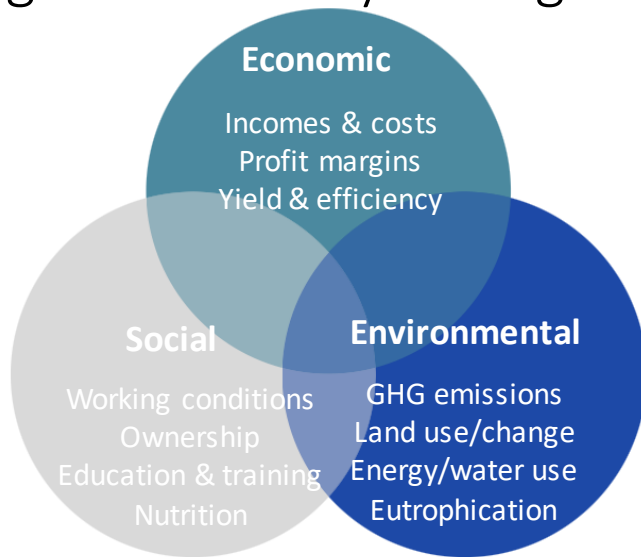REIMAGINE PLANET RIE

Concepts & indicators to balance environmental sustainability and nutritional value:
We need more than a one-size-fits-all solution:
Prof. Annemie Geeraerd Ameryckx

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Quantifying sustainability through indicators

Economic

Incomes & costs
Profit margins
Yield & efficiency

Social

Working conditions
Ownership
Education & training
Nutrition

Environmental

GHG emissions
Land use/change
Energy/water use
Eutrophication

Sustainability indicators and eco-labels
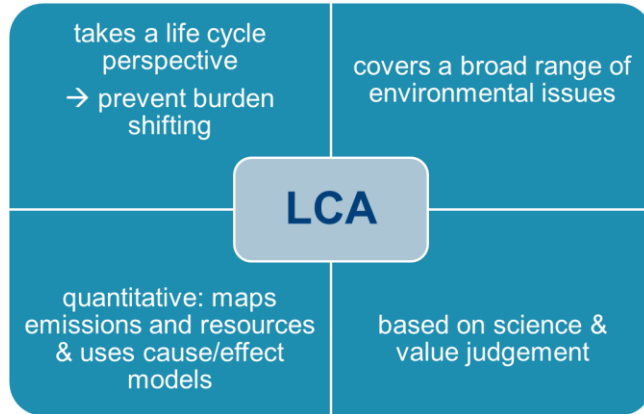
Food and non-food industry

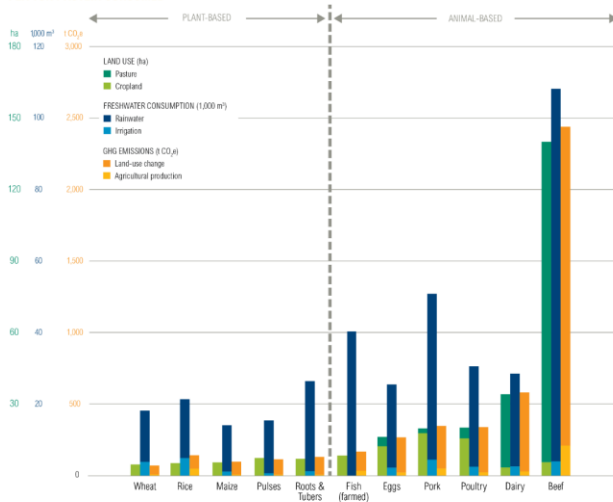# Life Cycle Assessment (LCA) in sustainability indicators

ISO 14040

"*LCA addresses the environmental aspects and potential environmental impacts (e.g., use of resources and the environmental consequences of releases) throughout a product's life cycle from raw material acquisition through production, use, end-of-life treatment, recycling and final disposal (i.e., cradle-to-grave).*"

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LCA in sustainability indicators

takes a life cycle perspective

→ prevent burden shifting

covers a broad range of environmental issues

LCA

quantitative: maps emissions and resources & uses cause/effect models

based on science & value judgement

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Animal-Based Foods Are More Resource-Intensive than Plant-Based Foods

Production chain pork schnitzel

Pig farm → Slaughterhouse → Meat cutting plant → Meat processing plant →

Inputs:
- Pig farm: Feed, Energy, Water
- Slaughterhouse: Energy, Water
- Meat cutting plant: Energy, Water
- Meat processing plant: Flour, Energy, Water

foreground

Outputs:
- Pig farm: Emissions, Waste
- Slaughterhouse: Waste
- Meat cutting plant: Waste
- Meat processing plant: Waste

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Production chain vegi & vegan soy schnitzel
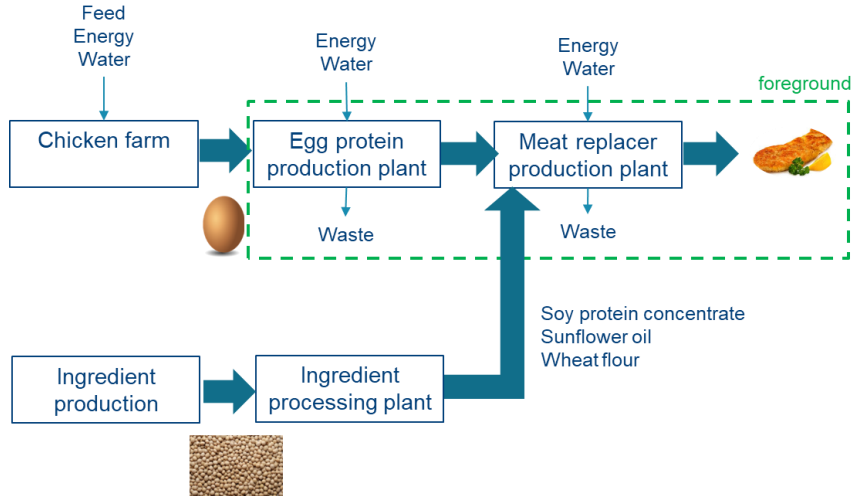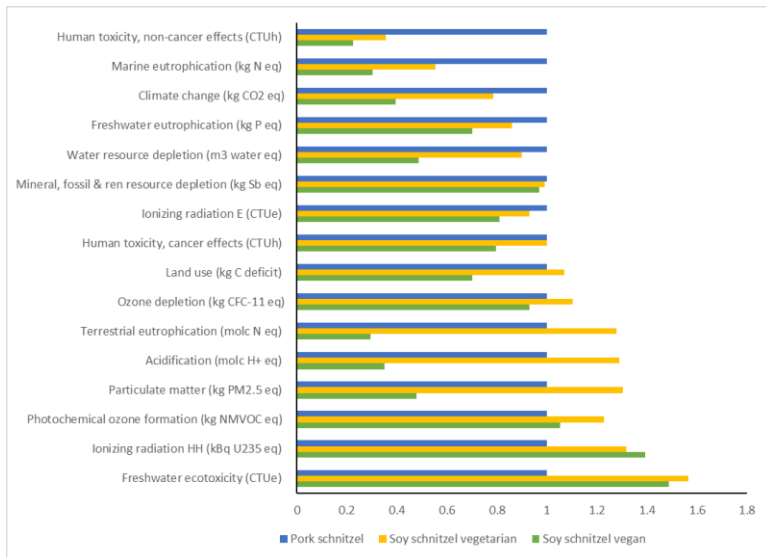
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Relative impact of pork and soy schnitzels - per PDCAAS

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Relative impact of pork and soy schnitzels - per PDCAAS

Chart legend: ■ Pork schnitzel ■ Soy schnitzel vegetarian ■ Soy schnitzel vegan

Chart categories (top to bottom):
- Human toxicity, non-cancer effects (CTUh)
- Marine eutrophication (kg N eq)
- Climate change (kg CO2 eq)
- Freshwater eutrophication (kg P eq)
- Water resource depletion (m3 water eq)
- Mineral, fossil & ren resource depletion (kg Sb eq)
- Ionizing radiation E (CTUe)
- Human toxicity, cancer effects (CTUh)
- Land use (kg C deficit)
- Ozone depletion (kg CFC-11 eq)
- Terrestrial eutrophication (molc N eq)
- Acidification (molc H+ eq)
- Particulate matter (kg PM2.5 eq)
- Photochemical ozone formation (kg NMVOC eq)
- Ionizing radiation HH (kBq U235 eq)
- Freshwater ecotoxicity (CTUe)

X-axis: 0, 0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.4, 1.6, 1.8

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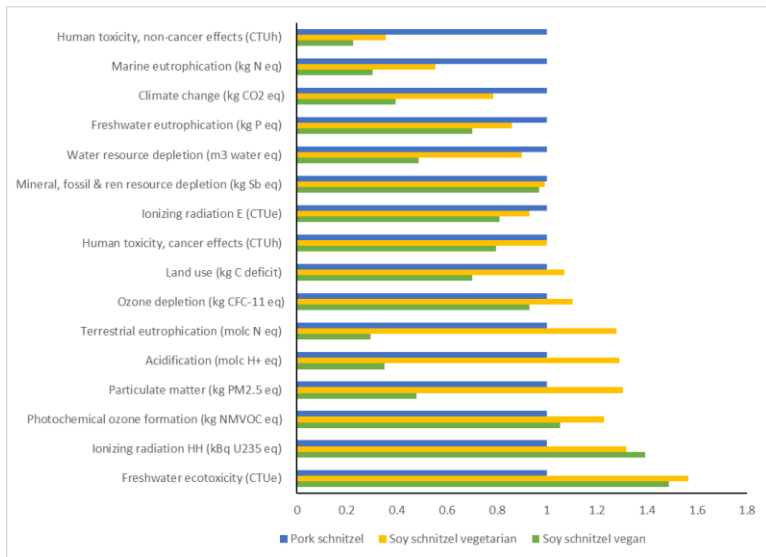
Planetary health diet by EAT-Lancet Commission

Regionalised plant-based diet
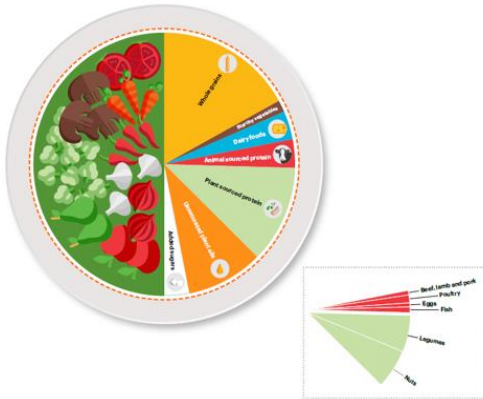
Goal: 'To achieve planetary health diets for nearly 10 Billion People by 2050'

- *Human health:* To prevent 11 million deaths annually
- *Planetary health:* To remain within safe operating system and planet boundaries

The Lancet Commissions

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

Walter Willett, Johan Rockström, Brent Loken, Marco Springmann, Tim Lang, Sonja Vermeulen, Tara Garnett, David Tilman, Fabrice DeClerck, Amanda Wood, Malin Jonell, Michael Clark, Line J Gordon, Jessica Fanzo, Corinna Hawkes, Rami Zurayk, Juan A Rivera, Wim De Vries, Lindiwe Majele Sibanda, Ashkan Afshin, Abhishek Chaudhary, Mario Herrero, Rina Agustina, Francesco Branca, Anna Lartey, Shenggen Fan, Beatrice Crona, Elizabeth Fox, Victoria Bignet, Max Troell, Therese Lindahl, Sudhvir Singh, Sarah E Cornell, K Srinath Reddy, Sunita Narain, Sania Nishtar, Christopher J L Murray

Executive summary

Food systems have the potential to nurture human health and support environmental sustainability; however, they are currently threatening both. Providing a growing global population with healthy diets from sustainable food systems is an immediate challenge. Although global food production of calories has kept pace with population growth, more than 820 million people have insufficient food, and many more consume low-quality diets that cause ... we found with a high level of certainty that global adoption of the reference dietary pattern would provide major health benefits, including a large reduction in total mortality. The Commission integrates, with quantification of universal healthy diets, global scientific targets for sustainable food systems, and aims to provide scientific boundaries to reduce environmental degradation caused by food production at all scales. Scientific targets for the safe operating space of food systems were established for ...

One-size-fits-all solution?

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Variability in eating patterns

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Nutritional policy and recommendations

Dietary advice

Average

General

VOEDINGSDRIEHOEK

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Nutritional policy and recommendations

Dietary advice

Average

Individual

General

Personalized

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Nutritional policy and recommendations

Dietary advice

Average

Typologies

Individual

General

Relatable

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Identifying protein typologies

Belgian National Food Consumption Survey 2014 – 2015
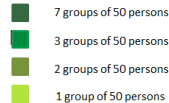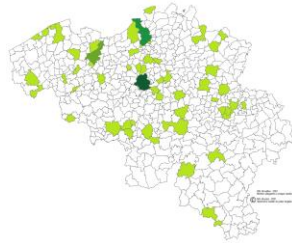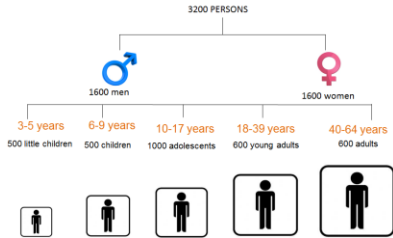
Scientific Institute of Public health, OD Public health and surveillance (2017). Belgian National Food Consumption Survey 2014-2015. WIV-ISP, FOD VVVL & EFSA

- 24-h recalls

  "<u>what</u> and <u>how much</u> did you eat in the last 24 hours?"

- Food Frequency Questionnaires (FFQ)

  "in the last year, <u>how often</u> did you eat … per day/week/month?"

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Clusters

1 - high in milk (products) and pork, low in grain products

2 - high in poultry and grain products, low in red meat

3 - average in all protein sources

4 - high in cheese and fish and shellfish, low in processed meat

5 - high in beef, processed meat and eggs, low in milk (products)

Total
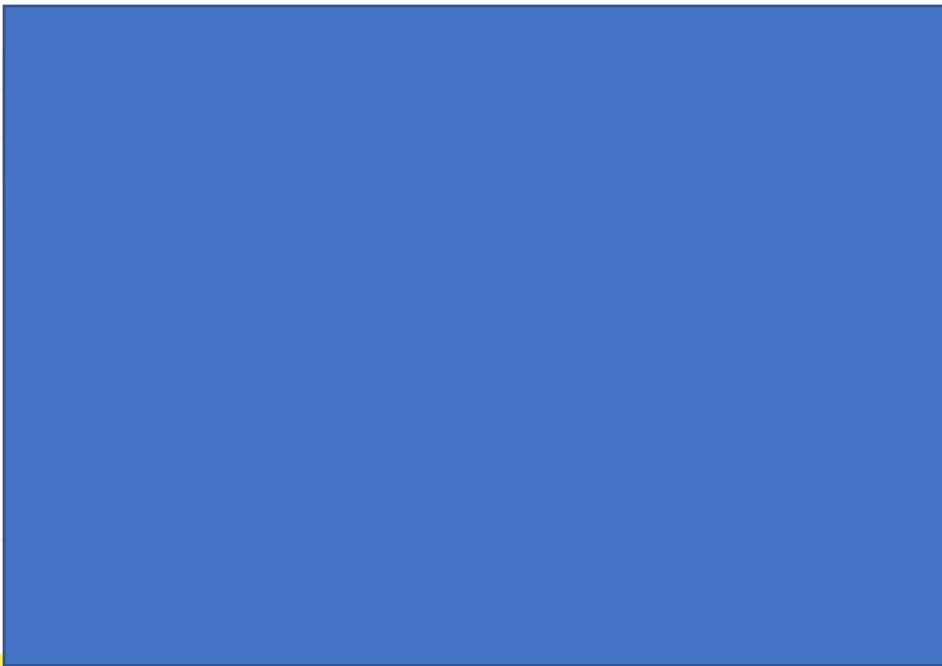
Clusters	1 - very frequent meat eaters
1 - high in milk (products) and pork, low in grain products	4.2% [1.02]
2 - high in poultry and grain products, low in red meat	2.2% [1.73]
3 - average in all protein sources	8.5% [1.08]
4 - high in cheese and fish and shellfish, low in processed meat	2.2% [1.32]
5 - high in beef, processed meat and eggs, low in milk (products)	7.3% [0.76]
Total	24.6% [1.00]

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Clusters	1 - very frequent meat eaters	2 - frequent meat eaters
1 - high in milk (products) and pork, low in grain products	4.2% [1.02]	7.4% [0.94]
2 - high in poultry and grain products, low in red meat	2.2% [1.73]	1.9% [0.81]
3 - average in all protein sources	8.5% [1.08]	16.2% [1.09]
4 - high in cheese and fish and shellfish, low in processed meat	2.2% [1.32]	2.7% [0.86]
5 - high in beef, processed meat and eggs, low in milk (products)	7.3% [0.76]	18.1% [1.00]
Total	24.6% [1.00]	46.3% [1.00]

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	Classes		
Clusters	1 - very frequent meat eaters	2 - frequent meat eaters	3 - regular meat eaters
1 - high in milk (products) and pork, low in grain products	4.2% [1.02]	7.4% [0.94]	3.9% [1.11]
2 - high in poultry and grain products, low in red meat	2.2% [1.73]	1.9% [0.81]	0.7% [0.63]
3 - average in all protein sources	8.5% [1.08]	16.2% [1.09]	5.7% [0.86]
4 - high in cheese and fish and shellfish, low in processed meat	2.2% [1.32]	2.7% [0.86]	1.2% [0.87]
5 - high in beef, processed meat and eggs, low in milk (products)	7.3% [0.76]	18.1% [1.00]	9.2% [1.13]
Total	24.6% [1.00]	46.3% [1.00]	20.6% [1.00]

Clusters	Classes					Total
	1 - very frequent meat eaters	2 - frequent meat eaters	3 - regular meat eaters	4 - occasional meat eaters	5 - no meat eaters	
1 - high in milk (products) and pork, low in grain products	4.2% [1.02]	7.4% [0.94]	3.9% [1.11]	1.2% [0.95]	0.2% [1.18]	17.0% [1.00]
2 - high in poultry and grain products, low in red meat	2.2% [1.73]	1.9% [0.81]	0.7% [0.63]	0.2% [0.68]	0.1% [1.31]	5.1% [1.00]
3 - average in all protein sources	8.5% [1.08]	16.2% [1.09]	5.7% [0.86]	1.1% [0.47]	0.5% [1.25]	31.9% [1.00]
4 - high in cheese and fish and shellfish, low in processed meat	2.2% [1.32]	2.7% [0.86]	1.2% [0.87]	0.7% [1.33]	0.0% [0.00]	6.9% [1.00]
5 - high in beef, processed meat and eggs, low in milk (products)	7.3% [0.76]	18.1% [1.00]	9.2% [1.13]	4.1% [1.44]	0.4% [0.85]	39.1% [1.00]
Total	24.6% [1.00]	46.3% [1.00]	20.6% [1.00]	7.2% [1.00]	1.2% [1.00]	100%

Variability and comparison with FBDG

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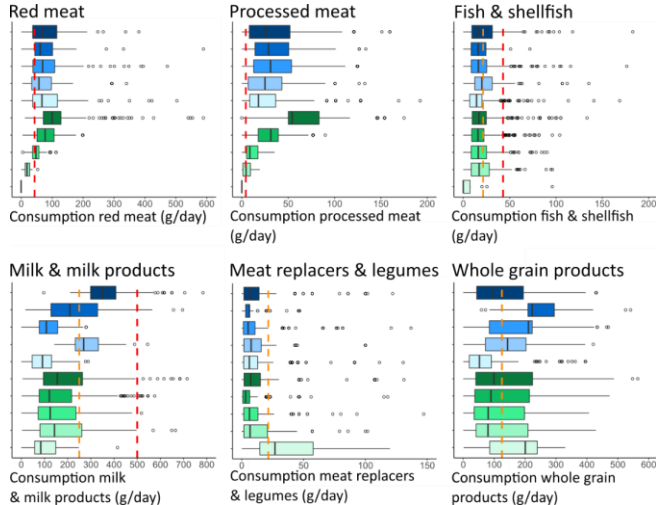
Nutritional **in**adequacy (% of group)
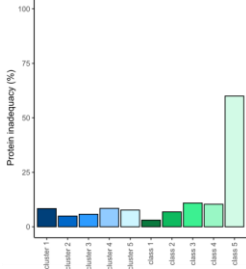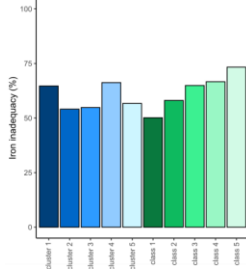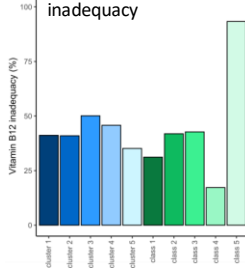
Klara Van Mierlo [a,b,*], Karin De Ridder [c], Annemie Geeraerd [a,b,**]

[a] KU Leuven, Biosystems Department, MeBioS Division, Sustainability in the agri-food chain group, Willem de Croylaan 42, B-3001, Leuven, Belgium
[b] KU Leuven, Science, Engineering and Technology group, Ethics@Arenberg, Willem de Croylaan 42, B-3001, Leuven, Belgium
[c] Sciensano, Department Epidemiology and Public Health, J. Wytsmanstraat 14, B-1050, Brussels, Belgium
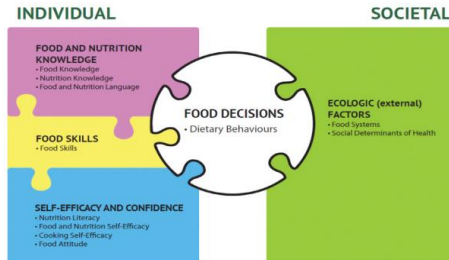
We need more than a one-size-fits-all solution
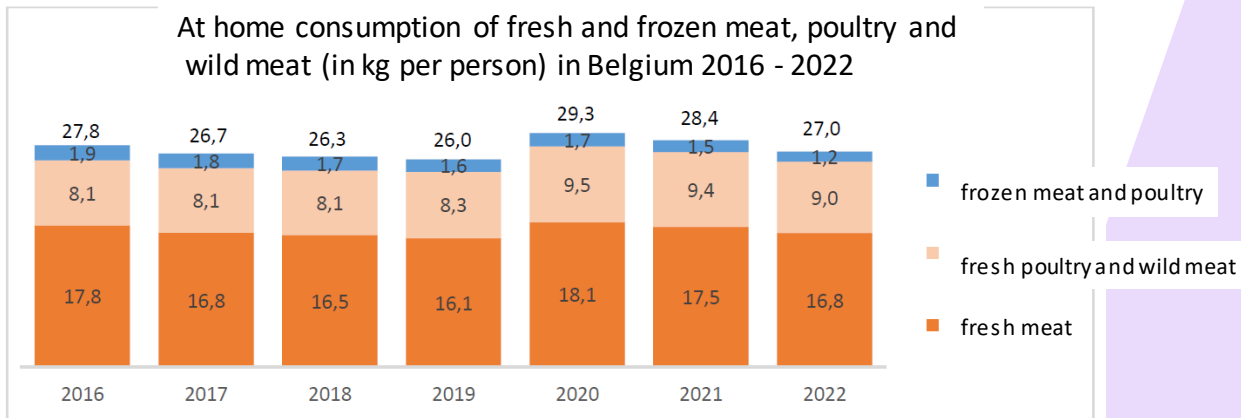
At home consumption of fresh and frozen meat, poultry and wild meat (in kg per person) in Belgium 2016 - 2022

Year	2016	2017	2018	2019	2020	2021	2022
Total	27,8	26,7	26,3	26,0	29,3	28,4	27,0
frozen meat and poultry	1,9	1,8	1,7	1,6	1,7	1,5	1,2
fresh poultry and wild meat	8,1	8,1	8,1	8,3	9,5	9,4	9,0
fresh meat	17,8	16,8	16,5	16,1	18,1	17,5	16,8

Bron: GfK België

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We need more than a one-size-fits-all solution

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Thank you!

Annemie Geeraerd Ameryckx

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Sustainability in the agri-food chain

Department of Biosystems

Willem de Croylaan 42, 3001 Leuven