



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department of Economic Affairs,
Education and Research EAER

Agroscope

Sustainability of various diets

Thomas Nemecek

**Agroscope, LCA research group
Zurich, Switzerland**

EAAP-ATF 27 August 2018

www.agroscope.ch | good food, healthy environment

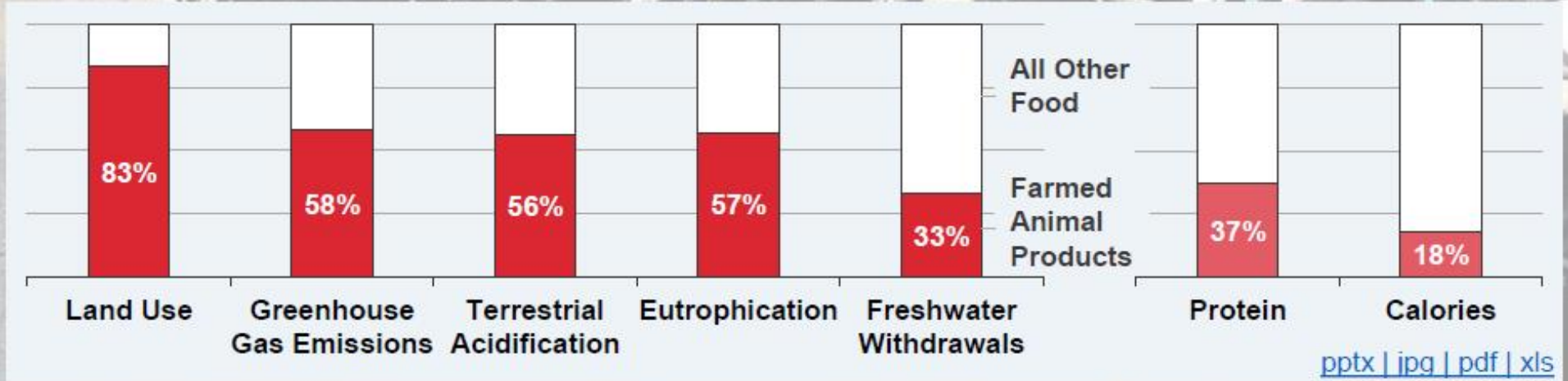


Overview

- A global perspective:
 - Environmental impacts of animal-based food
 - Comparison of animal-based vs. plant-based food
 - Potentials of changed diets
- A country's perspective: Switzerland
 - Quantify reduction of environmental impacts through optimised diets
 - Identify optimised diets
 - Determine consequences for land use, animal herds and imports
 - Modelling system
 - Scenarios investigated
 - Results of optimisation
 - Environmental impacts
 - Optimised diets
 - Implication for agricultural land use, animal herds and food self-sufficiency
- Conclusions

High environmental impacts through animal products

Meat, aquaculture, eggs, and dairy use ~83% of the world's farmland and contribute 56 to 58% of food's different emissions, despite providing just 37% of our protein and 18% of our calories.



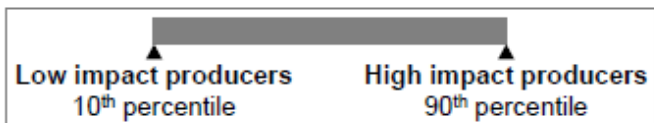
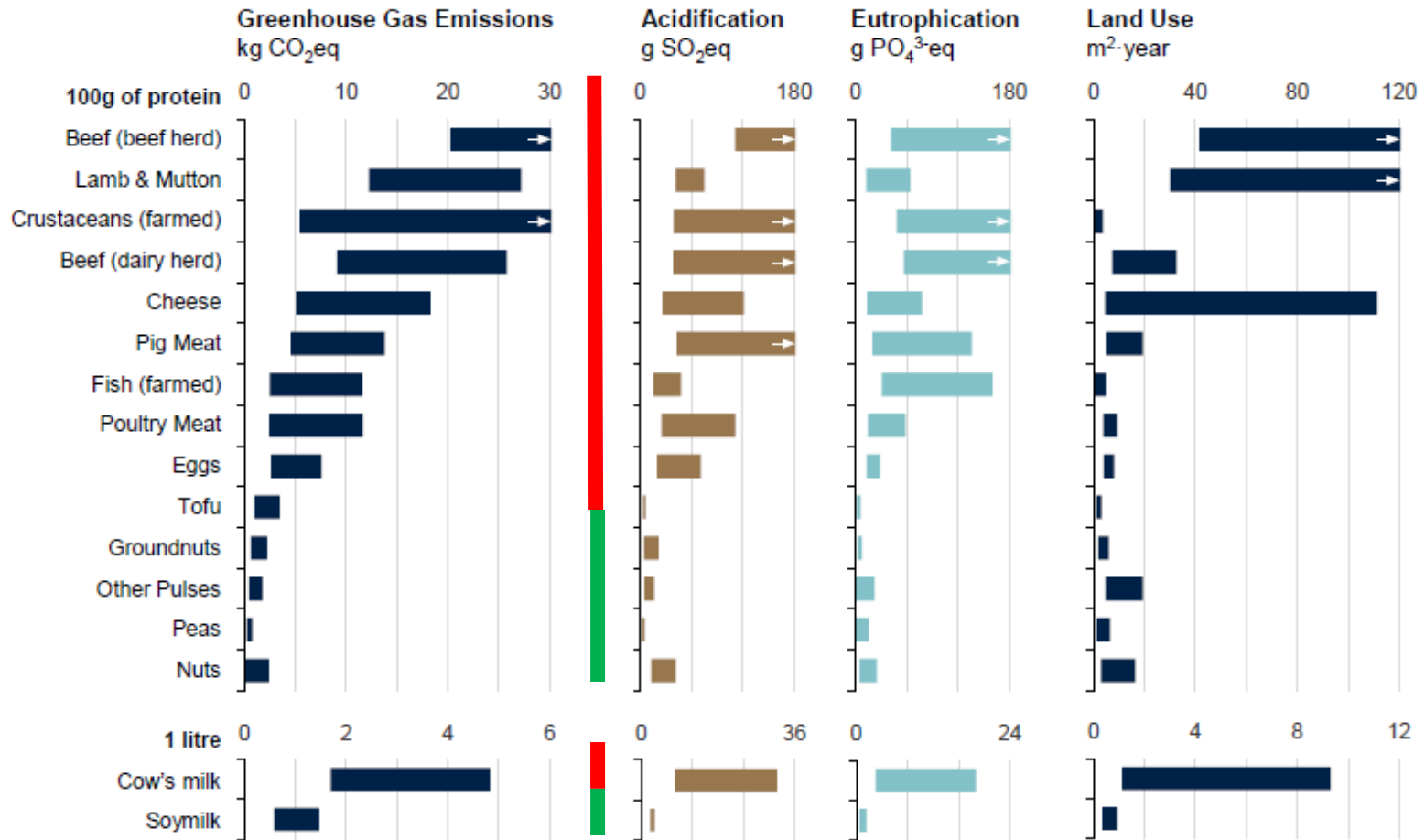
Can animal products be produced with sufficiently low impacts to redress this vast imbalance? Or will reducing animal product consumption deliver greater environmental benefits?



Animal-based food has much higher impacts than plant-based alternatives (on a protein basis)

The environmental impacts of protein-rich products are highly variable.

However, this variation fails to translate into animal products with lower impacts than vegetable equivalents. Today, diet change delivers greater benefits than purchasing sustainable meat or dairy.

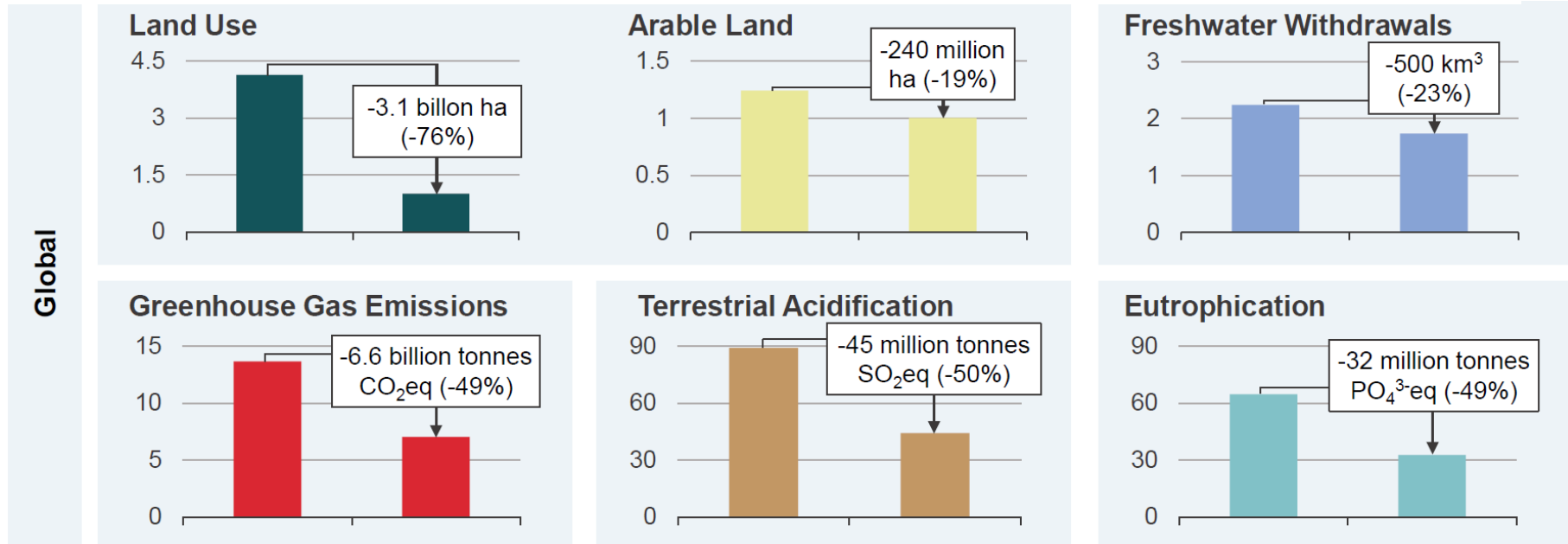


[pptx](#) | [jpg](#) | [pdf](#) | [xls](#)

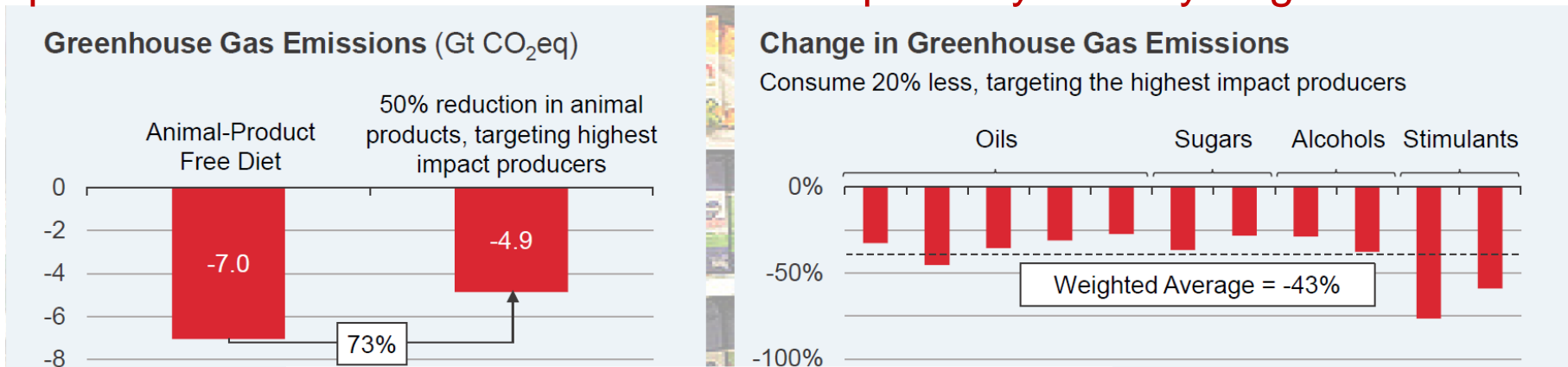
Source: Poore & Nemecek (2018), Science 360 (6392), 987-992

Changing global diets

Animal-product free diets could reduce most environmental impacts by 1/2



Halving consumption of animal-based products by avoiding the high-impact producers reduce most environmental impacts by 1/3 → synergistic effects



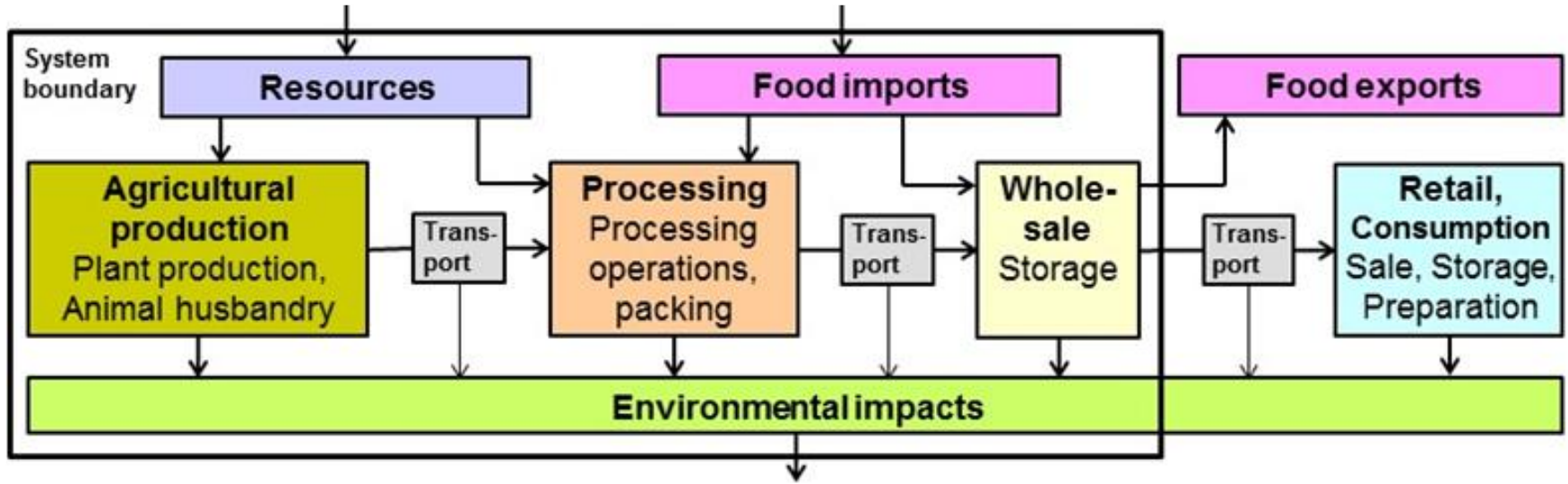
Source: Poore & Nemecek (2018), Science 360 (6392), 987-992

[pptx](#) | [jpg](#) | [pdf](#) | [xls](#)



Overview of the modelling system

- **Functional unit:** Nutrition of the Swiss population
- **System boundary:** Food supply
 - + Including upstream processes
 - + Including environmental impacts abroad through feed and food imports to Switzerland
 - Excluding environmental imports from exports
 - Excluding retail, food preparation and consumption





Scenarios investigated

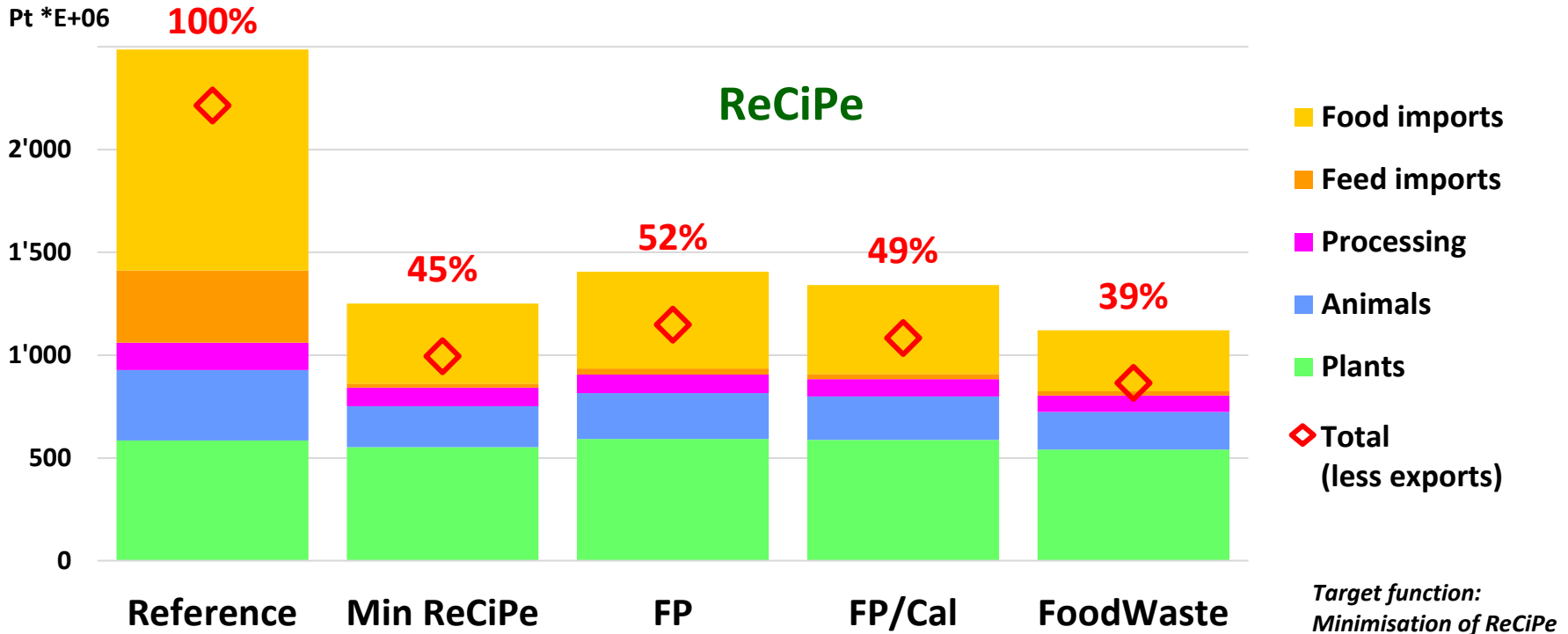
| | Scenario | |
|--|------------|---|
| | Reference | Current situation |
| Minimisation of environmental impact (ReCiPe method) | Min ReCiPe | Covering nutritional requirements |
| | FP | Composition of ration according to food pyramid |
| | FP/Cal | Composition of ration and energy intake according to food pyramid |
| | FoodWaste | All preventable food waste during consumption was avoided |

Additional conditions:

1. Whole agricultural area and arable land in Switzerland used for food production
2. Food exports kept constant at current levels
3. Current deviations from nutritional recommendations are tolerated, but no further increase is allowed



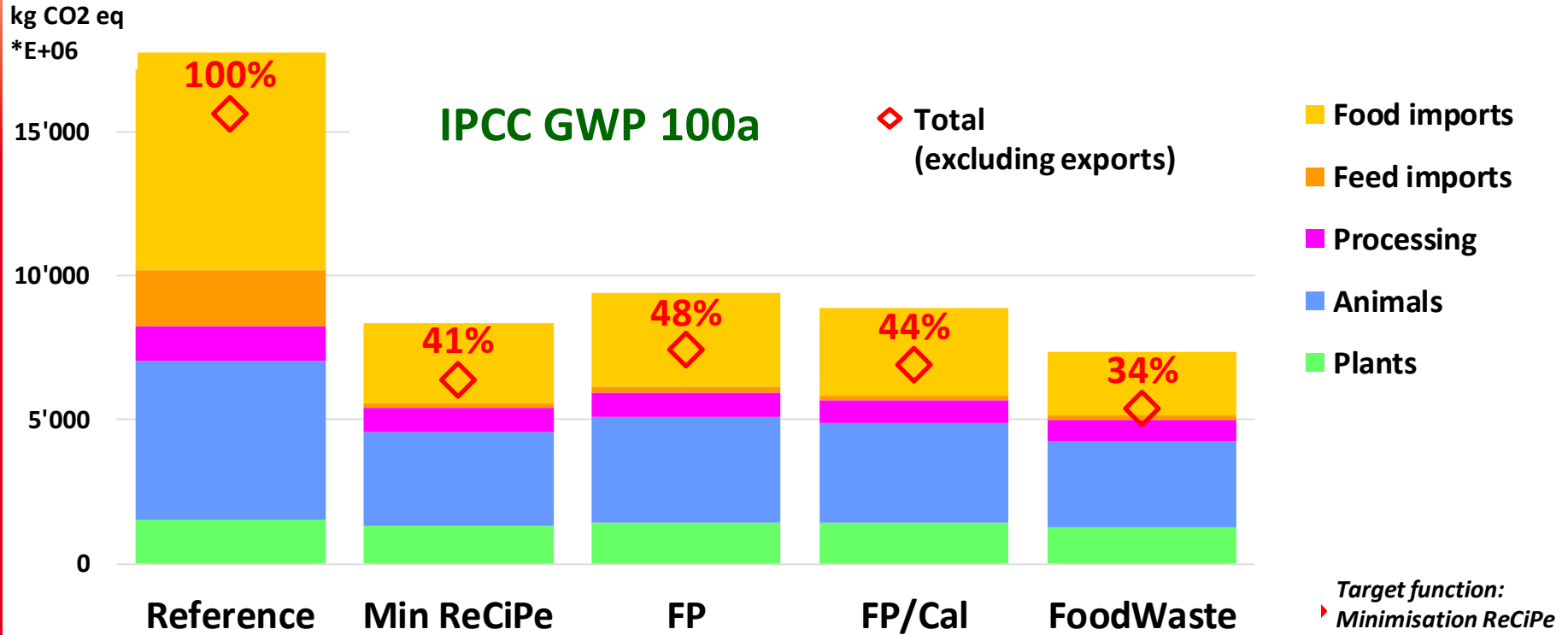
Total environmental impacts ... can be reduced over 50%



Mainly achieved by reducing food impacts, feed imports and animal herds. Further reductions through reduced calorie intake and avoided food waste.

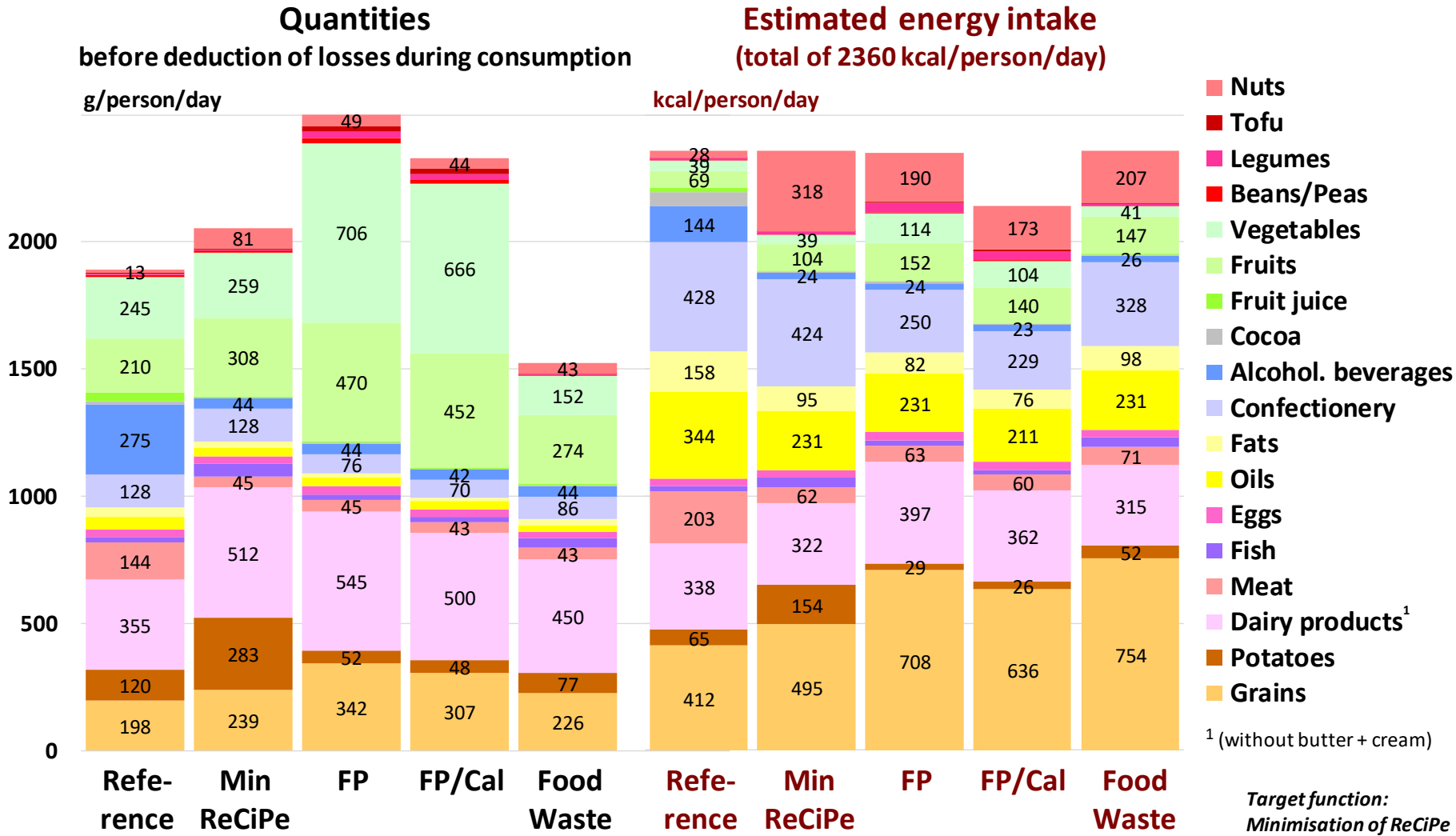


Climate change impacts can be reduced even more





Optimised diets differ significantly



- Less meat, alcohol, vegetable oils

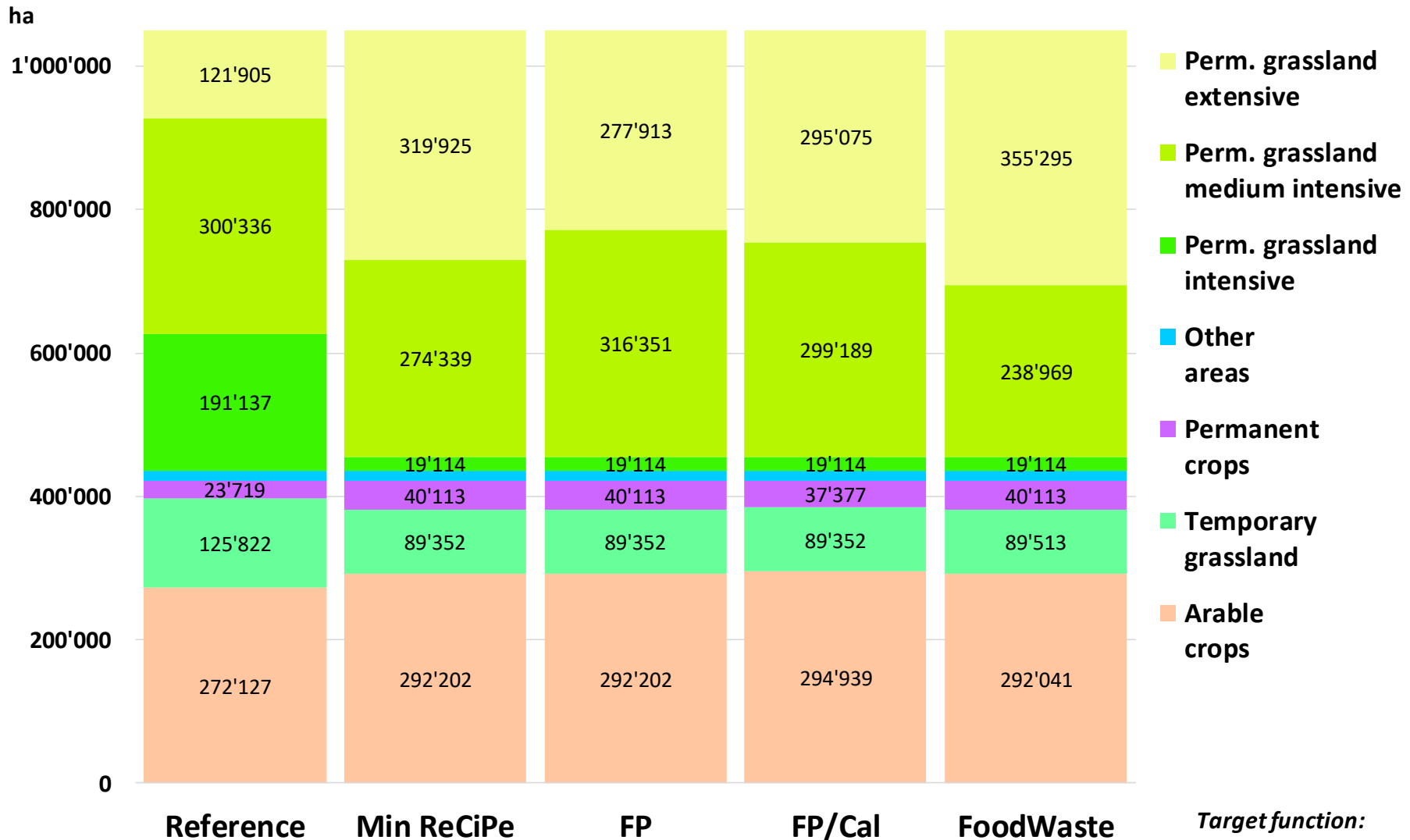
o Constant consumption of dairy products

+ More cereals, potatoes, fruits, vegetables, legumes incl. peanuts

Source: Zimmermann et al. (2018), Agroscope Science 55.



Implications for Swiss agricultural area use

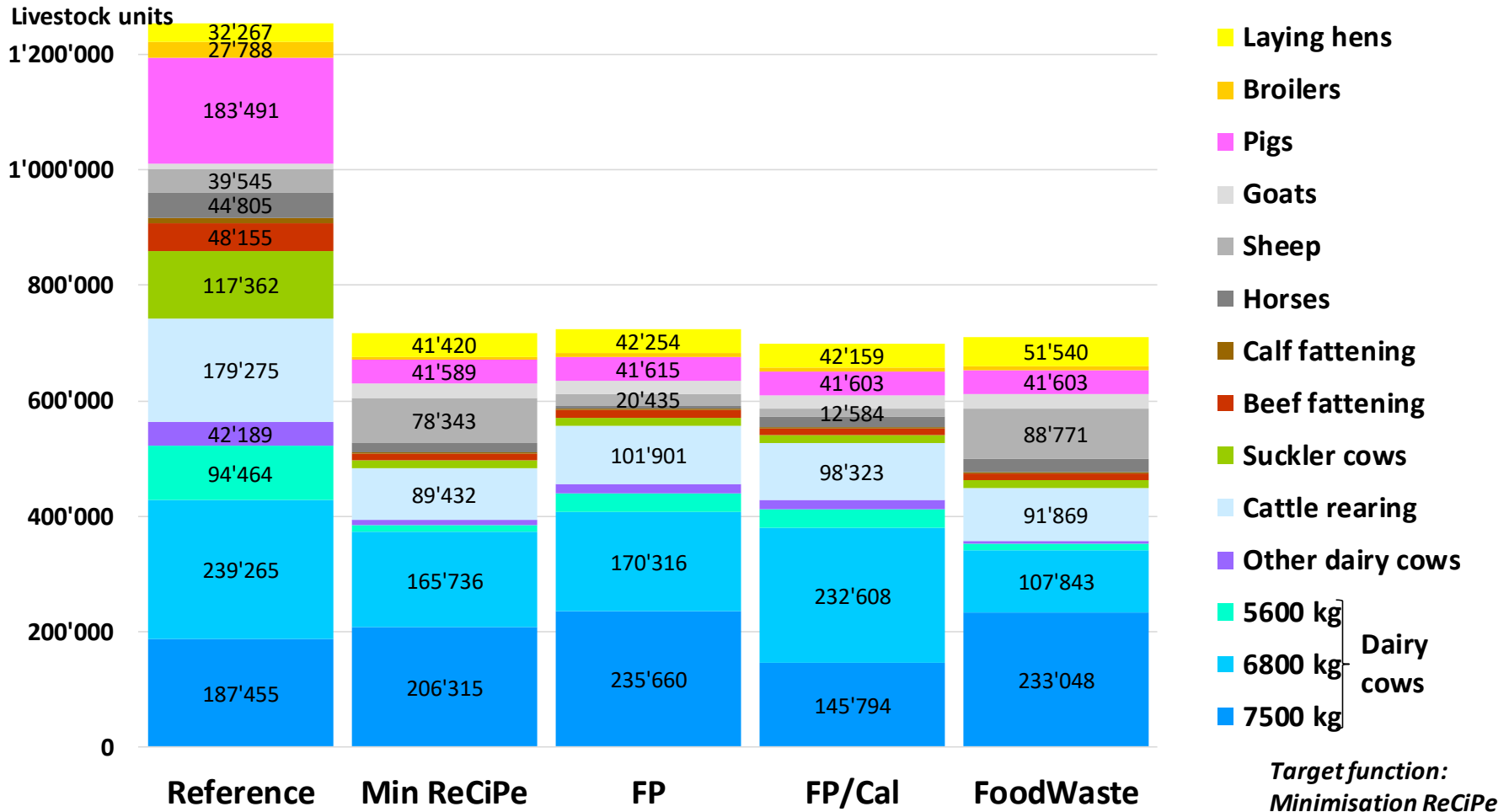


Target function:
Minimisation ReCiPe

Source: Zimmermann et al. (2018), Agroscope Science 55.



Implications for Swiss animal herds





Conclusions

- Even the lowest-impact animal-based products have higher environmental impacts than plant-based alternatives
- Reducing consumption of high-impact products by avoiding high-impact producers creates synergistic mitigation effects
- The environmental impacts of the diet of the Swiss population could be reduced by over 50 % in the optimized scenarios ... by reducing feed imports, food imports and animal production impacts
- The composition of the average diet needs significant changes:
 - -70% meat
 - +35% grains and potatoes
- Milk consumption remaining at current level
- Optimised diet would be closer to nutritional recommendations
- Swiss agriculture would focus mainly on crop and dairy production
- Self-sufficiency of Swiss food supply would increase



Thank you for your attention

Thomas Nemecek

thomas.nemecek@agroscope.admin.ch

Agroscope good food, healthy environment

www.agroscope.admin.ch

