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Agroscope

The nutritional and environmental consequences of replacing meat and dairy products with market-ready alternatives in recommended and self-selected Swiss diets

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Novel foods and protein diversification (II)

Background

- Animal-based foods responsible for a large share of the environmental impacts of nutrition
- Animal welfare important to consumers
- Excessive consumption of red and processed meat associated with health risks

More and more products available intended to replace animal products

Is a diet incorporating alternative products desirable?

- Holistic study to answer the question on a consumer- and society-level

→ **Environmental impacts** and **nutrient contents**

Product choice

Reference Products

- Animal products with high relevance for the Swiss food industry

Meat		Dairy	
Pork	Poultry	Cheese	Milk
Beef	Veal	Cream	Yoghurt

Alternative Products

- Novel or newly introduced products intended to replace the reference products
- Differentiation according to:
  - Production: autotroph (plant-based) or heterotroph (not plant-based)
  - Processing: physical or biochemical
  - Ingredients: soy, wheat, pea, bean, oat, almond, rice, coconut, mycoprotein, insect

Methods

Diet modelling

Reference diets
- Self-selected diet of Swiss adult population
- Recommended diet according to Swiss food pyramide

Alternative diets
- Substitution of meat/meat and dairy based on weight (1:1)
- Each product group individually

Data sources

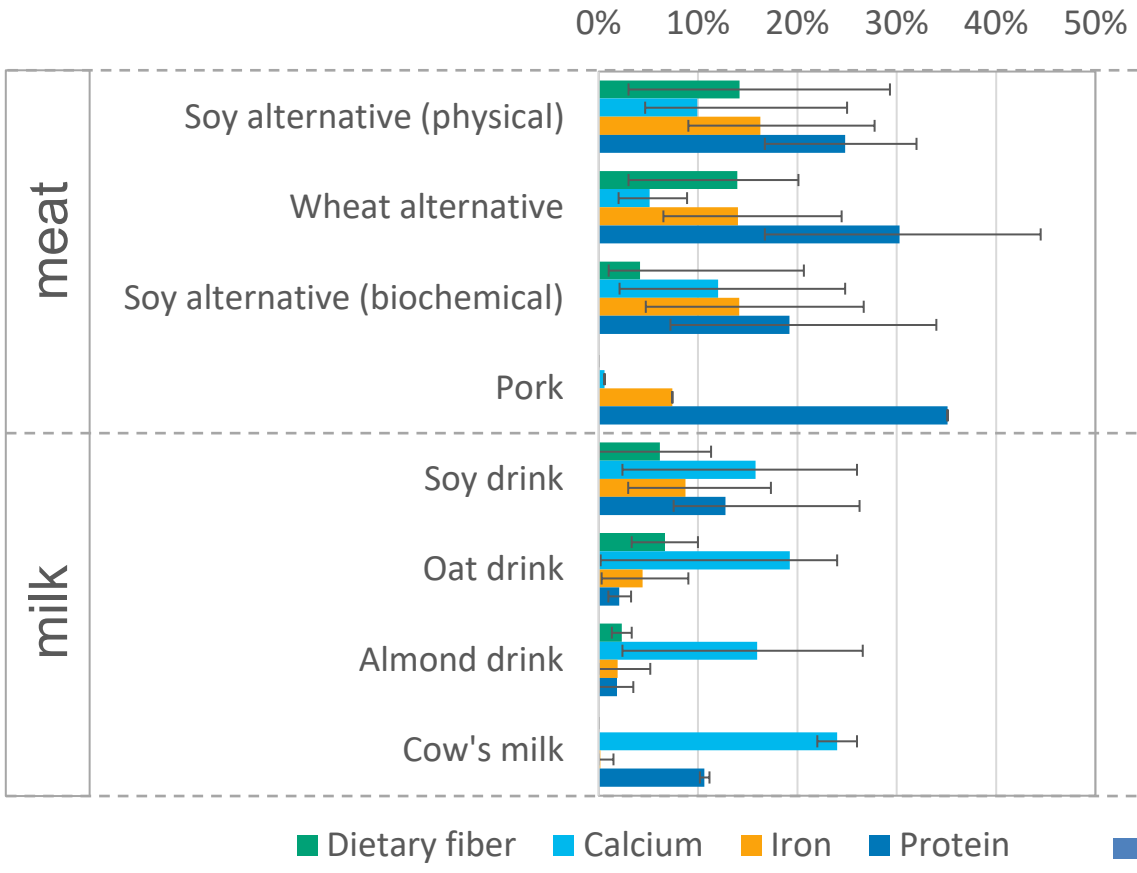
Nutrient contents
- EuroFIR (CH, FR, GR, PT, SI, ES & UK)
- Raw and unprocessed foods

Life Cycle Assessment
- Agribalyse, WFLDB, ecoinvent, SALCA
- Adjustments for CH production conditions
- Domestic production and imports
- LCIA: SALCA 2.01 (Douziech et al., 2024)

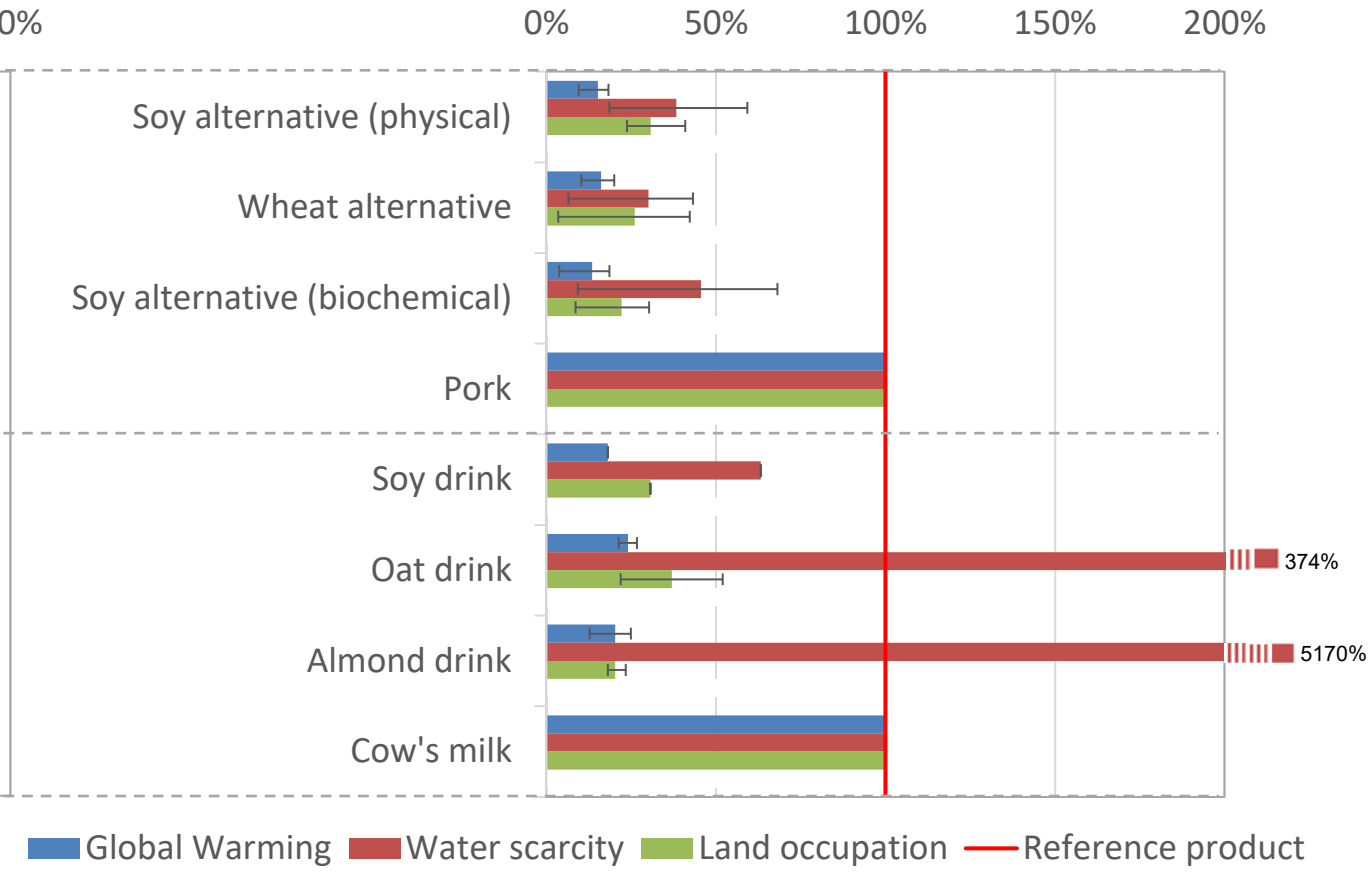
EuroFIR, https://www.eurofir.org/
Douziech et al. (2024), https://doi.org/10.34776/as183e

Product-level analyses

Nutrient content per portion in relation to the dietary reference intake



Comparison between product and reference environmental impact



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Product-level analyses

Nutrient content per portion in relation to the dietary reference intake

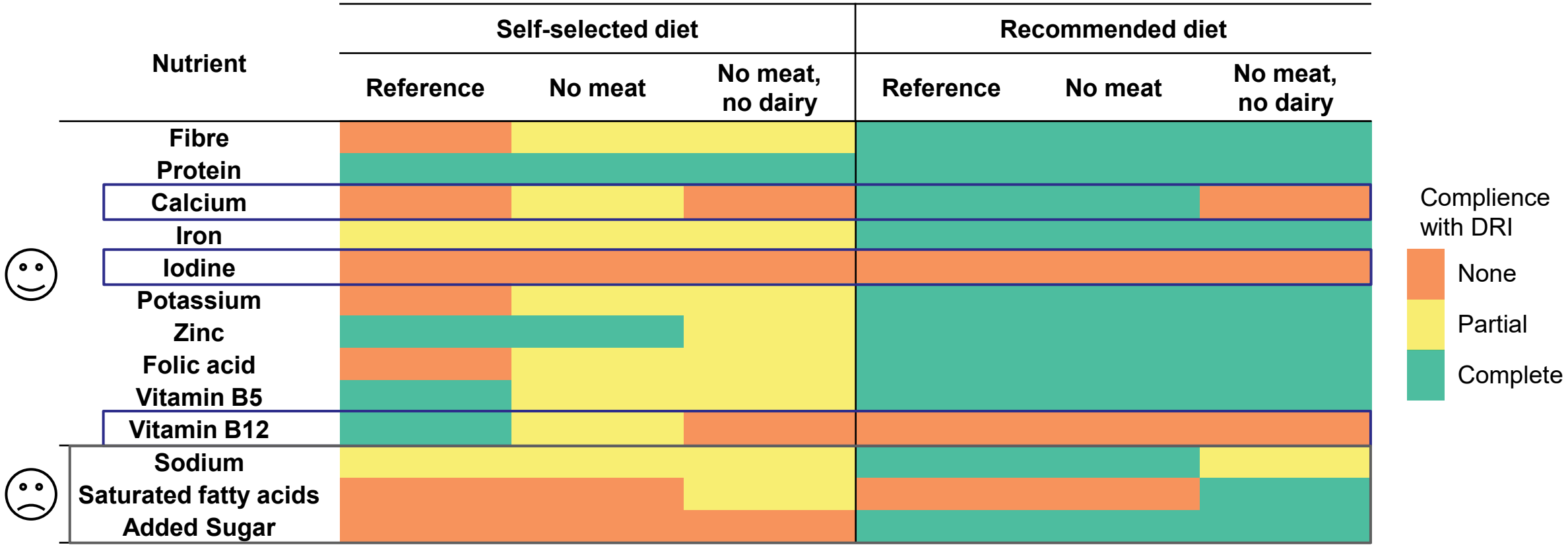
Comparison between product and reference environmental impact

meat

milk

- Clear difference in nutrient composition
- Mostly lower environmental impacts
- A lot of variability

Nutrient contents of the diets



- **Dairy alternatives more commonly insufficient than meat alternatives**
- **Critical:** Calcium, iodine and vitamin B12

Environmental impacts of the diets

Environmental impact categories	Self-selected diet			Recommended diet		
	Reference [/pers*day]	No meat	No meat, no dairy	Reference	No meat	No meat, no dairy
Land occupation, agricultural	**4.8** m^2a					
Water scarcity	**6.4** m^3					
Global warming	**3.7** kg CO_2-eq					
Acidification, terrestrial	**38** g SO_2-eq					
Eutrophication, freshwater	**0.93** g P-eq					

Comparison to self-selected diet

- > 100%
- ≈ 100%
- < 100%
- < 90%
- < 80%
- < 70%
- < 60%
- < 50%

- **Meat alternatives:** (almost) always lower impacts
- **Dairy alternatives:** increase water scarcity and eutrophication

Conclusion

Is a diet incorporating alternative products desirable?

→ Meat alternatives generally yes

→ Dairy alternatives rather to complement the diet

- Critical aspects, especially for dairy alternatives:
  - Contents of ciritical nutrients (calcium, iodine, vitamin B12)
  - Reduction of disqualifying nutrients
  - Environmental burdens of raw materials
- Variability should be communicated

Take Home Message

- **Nutrient composition** of alternative products **requires improvements**
- Raw materials with **low environmental burdens** should be favoured
- **Transparency** along the value chain needs to be **increased**

- The work has been published as a book (in German), available at «www.ta-swiss.ch/fleisch-und-milch-ersatz»
- A scientific publication is in submission

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Thank you for your attention

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