
DTU

Climate impact of transitioning to a Danish plant-rich diet

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Carbon footprint (CF) of the current Danish diet and CF reduction from transition to FBDG - comparison between different CF databases

Trolle E, Nordman M, Lassen AD, Colley TA, Mogensen L. Carbon footprint reduction by transitioning to a diet consistent with the Danish climate-friendly dietary guidelines: a comparison of different carbon footprint databases. *Foods* 2022;11(8):1119

Objectives:

- To estimate the CF reduction of a transition from the current Danish diet to a plant-rich diet as recommended by the official food-based dietary guidelines (FBDG)
- To estimate the contribution of different food groups to the total CF of the diets
- We used two data sets on foods on the Danish market for calculations: preliminary updated CF data based on a traditional attributional LCA (bottom-up) approach from literature AU-DTU-data, and CF based on consequential LCA, top-down hybrid approach using input-output data (the Big Climate Database, launched by CONCITO)

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Modelling the Danish adapted plant-rich diet

Aim: to **provide scientific evidence** to guidance the revision of the current official Danish FBDG towards a **more sustainable** diet- with focus on reducing climate impact, and to develop a **nutritional adequate Danish adapted plant-rich diet**

Lassen AD, Christensen LM, Trolle E. 2020.
Development of a Danish Adapted Healthy Plant-based Diet based on the EAT-Lancet Reference Diet.
Nutrients 2020, 12, 738; doi:10.3390/nu12030738
Lassen, A.D., Christensen, L.M., Fagt, S. og Trolle, E. 2019. "Råd om bæredygtig sund kost
- fagligt grundlag for et supplement til De officielle Kostråd". DTU Fødevareinstituttet. Kgs.Lyngby.

Proces for the development of the Danish adapted plant-rich diet

Method

Evidence
Health
Sustainability
(Climate)

EAT-Lancet reference-diet

Danish food database

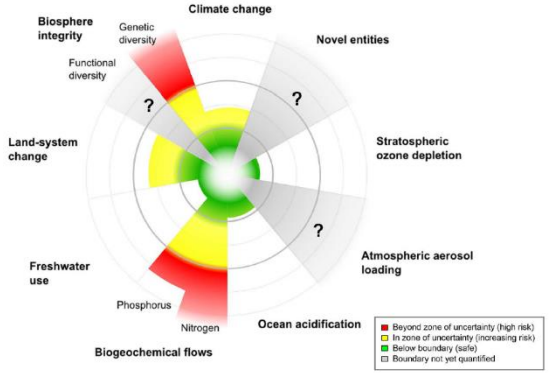
Foods and amounts reflecting Danish food culture

Adjusted to reflect Danish FBDG, NNR and scientific evidence

Evidence health and sustainability – literature

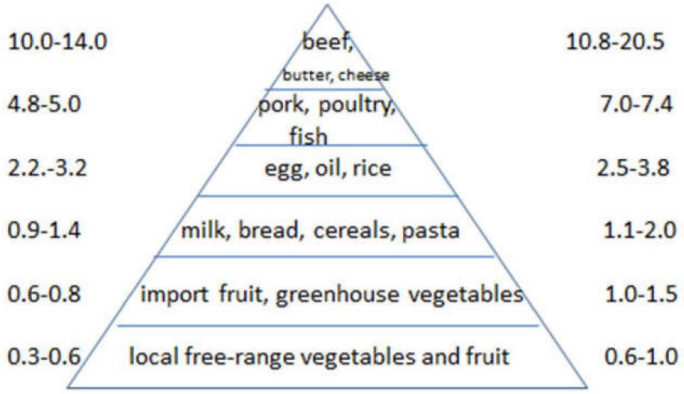
- **Health**
- Systematic evidence evaluations based on systematic reviews – relation between **food intake** and disease risks
- Danish report 2013 +
- *World Cancer Research Fund/ American Institute for Cancer Research 2018 +*
- *Quality check - newer Systemaic reviews (e.g.pulses).*

- **Sustainability** Environmental footprints of foods and diets
- Planetary boundaries - metrics
- CO_2 eqv
- Land use
- Water use
- Biodiversity
- N and P, pesticies
- Etc.



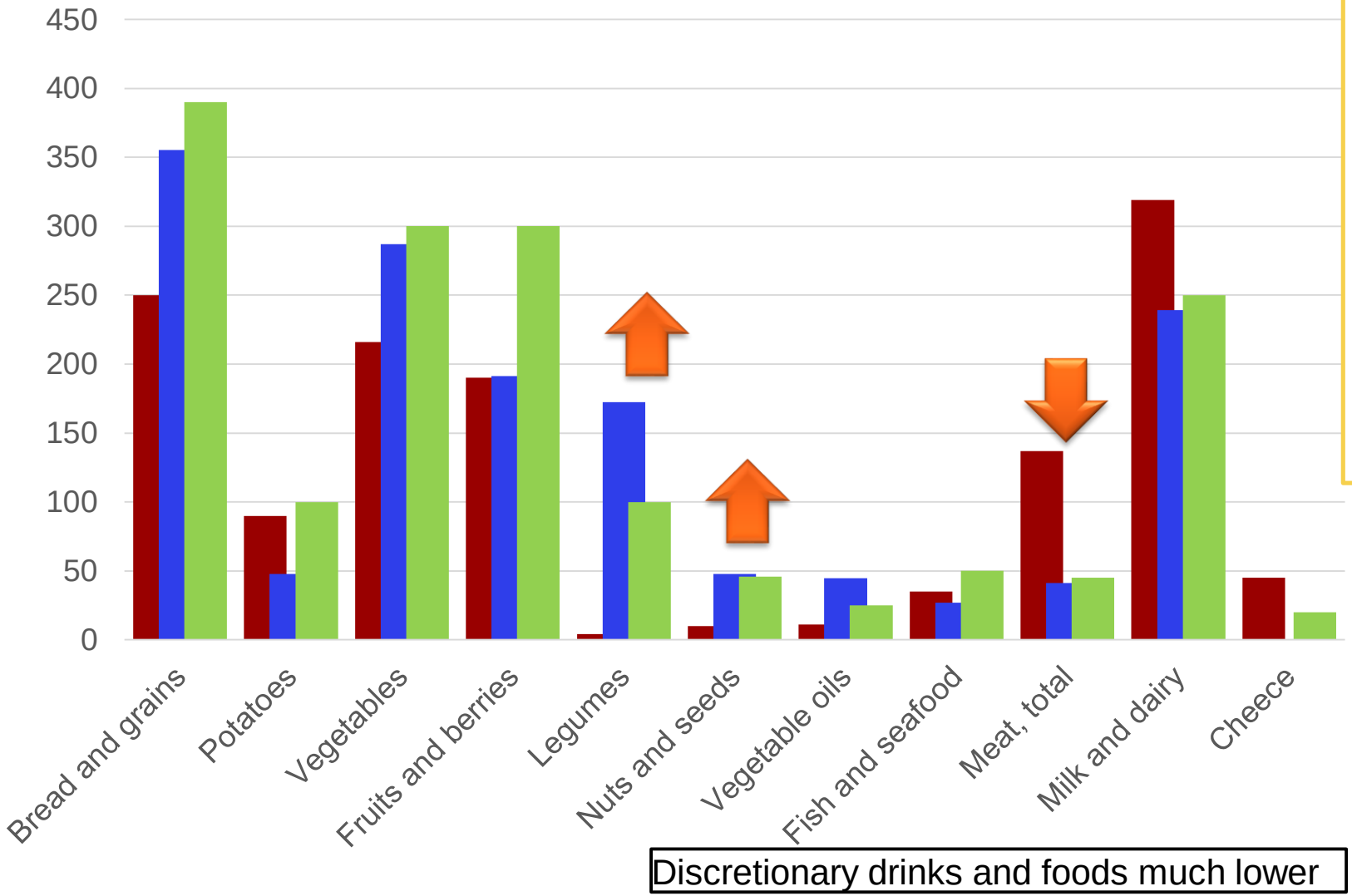
- **Dietary patterns** and risk of diseases*:*
- Mediterranean, DASH, Anti-inflammatory, New Nordic and Vegetarian (reduced risk of CVDs, T2D, some Cancers and risk factors like obesity)
- Indicate **more plant based diets** to have positiv health effect

(Satija et al. 2017, (Baden et al. 2019)



Mogensen et al 2020

Comparison of intake (cooked weights in gram)



Discretionary drinks and foods much lower

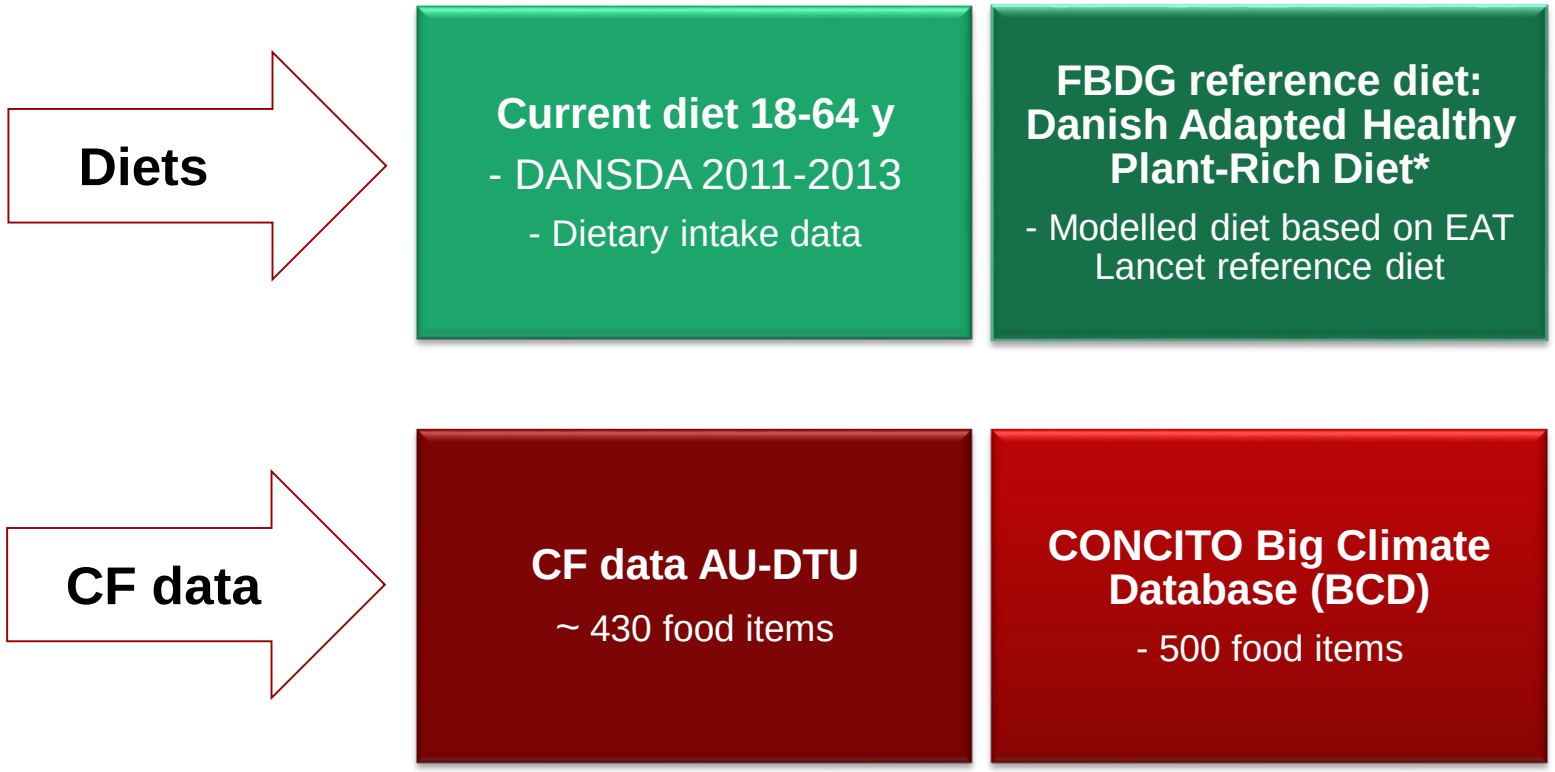
The plant-rich diet fulfill the nutrient recommendations – both macro- and micronutrients, except for for Vit D (need other solutions). Further, the results highlights vitamins and minerals that may need special attention in a plant-rich diet, i.e. calcium, iron, selenium, zinc, vitamin B_{12} and vitamin A.

- 15-75-y mean intake per 10 MJ

  (DANSDA 2011-13 Pedersen et al. 2015)
- EAT-Lancet reference diet per 10 MJ

  (Willett et al. 2019)
- Danish adapted plant-rich diet per 10 MJ, 6-65 år

Carbon footprint (CF) of the current Danish diet and CF reduction from transition to FBDG - comparison between different CF databases: Data



*Lassen, A.D.; Christensen, L.M.; Trolle, E. Development of a Danish adapted healthy plant-based diet based on the EAT-lancet reference diet. *Nutrients* **2020**, *12*, 738, doi:10.3390/nu12030738.

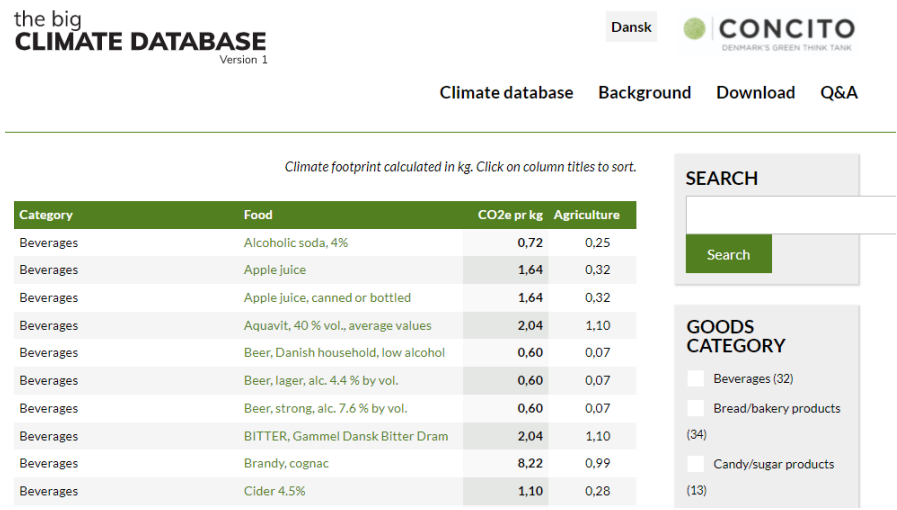
Carbon footprint datasets

CF data AU-DTU

~ 430 food items

CONCITO Big Climate Database (BCD)

- 500 food items



https://denstoreklimadatabase.dk/en

- Collaboration between Aarhus University (AU) and DTU
- attributional LCA (aLCA)
- bottom-up approach
- literature review of existing LCA studies + standard values

- Launched by green think tank Concito
- consequential LCA (cLCA)
- top-down hybrid approach
- including and excluding the contribution from indirect land-use change (iLUC)

→ Functional units aligned so that data are comparable

Calculating the carbon footprint of the Danish diet

Current diet 18-64 y

- DANSDA 2011-2013
- Dietary intake data

Individual level

FBDG reference diet: Danish Adapted Healthy Plant-Rich Diet

- Modelled diet based on EAT Lancet reference diet

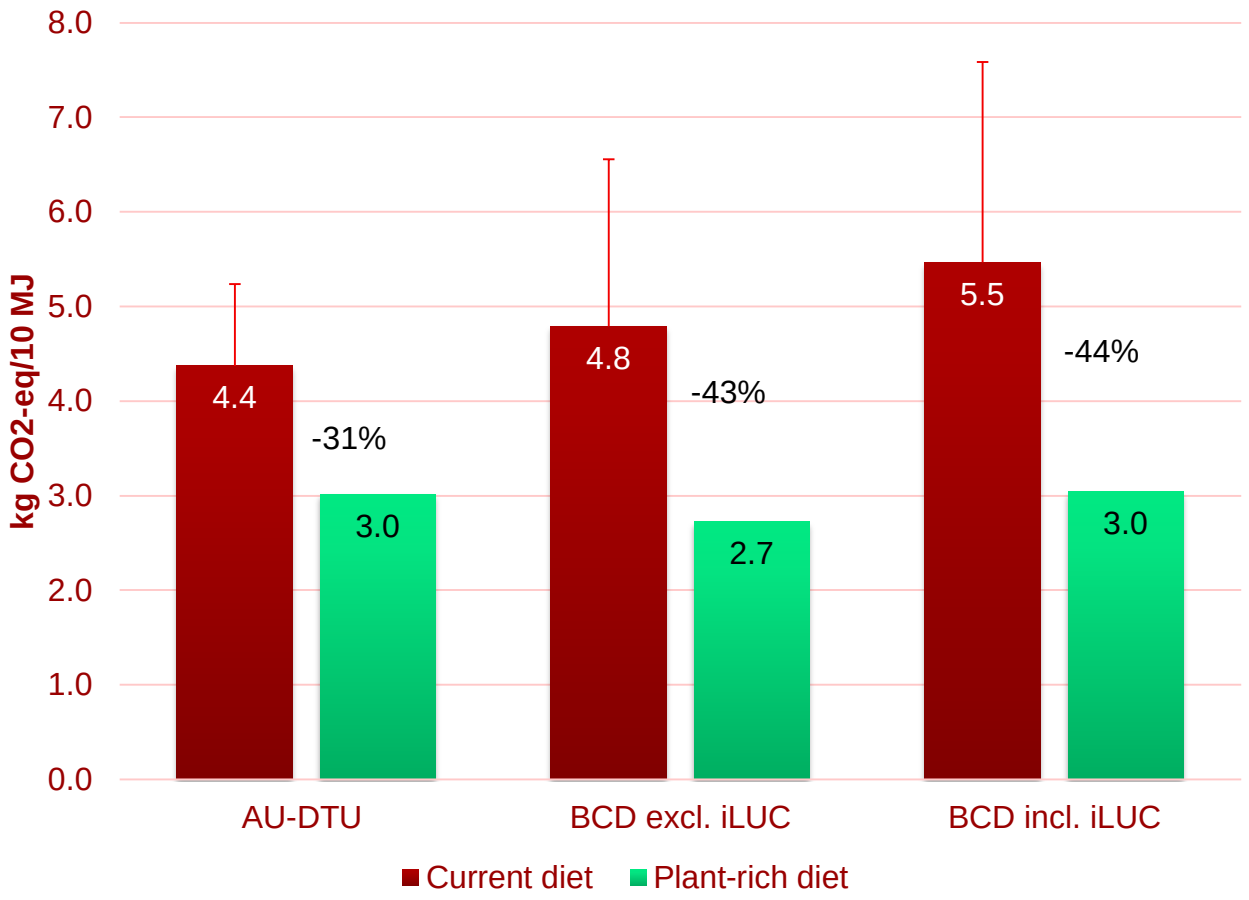
Population level

- Food items in intake data are matched with food items in both CF databases
- Intakes of different food items (g per day/ g per 10 MJ) multiplied with CF data of foods (kg CO_2-eq/kg food) → **CF of the diet (kg CO_2-eq/10MJ)**

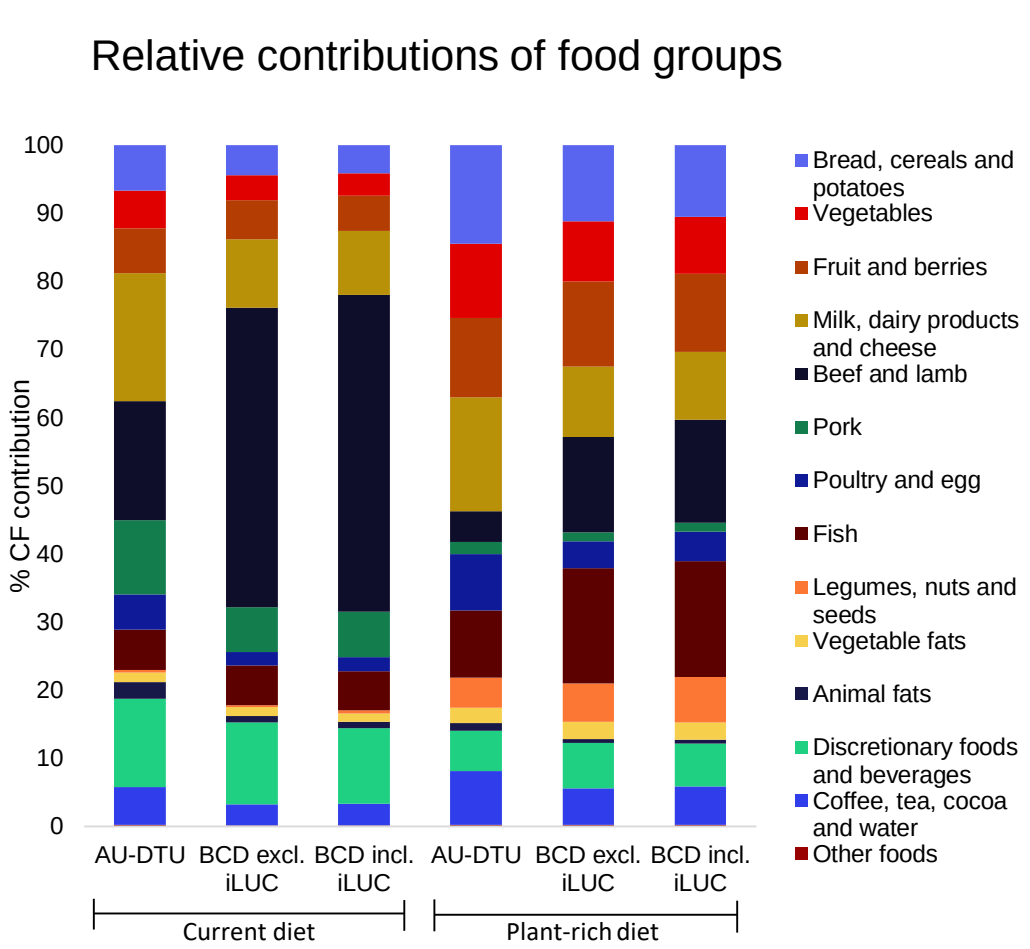
The Official Dietary Guidelines – good for climate and health. Available at: https://altomkost.dk/english/

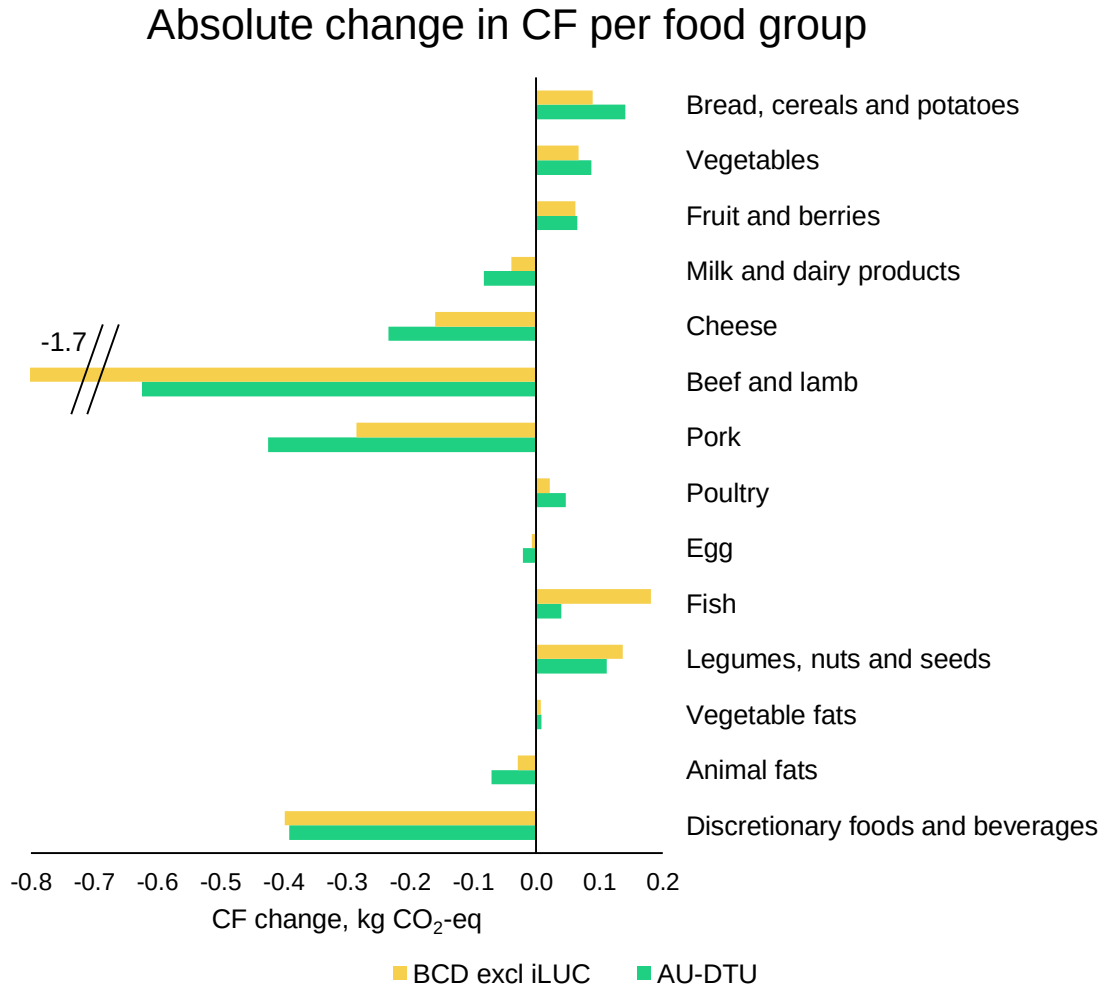
Results

Carbon footprint of the current diet, the plant-rich diet and CF reductions per 10 MJ



CF contributions from different food groups

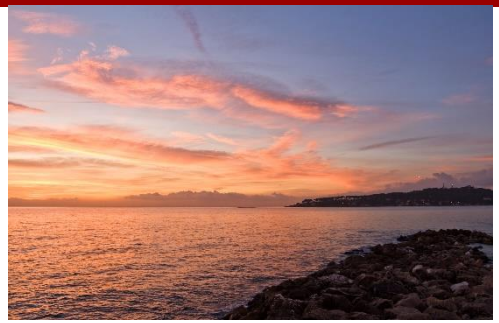




Conclusions

- The transition from the current Danish diet to a diet consistent with the food-based dietary guidelines warrants a substantial reduction in CF
- Choice of CF data has an impact on the obtained CF reduction
- Since the CF of different foods differ between data, the strategy for achieving diet-related CF reduction diet may be different depending on what data is used
- Future perspective – continuously updated data and include other sustainability topics (land use, water use, acidification, eutrophication, biodiversity...)

Thank you for listening



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