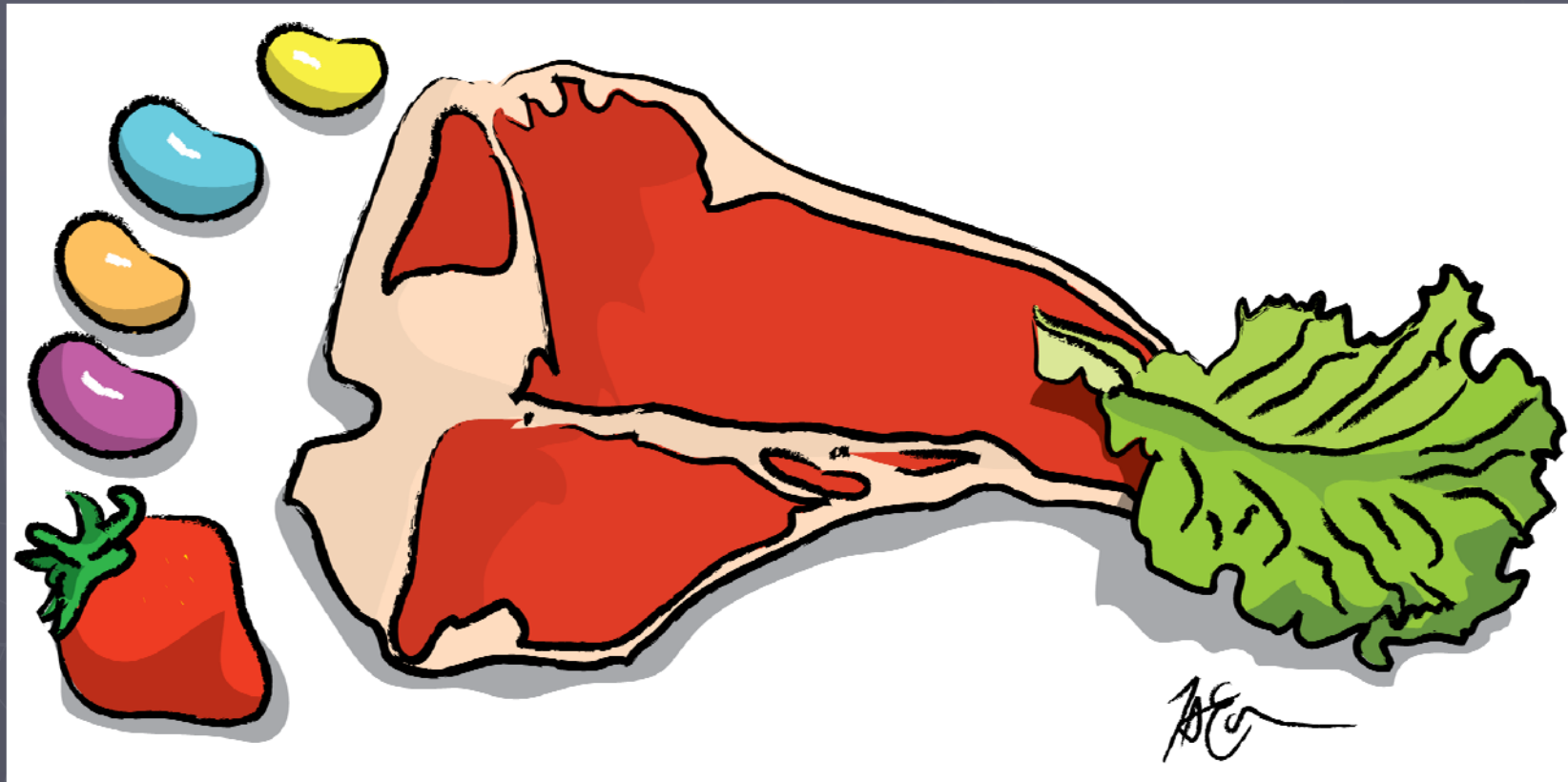


Estimated carbon dioxide equivalents emission in Greece, following different types of diet



Anagnostopoulos K., Kalogeropoulos N., Costarelli V. & Abeliotis K.
Harokopio University, Athens Greece

Diet and greenhouse gases emissions.

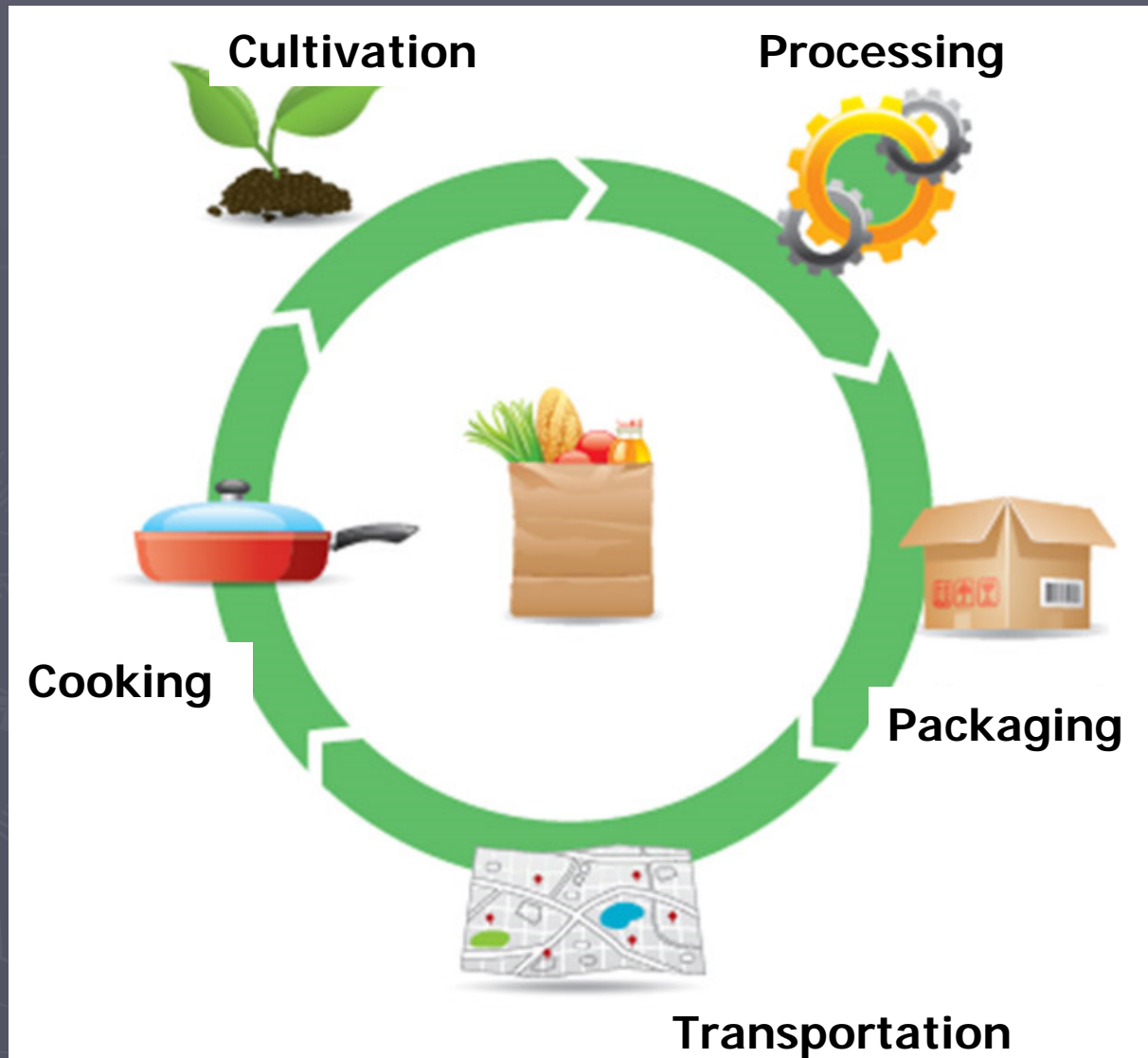


Food systems contribute **19%–29%** of global anthropogenic greenhouse gas (GHG) emissions, releasing 9,800–16,900 megatonnes of carbon dioxide equivalent in 2008.

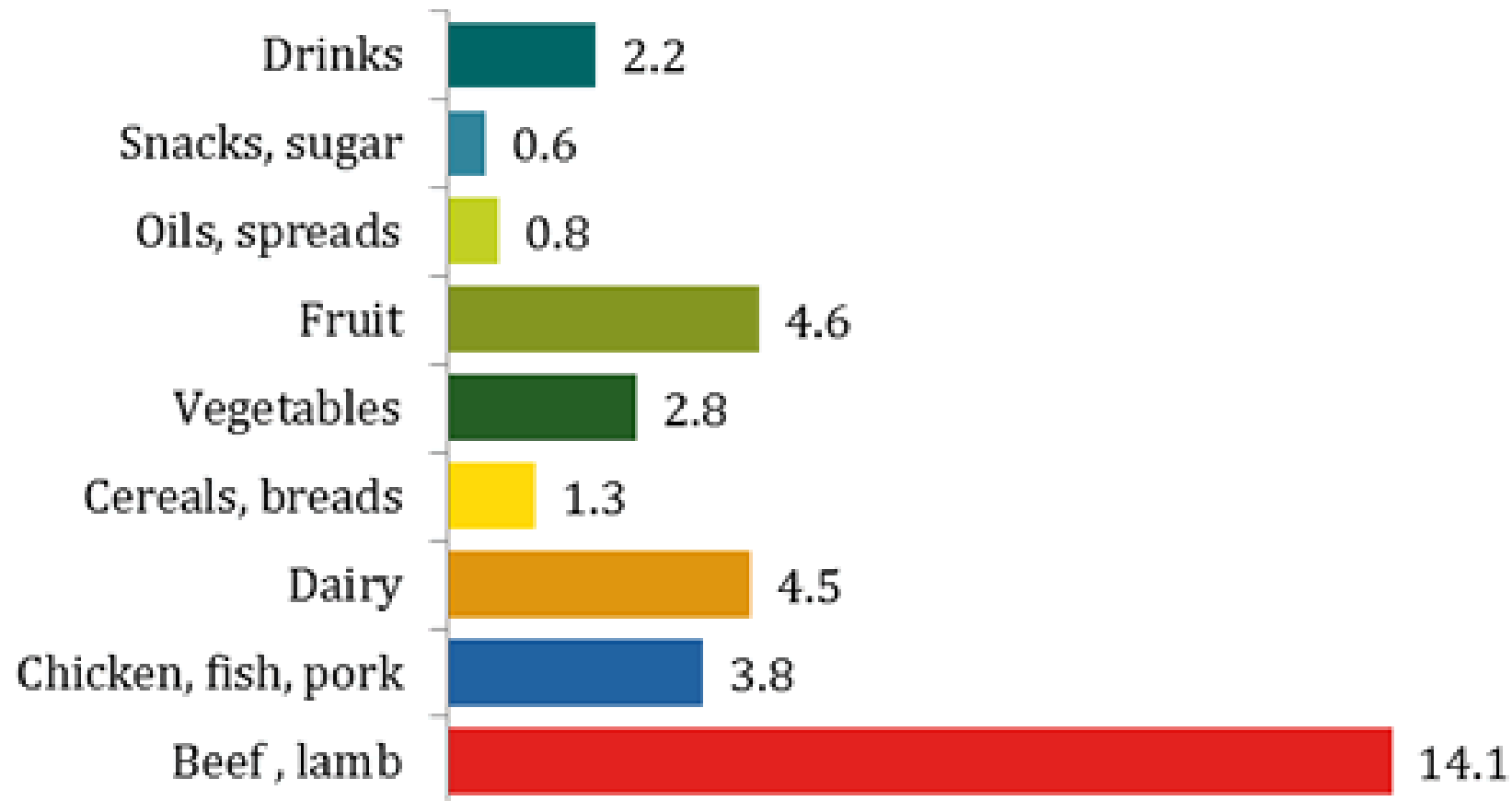
source: **Sonja J. et al., 2012**



Lifecycle of a food product



Carbon Intensity of Eating: g CO₂e/kcal



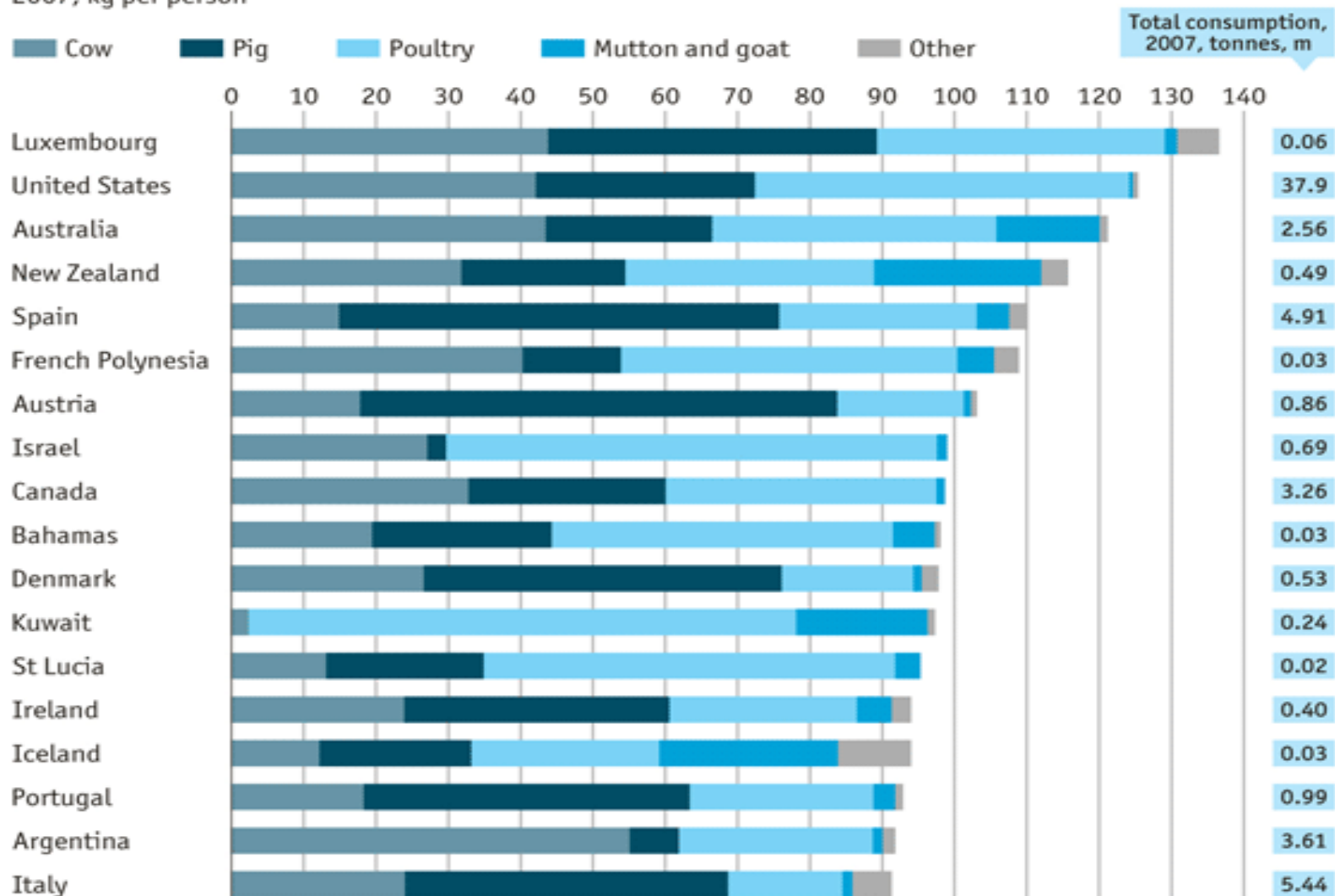
Note: Figures are grams of carbon dioxide equivalents per kilocalorie of food eaten (g CO₂e/kcal). Intensities include emissions for total food supplied to provide each kilocalorie consumed. This accounts for emissions from food eaten as well as consumer waste and supply chain losses. All figures are based on typical food production in the USA. Estimates are emissions from cradle to point of sale, they do not include personal transport, home storage or cooking, or include any land use change emissions

Sources: ERS/USDA, LCA data, IO-LCA data, Weber & Matthews



World's biggest meat-eaters

2007, kg per person



Sources: UN Food and Agriculture Organisation; *The Economist*

What is sustainable consumption?

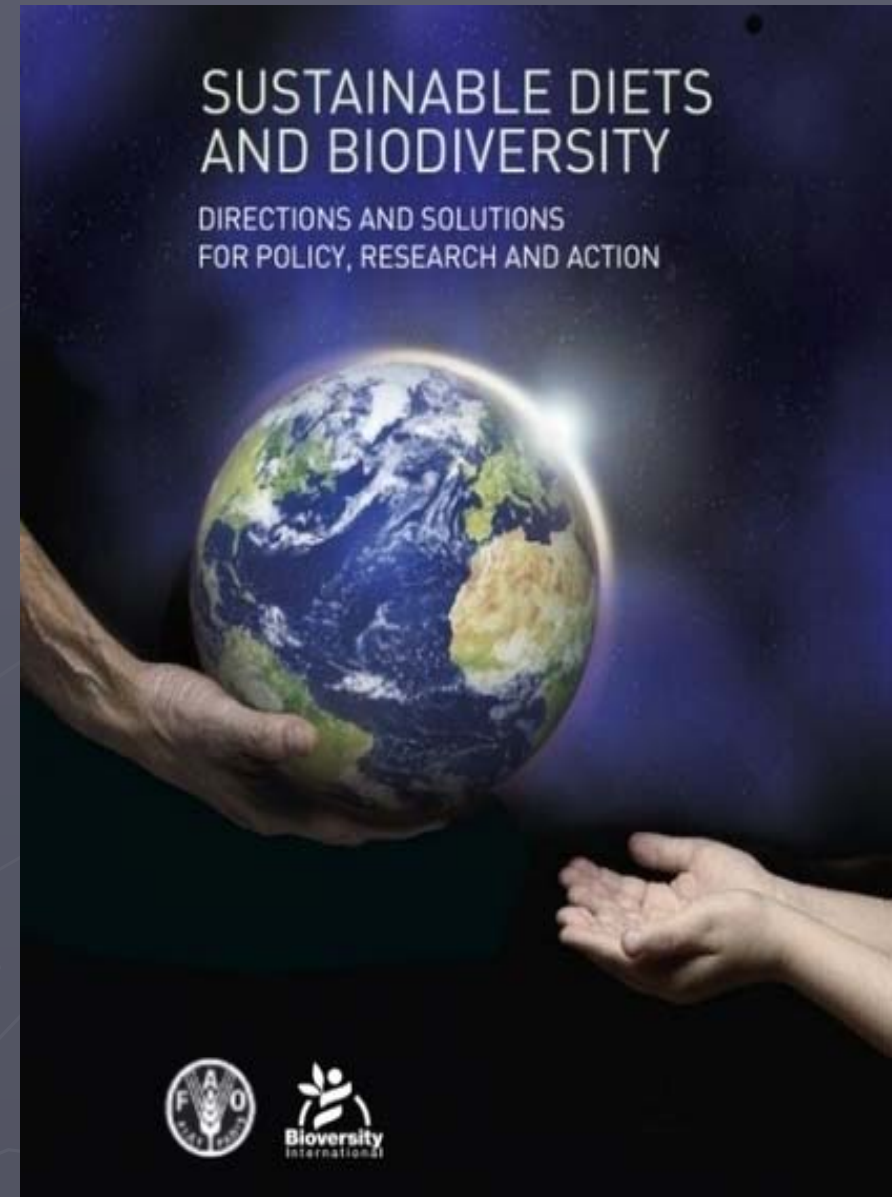


Sustainable Diets

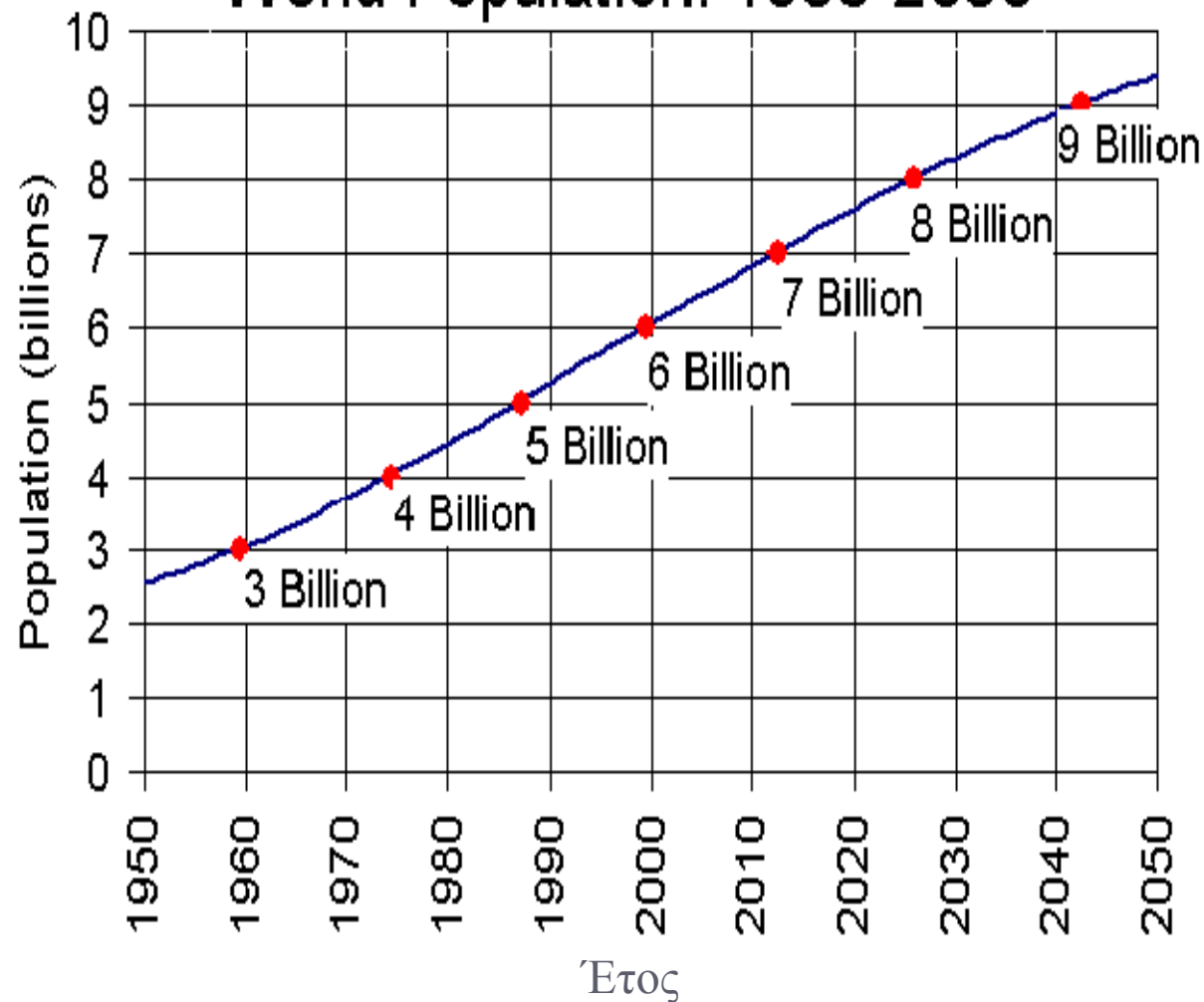
Diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and *future generations*. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources.

Source: FAO, 2010

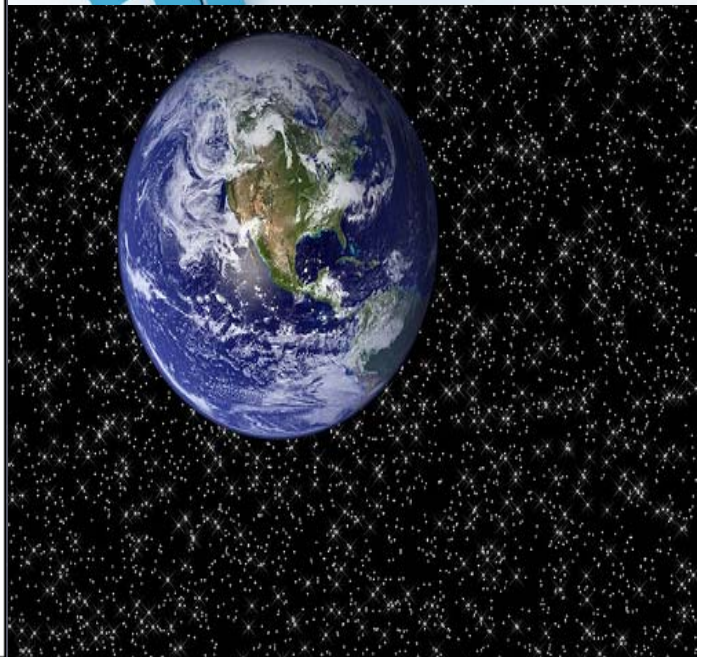
<http://www.fao.org/docrep/016/i3004e/i3004e.pdf>



World Population: 1950-2050



Source: U.S. Census Bureau, International Data Base, August 2006 version.





The resources of the planet are limited

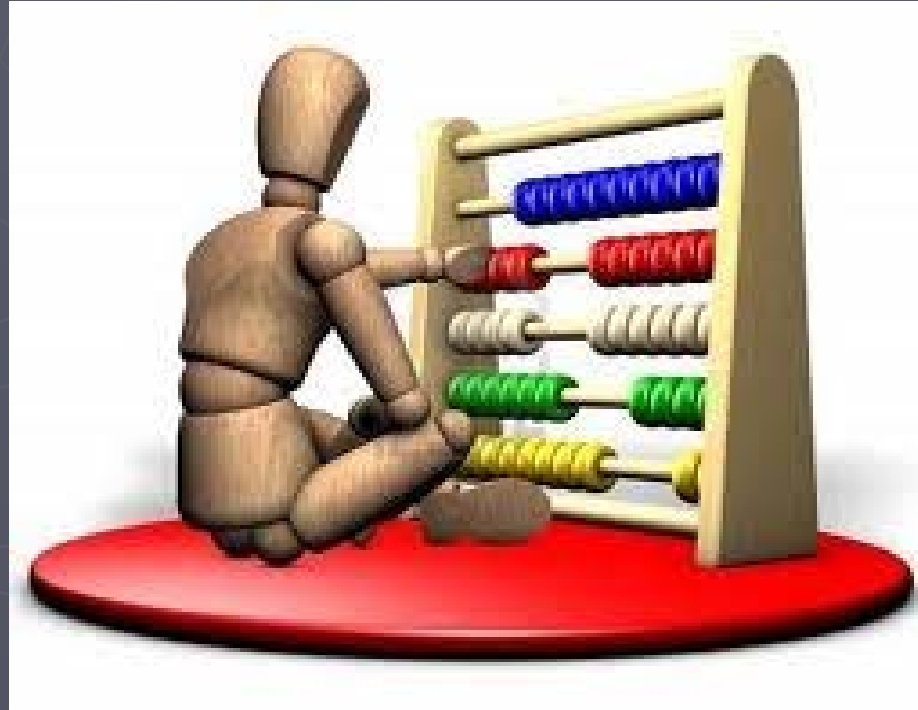




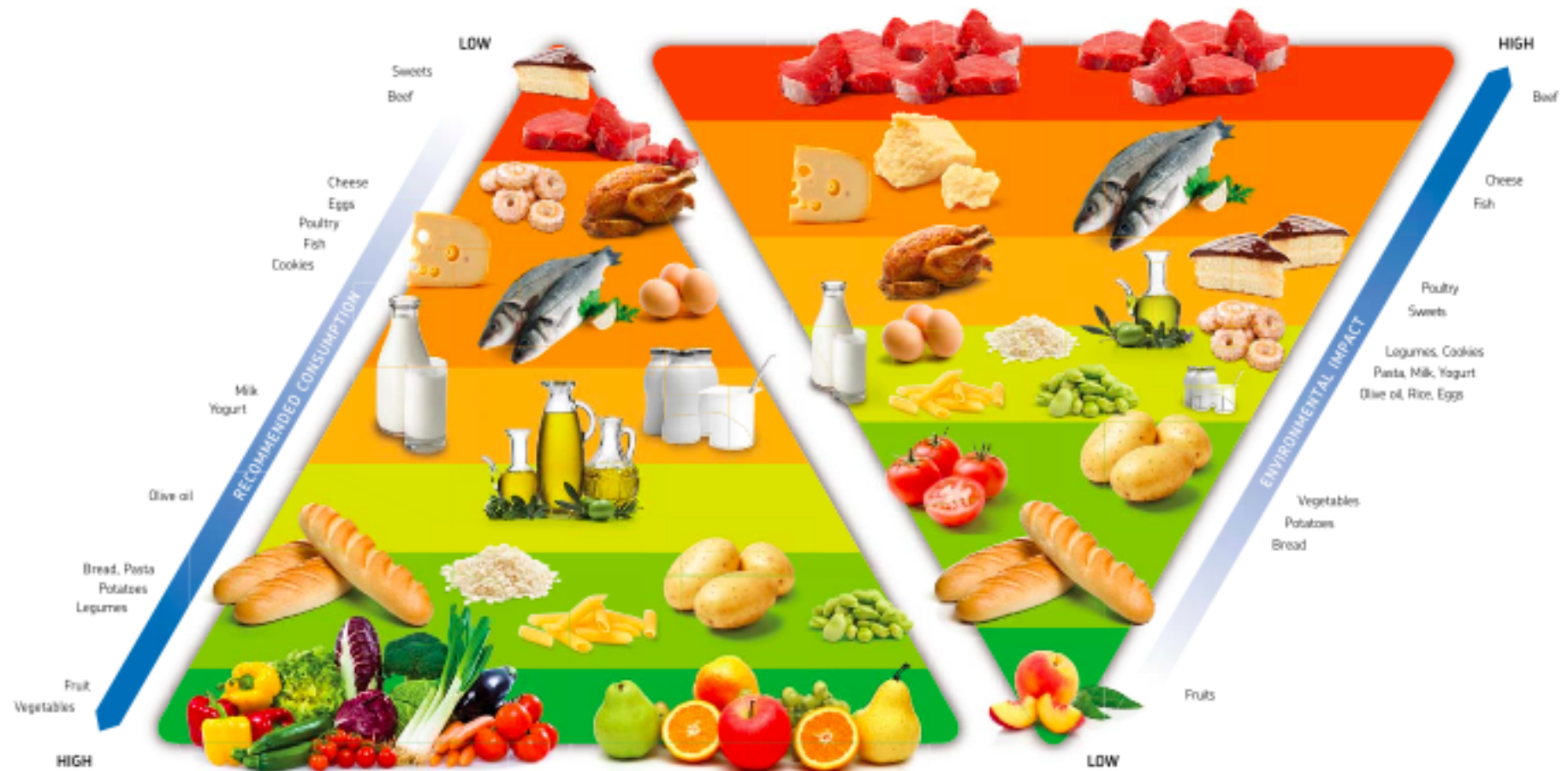
Photo: [Filipe Moreira \(flickr\)](#)



Sustainable diet. How difficult is it to define it?



ENVIRONMENTAL PYRAMID



FOOD PYRAMID

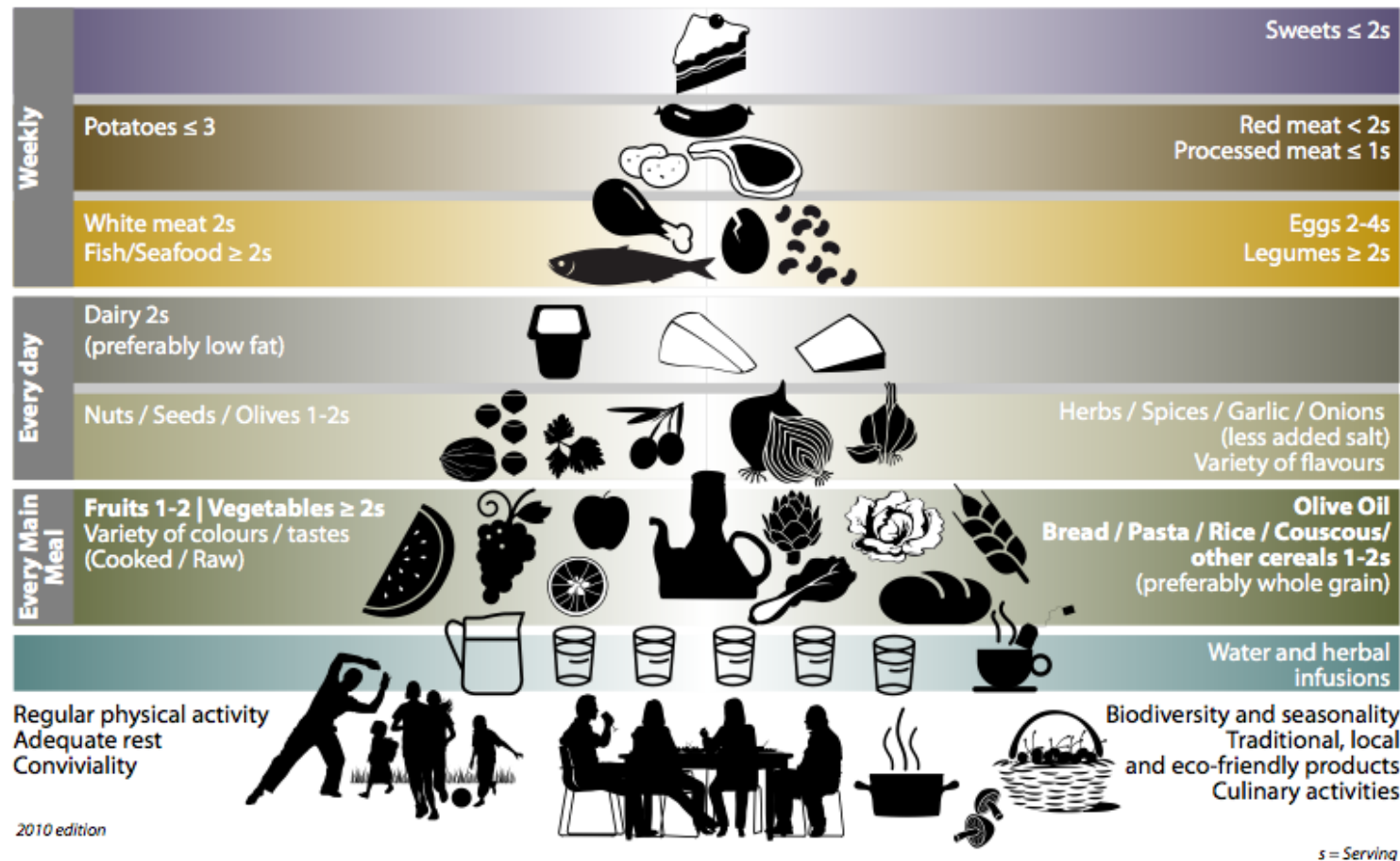
Mediterranean Diet Pyramid: a lifestyle for today

Guidelines for Adult population

Serving size based on frugality
and local habits



Wine in moderation
and respecting social beliefs



Environmental
footprint

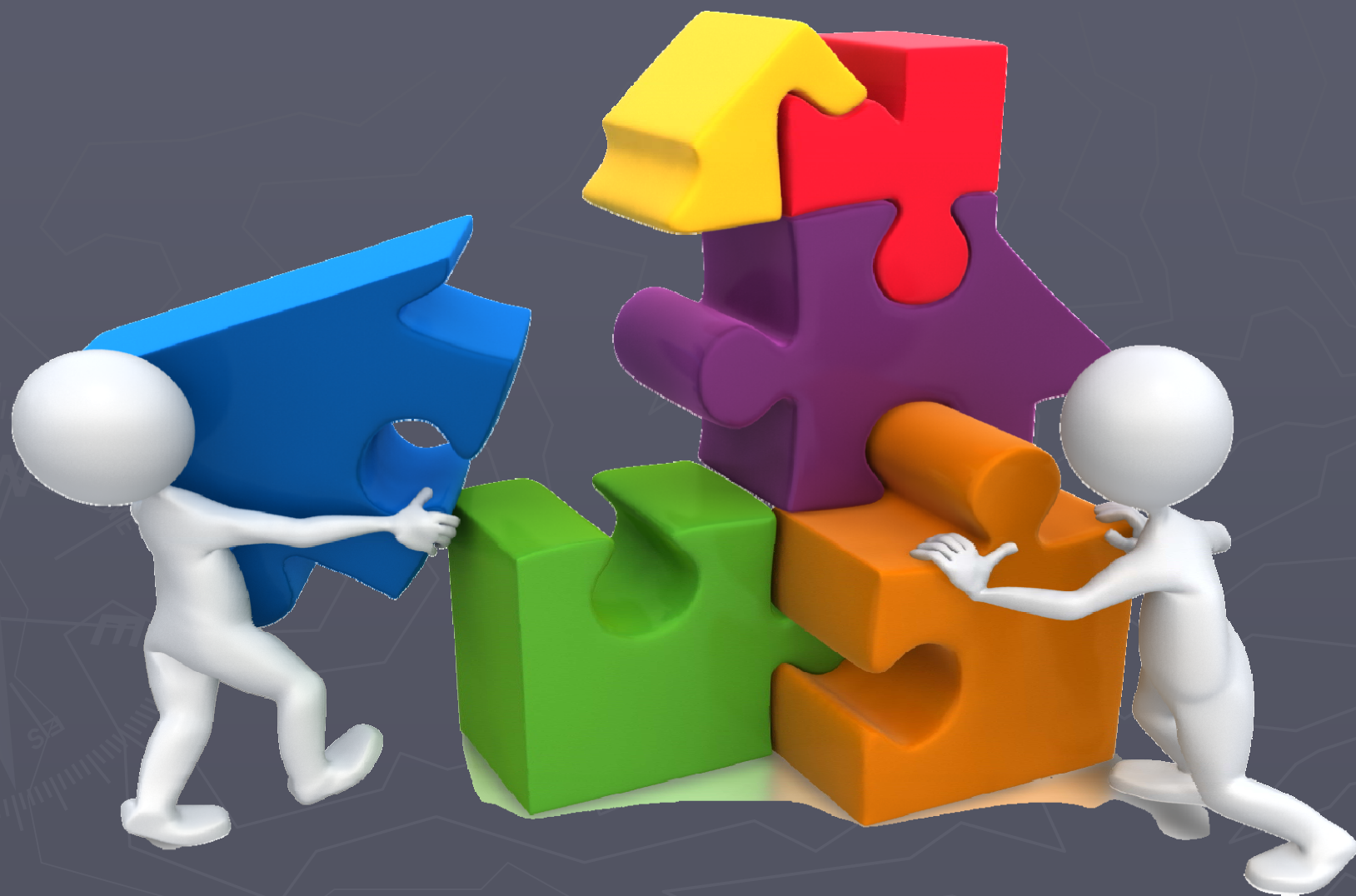
Source: Mediterranean Diet Foundation, 2010

Aim of the study

The current study aims at estimating the carbon footprint of the diet of the Greek consumers, following different dietary modifications.



Methods



Calculated footprint
of different
diets

```
graph BT; A[Per capita food items consumption] --> C[Calculated footprint of different diets]; B[Equivalent CO2 emission factors] --> C;
```

The diagram is a flowchart on a dark blue background. At the top is a purple-outlined circle containing the text 'Calculated footprint of different diets'. Below it are two green-outlined circles. The left one is labeled 'Per capita food items consumption' and the right one is labeled 'Equivalent CO2 emission factors'. Two white arrows point from these bottom circles up to the top circle. To the left of the bottom-left circle, the text 'National Statistical Service of Greece for 2004.' has an arrow pointing to it. To the right of the bottom-right circle, the text 'Carbon footprints for various food items have been obtained from existent European datasets' has an arrow pointing to it.

National Statistical
Service of Greece for
2004.

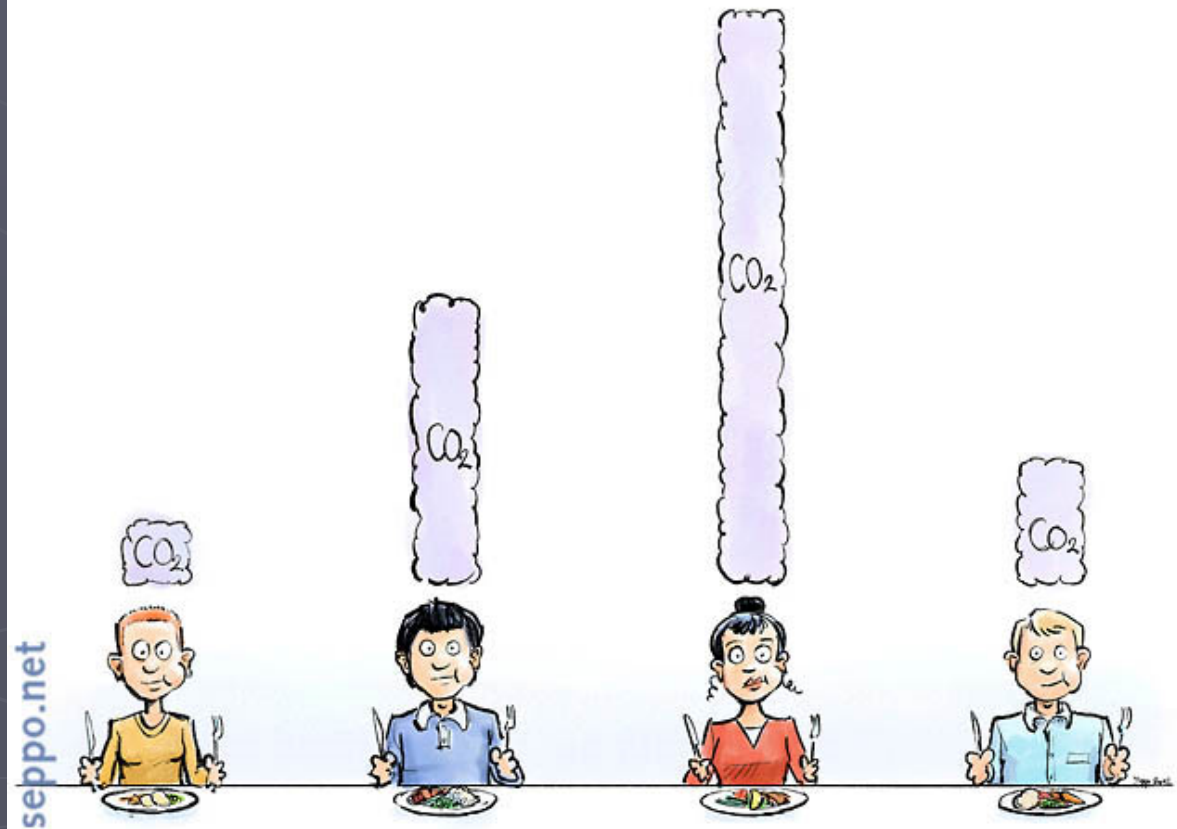
Per capita food
items
consumption

Carbon footprints for
various food items
have been obtained
from existent
European datasets

Equivalent CO2
emission factors

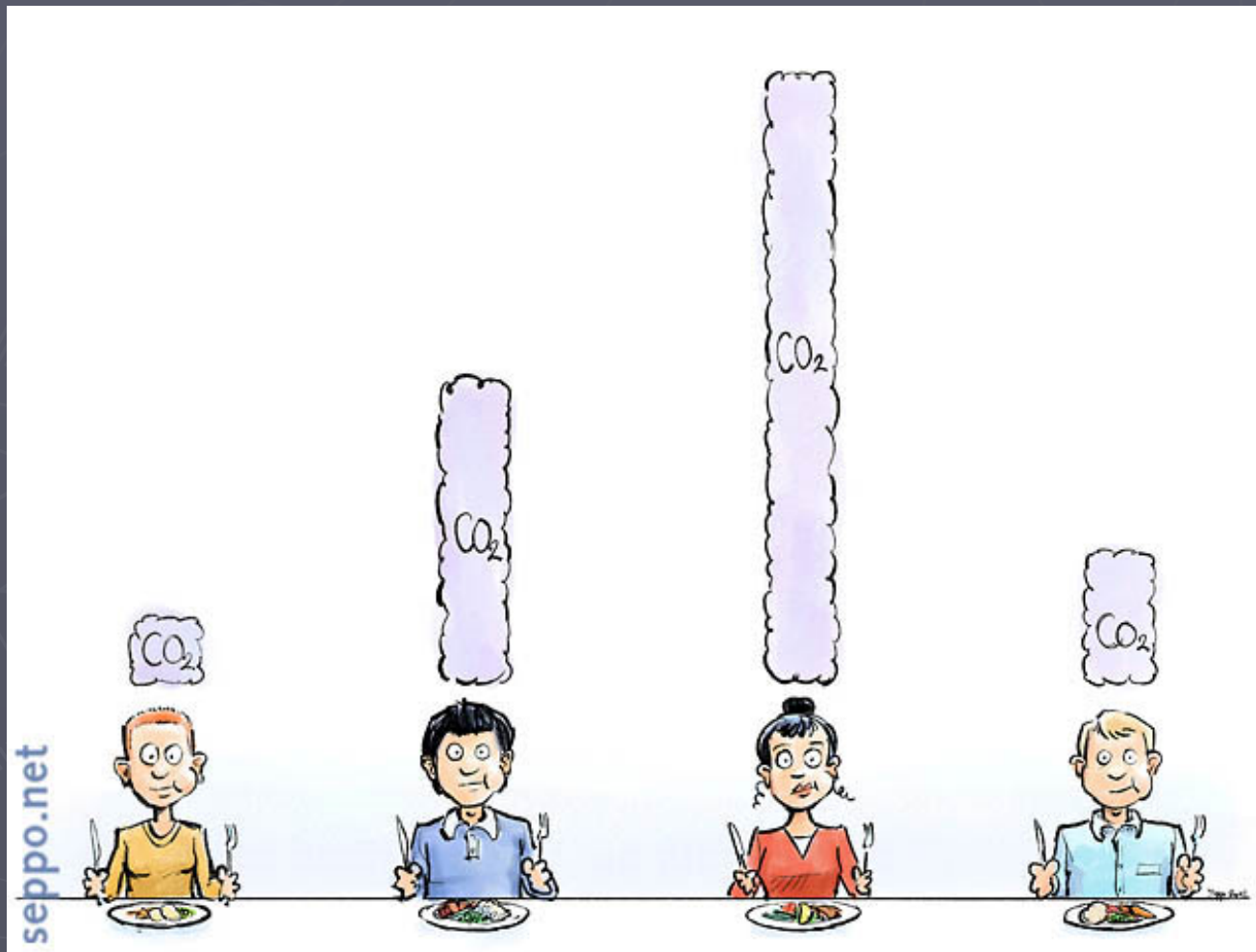
Different Dietary Scenarios

- ▶ Null scenario
(conventional-habitual diet)
- ▶ Lacto-ovo-vegetarian diet
- ▶ Substitution of beef
by pork and chicken
- ▶ Substitution of rice
by potatoes.



Different Dietary Scenarios

Effort was made so that the 4 different dietary scenarios were very comparable in terms of calories and protein content.



Equivalent CO₂ emission factors



There is no available data for Greece regarding equivalent CO₂ emissions hence the following two existent databases were used:

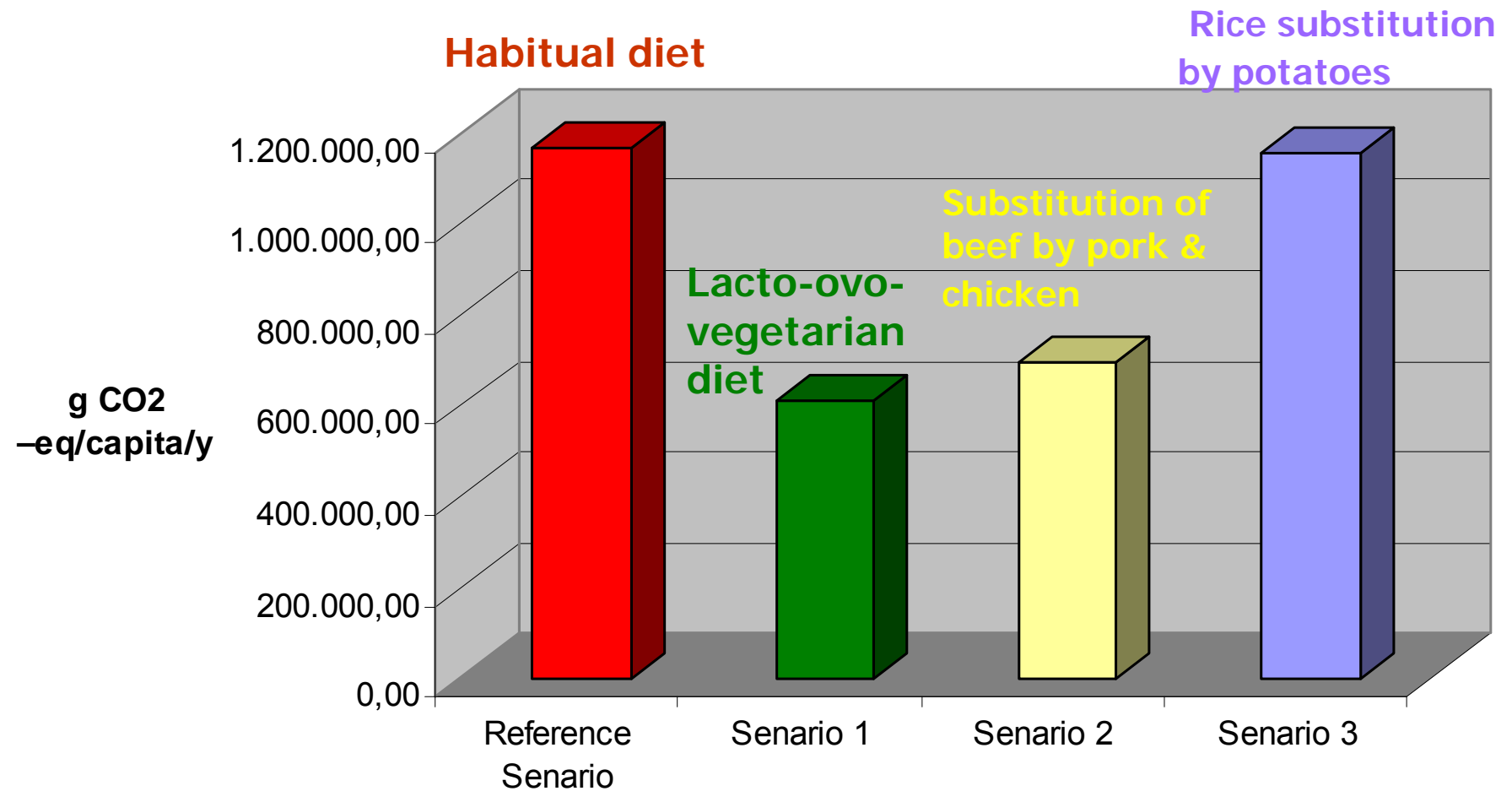
Barilla Double Pyramid: Healthy Food for People, Sustainable Food for the Planet, Barilla Center for Food and Nutrition, Parma (2010).

A. Wallen, N. Brandt & R Wennersten, Does the Swedish consumer's choice of food influence greenhouse gas emissions? Environmental Science & Policy 7, (2004) 525-535.

Table 1. Overall carbon footprint per food product category per scenario.

	Reference Scenario	Scenario 1	Scenario 2	Scenario 3
<i>Flour - Bread - Cereals</i>	105,458.865	123,066.634	105,458.865	90,025.382
<i>Meat</i>	635,445.531	0	163,798.036	635,445.531
<i>Fish - Seafood</i>	47,820.191	0	47,820.191	47,820.191
<i>Dairy - Eggs</i>	208,560.222	290,852.125	208,60.222	208,560.222
<i>Oils - Fats</i>	65,026.788	76,592.741	65,026.788	65,026.788
<i>Fruits</i>	7,496.264	8,425.768	7,496.264	7,496.264
<i>Vegetables</i>	25,550.554	37,965.897	25,550.554	29,620.120
<i>Sweetening - Marmalade - Chocolates – Ice creams</i>	8,049.685	8,049.685	8,049.685	8,049.685
<i>Non alcoholic drinks</i>	46,317.909	46,317.909	46,317.909	46,317.909
<i>Alcoholics drinks</i>	17,555.691	17,555.691	17,555.691	17,555.691
Total emissions (g CO₂ –eq/capita/y.)	1,167,281.7	608,826.5	695,634.2	1,155,917.8

Overall carbon footprint per scenario



Results

- ▶ By switching from a conventional diet, to a lacto-ovo-vegetarian diet, the estimated Green House Gas (GHG) emissions were reduced by 48%.
- ▶ The substitution of beef in the diet by pork and chicken resulted in a GHG emission reduction of 40%
- ▶ Substituting rice by potatoes, the carbon footprint was reduced by 1%.

Results

- The need for the estimation of CO₂ emission factors of different foods, specific for the southern Mediterranean area, is also indentified in this study



The Mediterranean Diet



We have not evolved to eat this
type of diet

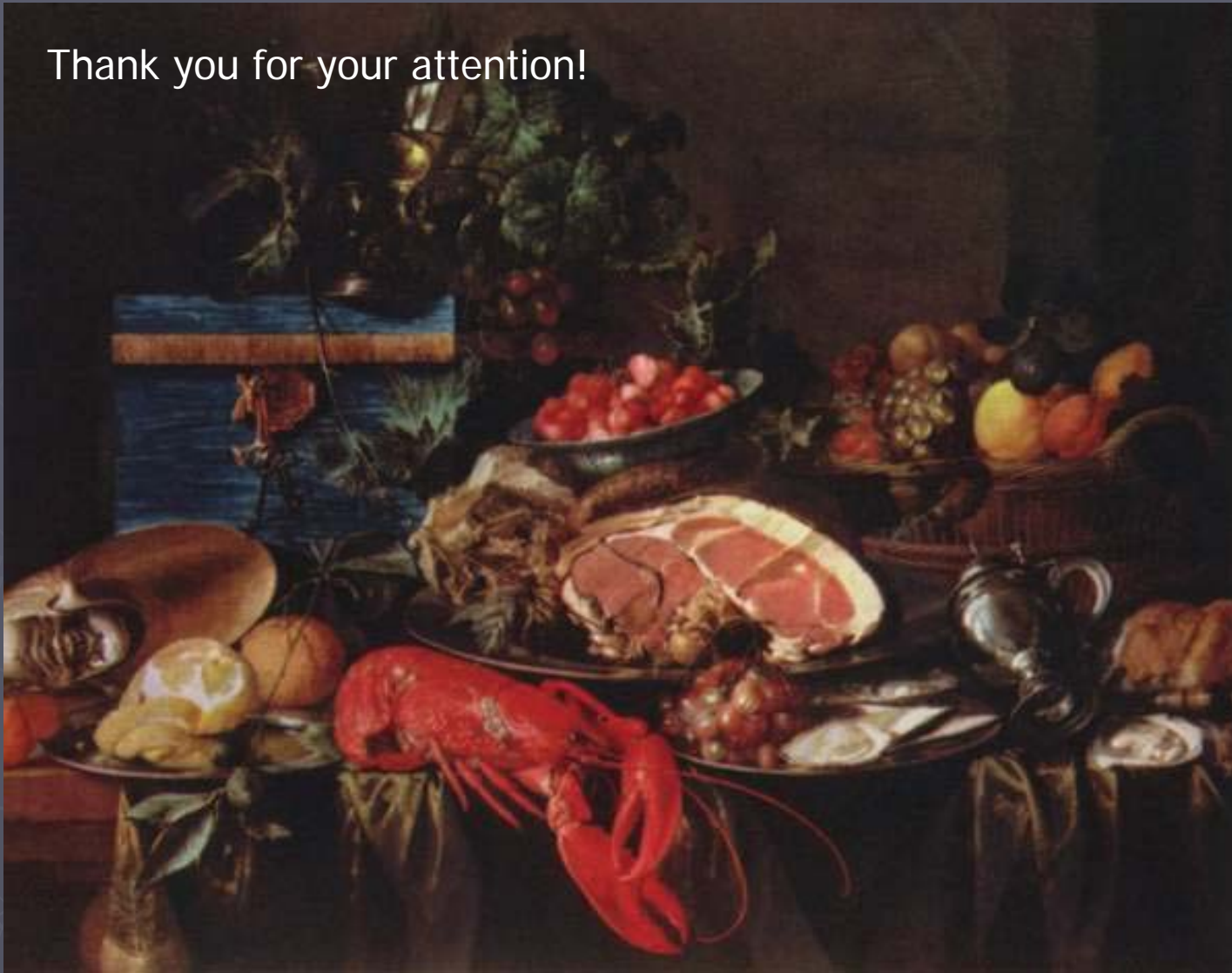


Conclusions

- ▶ It is plausible that specific dietary changes can lead to important differences in the carbon footprint of Greece, however, possible environmental burdens of the different types of the human diet, warrants further investigation.
- ▶ The need for future research to generate carbon dioxide emission factors representative of the Mediterranean region, is identified.



Thank you for your attention!



Jan Davidszoon de Heem, *Still Life with Fruit and Ham*, 1648-49