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## **ENVIRONMENTAL IMPACTS OF FOOD CONSUMPTION AND ITS REDUCTION POTENTIALS**

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### **ABSTRACT**

Nutrition accounts for 30% of environmental impacts caused by the final consumption of Swiss households. It is the most important activity from an environmental point of view. We investigated possibilities to reduce the environmental impacts of food consumption, energy use and mobility in a systematic approach for different behavioral options of consumers. Most important improvements for nutrition can be expected on the level of diets and especially in the reduction of meat consumption. The approach has also been applied in the consumption sectors mobility and energy use of households. It allows for a systematic comparison of the reduction potential of environmental impacts due to different changes in consumer behavior.

### **GOAL AND SCOPE**

Nutrition accounts for about 30 % of environmental impacts caused by the final consumption of Swiss households (Jungbluth, Nathani, Stucki, & Leuenberger, 2011). It is the most important consumption sector from an environmental point of view. Therefore, it is necessary to investigate and understand the environmental impacts of food consumption and possibilities for the reduction of these environmental impacts.

We investigated possibilities to reduce the environmental impacts of food consumption in several LCA case studies during the past 15 years. Several options of reducing environmental impacts have now been compared within a general framework. Besides the consumption of food products also reduction potentials for impacts due to energy use in households and private mobility have been investigated (Jungbluth, Itten, & Stucki, 2012). The assessment has been made for average consumption patterns in Switzerland and the city of Zurich (Jungbluth & Itten, 2012).

### **METHOD**

The method follows a stepwise approach (Jungbluth, et al., 2012). In a first step, the total environmental impact of Swiss consumption was calculated. Then the share of the environmental impacts related to food consumption was assessed. Based on a more detailed

analysis of this consumption sector, it was investigated by what percentage environmental impacts can be reduced by a certain change in the consumer behavior. Finally, this estimation is used to evaluate the potential reduction of the total environmental impacts. For the impact assessment the ecological scarcity method was used as a key indicator (Frischknecht, Steiner, & Jungbluth, 2009), but the results were also computed for greenhouse gas emissions and cumulative energy demand.

## RESULTS

### *Share of food consumption*

The investigation of the share of the environmental impacts shows that nutrition causes about 12% of total energy demand and 18% of greenhouse gas emissions of the total Swiss consumption. If all types of environmental impacts are included in the analysis this share rises to about 30% (Jungbluth, et al., 2011). The main part of the environmental impact arises from the agricultural production of meat.

### *Changes in consumer behaviour*

Consumers can aim to reduce the environmental impacts by decisions on different levels (Jungbluth, Tietje, & Scholz, 2000). These range from the choice of packages for a product, preferences for certain labels, choices on ingredients for a meal, vegetarian or other diets to general considerations such as e.g. concerning household budgets. In this short paper we present and compare the reduction potential in the total environmental impacts, if all consumers:

- Buy locally (no air-transported products)
- Buy seasonally (no fruits and vegetables from heated greenhouses)
- Vegetarian diet
- Buy organic food
- Resign on luxury food (chocolate, wine, coffee etc.)
- No food wastes in households
- Reduce obesity to normal weight
- Combine different changes towards a healthy and environmentally friendly diet

### *Example for modelling a vegetarian diet*

A vegetarian diet is one approach to reduce the environmental impact. The comparison of meat products with vegetarian alternatives however is complicated because vegetables or other vegetarian products cannot always one-to-one substitute meat. In order to overcome this obstacle, we assessed the environmental impact of 10 different meat based and vegetarian canteen meals. The meat-based meals have an average environmental impact of 6622 ecopoints per meal and the vegetarian meals account for 2085 ecopoints (Leuenberger & Jungbluth, 2009) which equals a reduction potential of more than 50%.

### *Reduction potentials*

The most promising single change in behavior is a vegetarian diet. The next best option is the resign on luxury products such as alcohol, coffee and chocolate. A further important option is the reduction of food waste. A regional or seasonal choice of products only does however not show such a high potential for reducing environmental impacts. Different such measures can be combined in order to achieve an even higher reduction potential: For the modeling of the “healthy and environmentally friendly diet”, it is assumed that meat consumption is reduced to two portions a week instead of six. Furthermore, air-transported products are not bought anymore and fruits and vegetables are purchased seasonally. With this combination of measures it would be possible to reduce the environmental impacts of total household consumption by more than 12% (and cut the impacts of the nutrition by 40%).

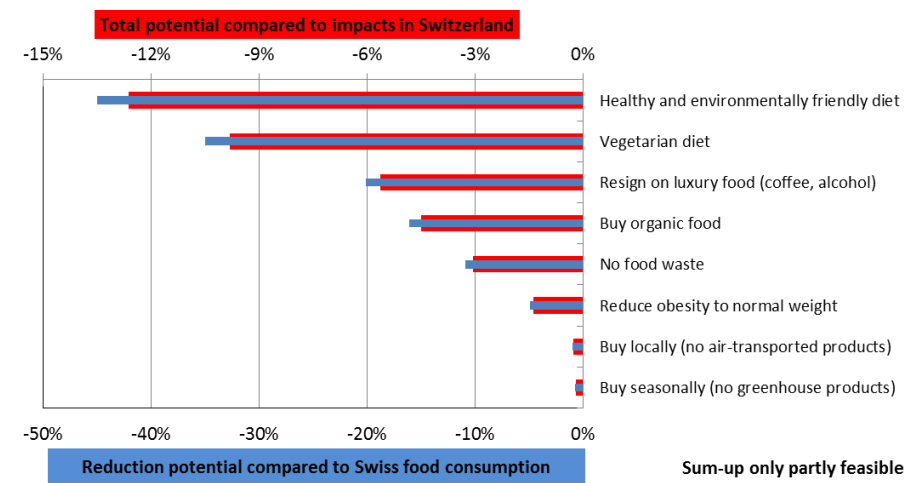


Fig. 1: Reduction potentials for total environmental impacts (ecological scarcity method 2006) due to behavioral changes in food consumption

## CONCLUSIONS & OUTLOOK

With this research, it has been shown that, the reduction of meat and animal products is the most important issue from an environmental point of view. Also important is the reduction of luxury food and food wastes. The same methodological approach has also been applied on the consumption sectors energy and mobility and thus allows a consistent framework for the comparison of different changes in consumer behavior.

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