Reduction of GHG emissions by reduced livestock production resulting from dietary changes in the EU

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ALTERRA WAGENINGEN UR

PBL Netherlands Environmental Assessment Agency

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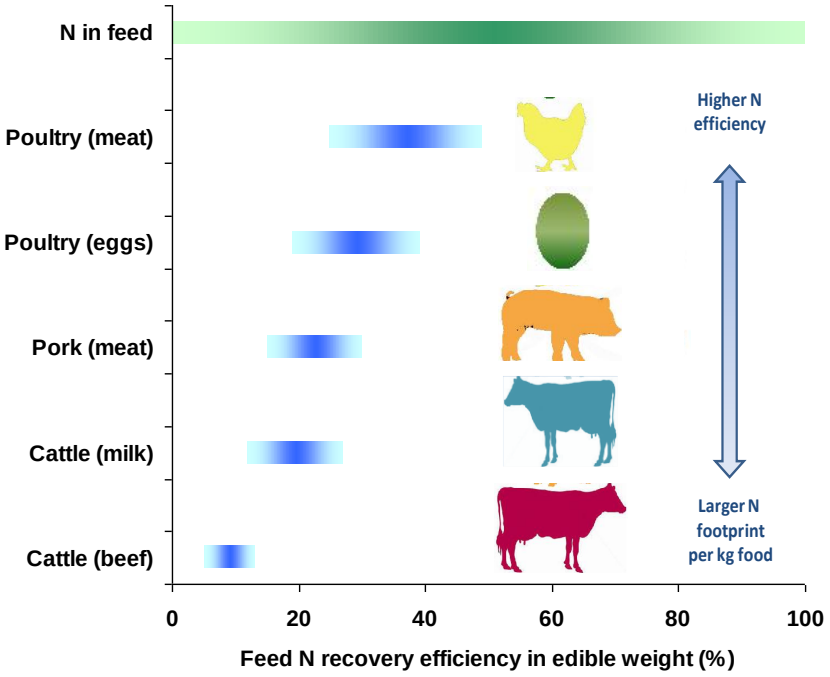
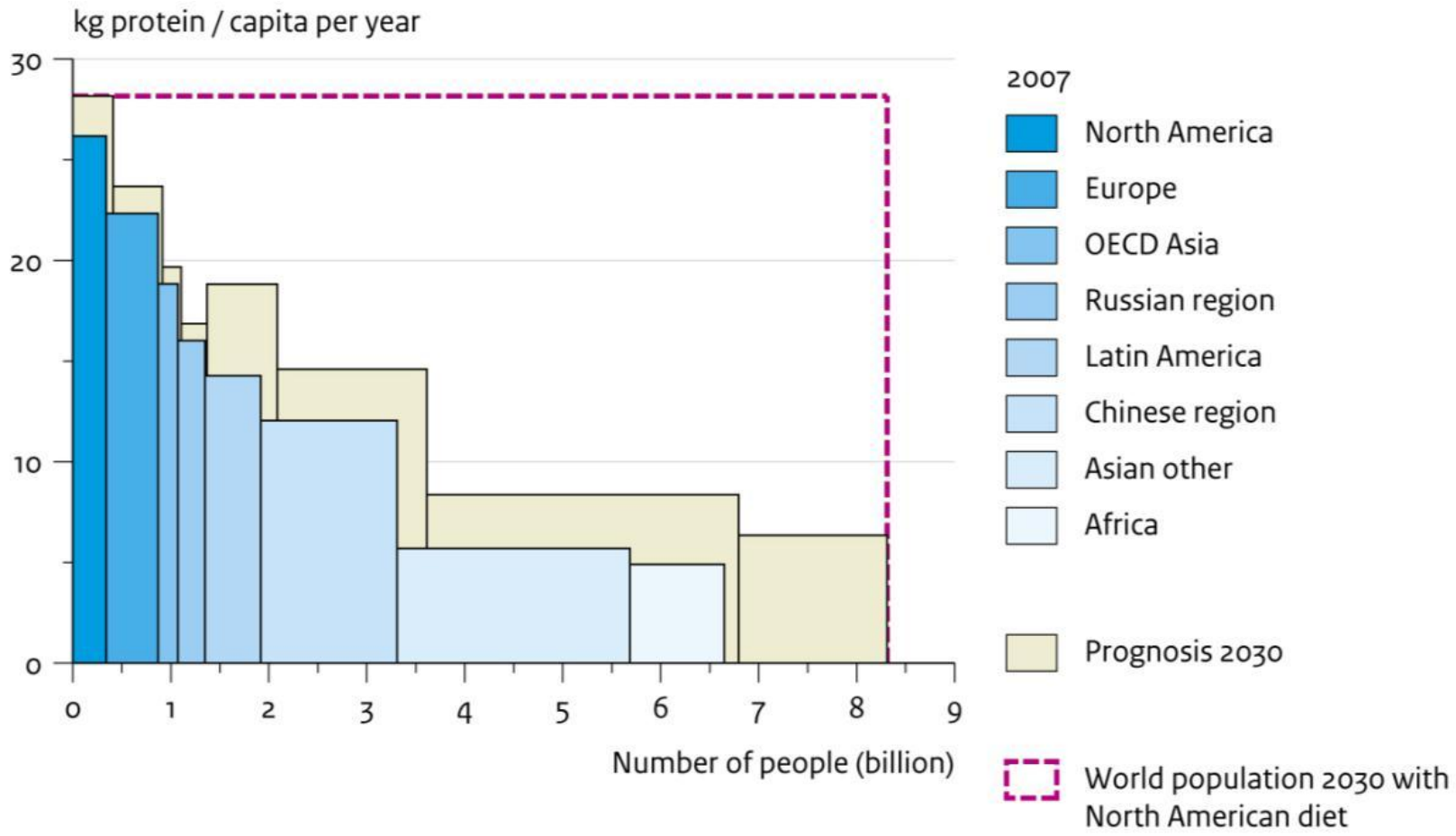
Introduction

- Nitrogen and resource use efficiency is generally low in livestock production systems
- Need to increase global food production and lower environmental impact
- Technical mitigation measures alone are not sufficient
- Change in diets effective option to reduce emissions



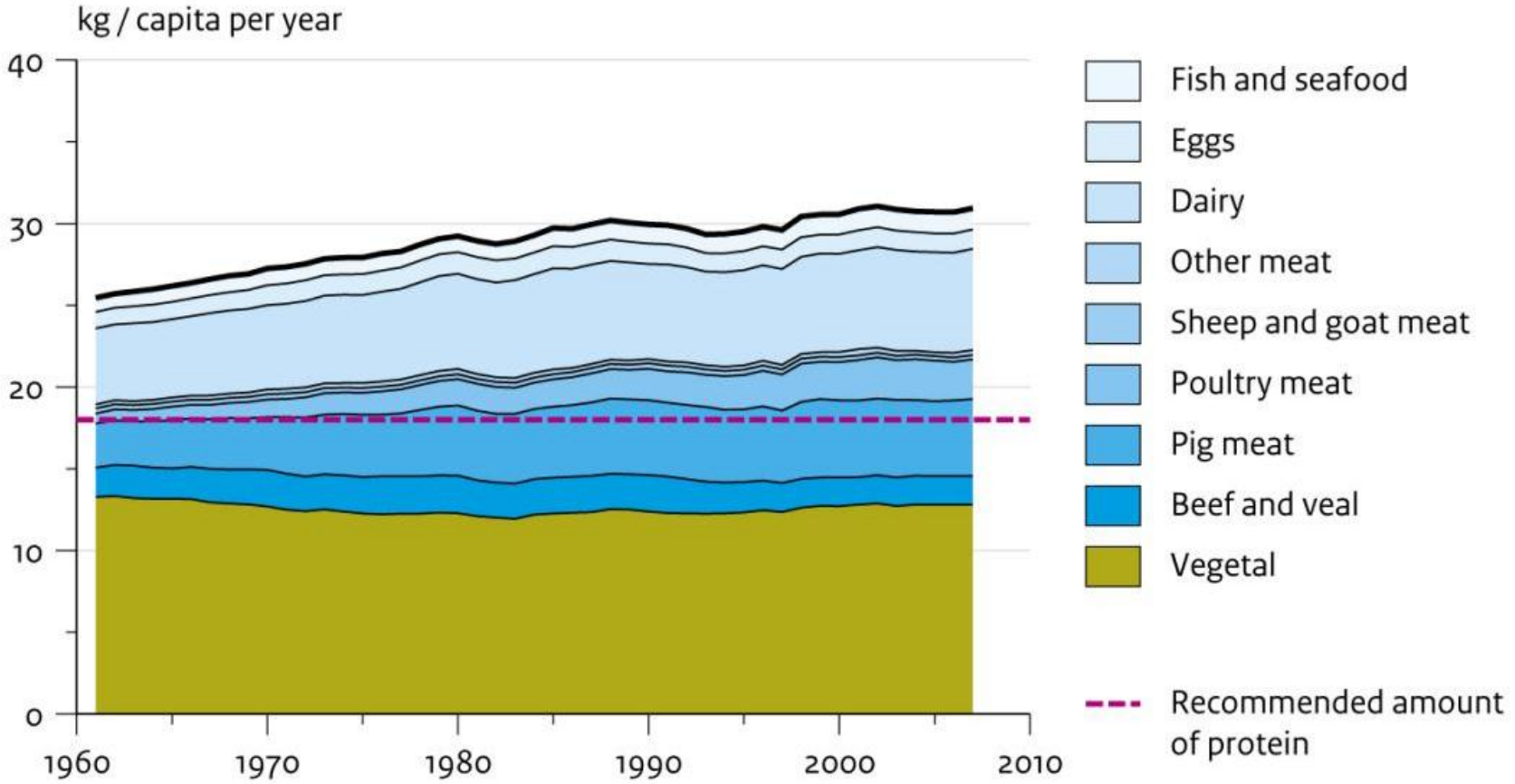
Sutton et al. (2011), ENA report

Protein consumption will increase

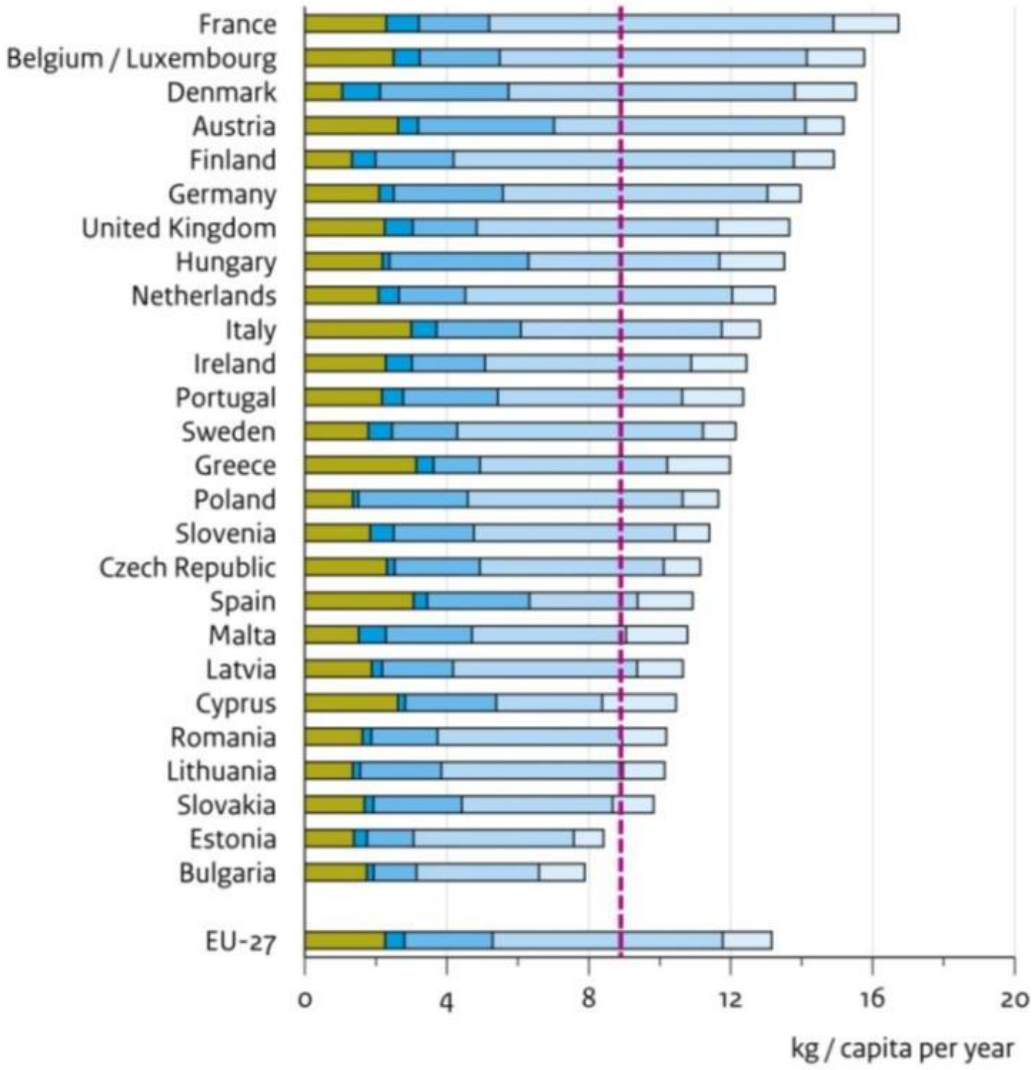


Intake of protein in EU-27

70% more protein than recommended



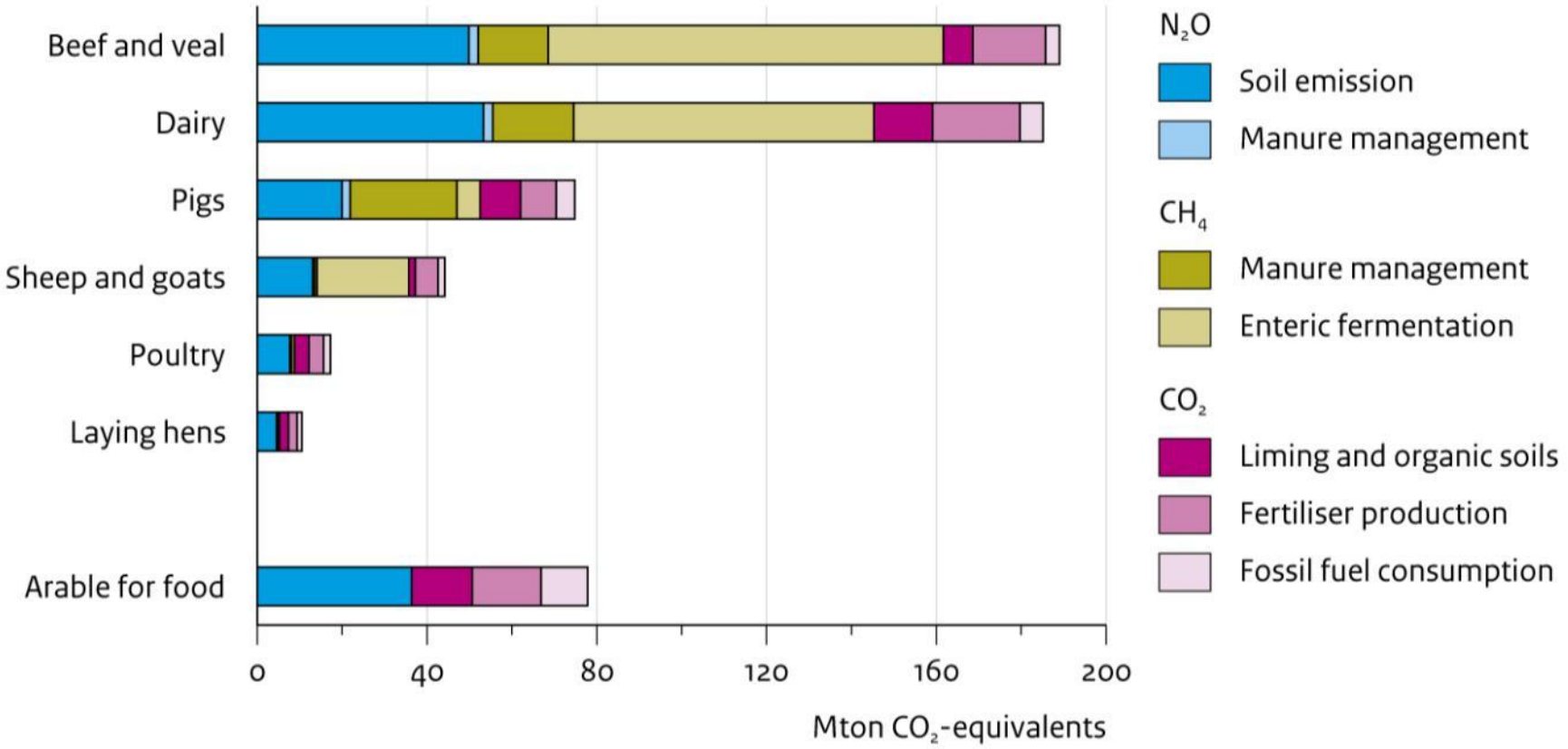
Intake saturated fats in EU-27



40% more saturated fat than recommended maximum

80% of saturated fats are of animal origin

GHG emissions from livestock



10% of total GHG emissions in EU

Source: Lesschen et al., 2011

Objective and approach

Objective: Assess GHG impact of reduced consumption of livestock products in EU-27

Approach:

- 6 alternative diets (25 and 50% reduction of pork and poultry, dairy and beef and combined)
- Similar reduction in livestock production assumed
- Define changes in feed demand / feed basket
- Assess changes in land use
- Assess environmental impact (MITTERA-Europe)

MITERRA-Europe

- A model for *integrated* assessment of N, C and P emissions from agriculture in EU-27 at Member State and regional levels (NUTS-2)
- Developed for the European Commission
- Simple and transparent model; *uniform* approach for EU-27
- Scenario, measure and policy analysis
- Outputs: N and P balances, emissions of N_2O, NH_3, NO_X, CH_4, CO_2, N leaching and runoff, changes in SOC stocks

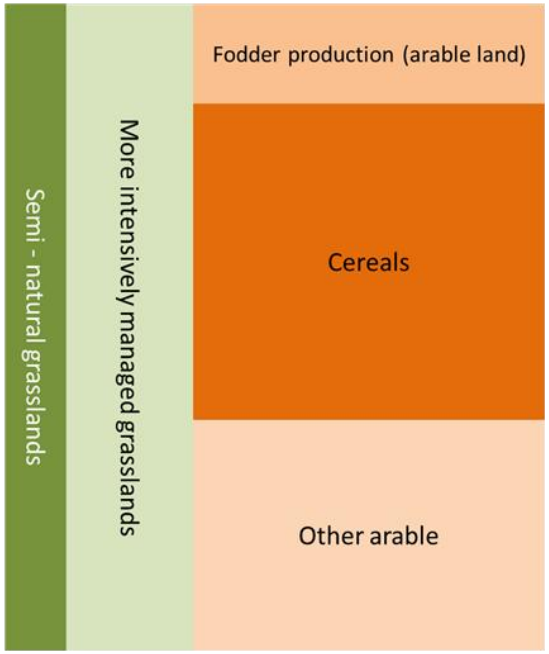
Velthof et al., 2009. J. Env. Qual. **38**: 402–417
Lesschen et al., 2011. Animal Feed Sci. Tech. **166-167**: 16-28

Assumptions

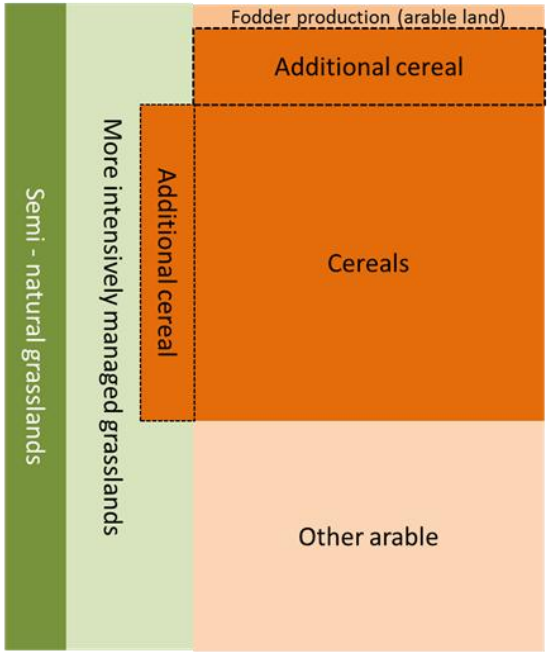
- Changes in food consumption lead to proportional changes in food production → reduction in livestock production, increase in certain crops to replace animal products
- Use of domestic by-products shall not be reduced
- For protein mainly reduction of oil meal imports (soybean)
- No reduction of extensive and natural grasslands
- Two scenarios for land use change:
    1. high commodity prices: conversion of temporary and intensive grassland into arable land; export of surplus cereals
    2. environment policy setting: extensification intensive grassland; conversion of excess arable land into perennial energy crops

Land use: two scenarios

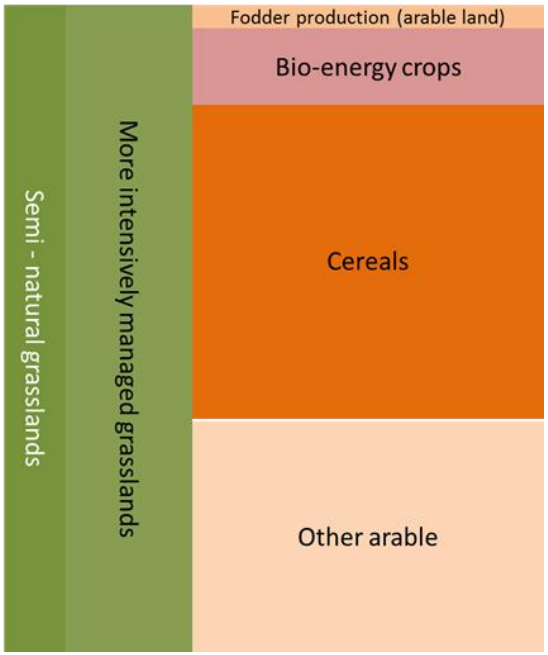
Land use Reference



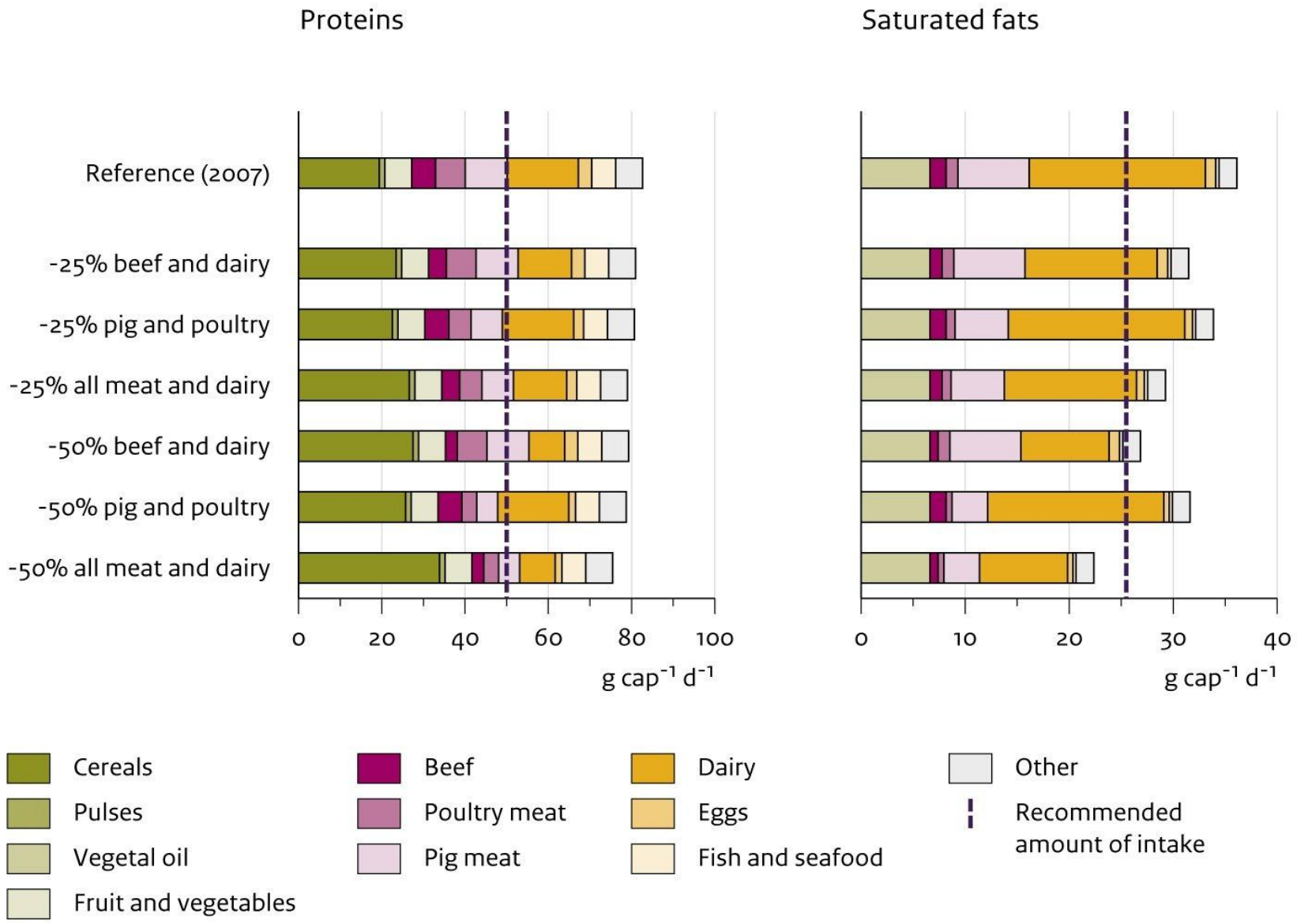
Land use 'high prices' scenario



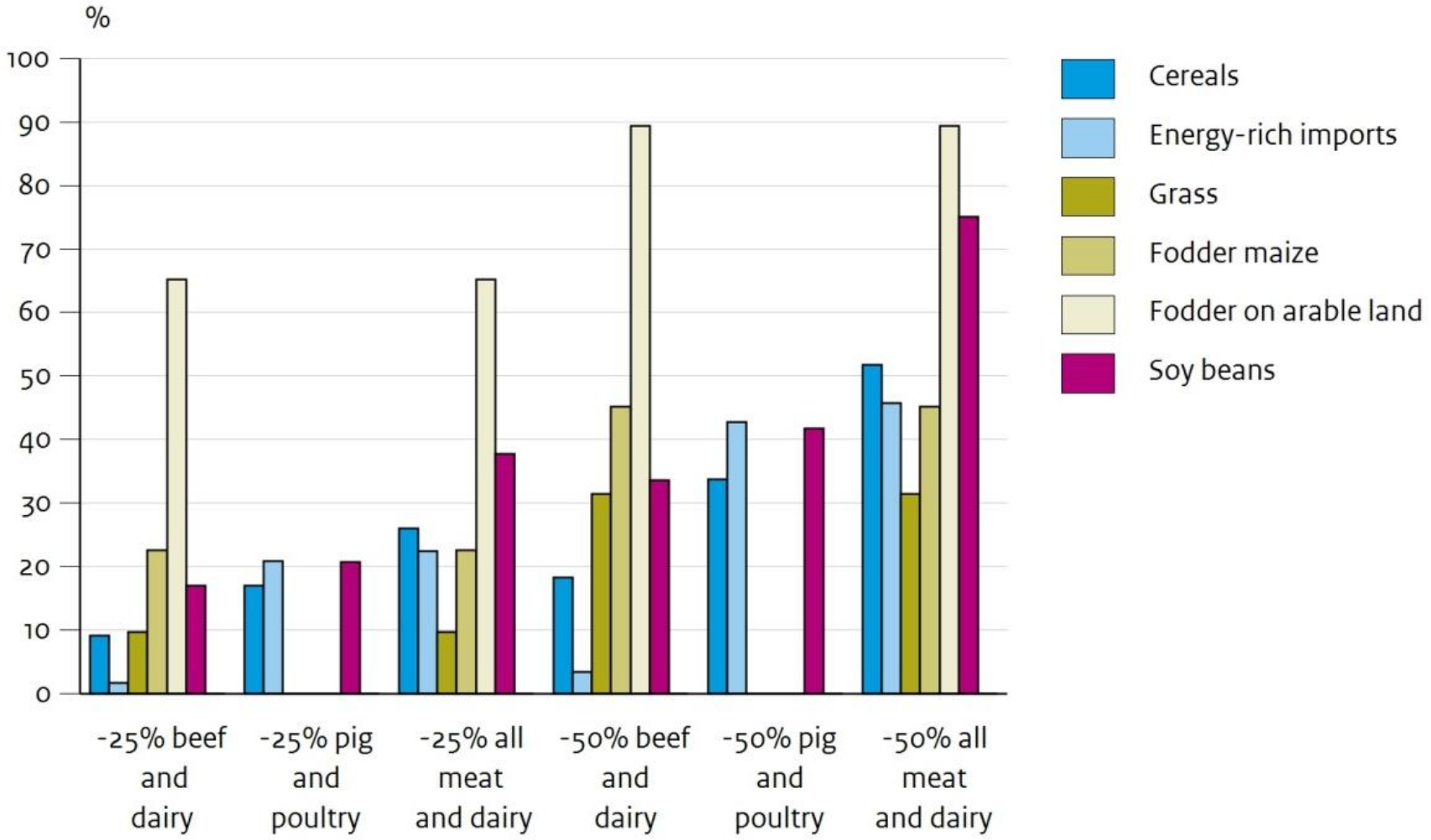
Land use 'greening' scenario



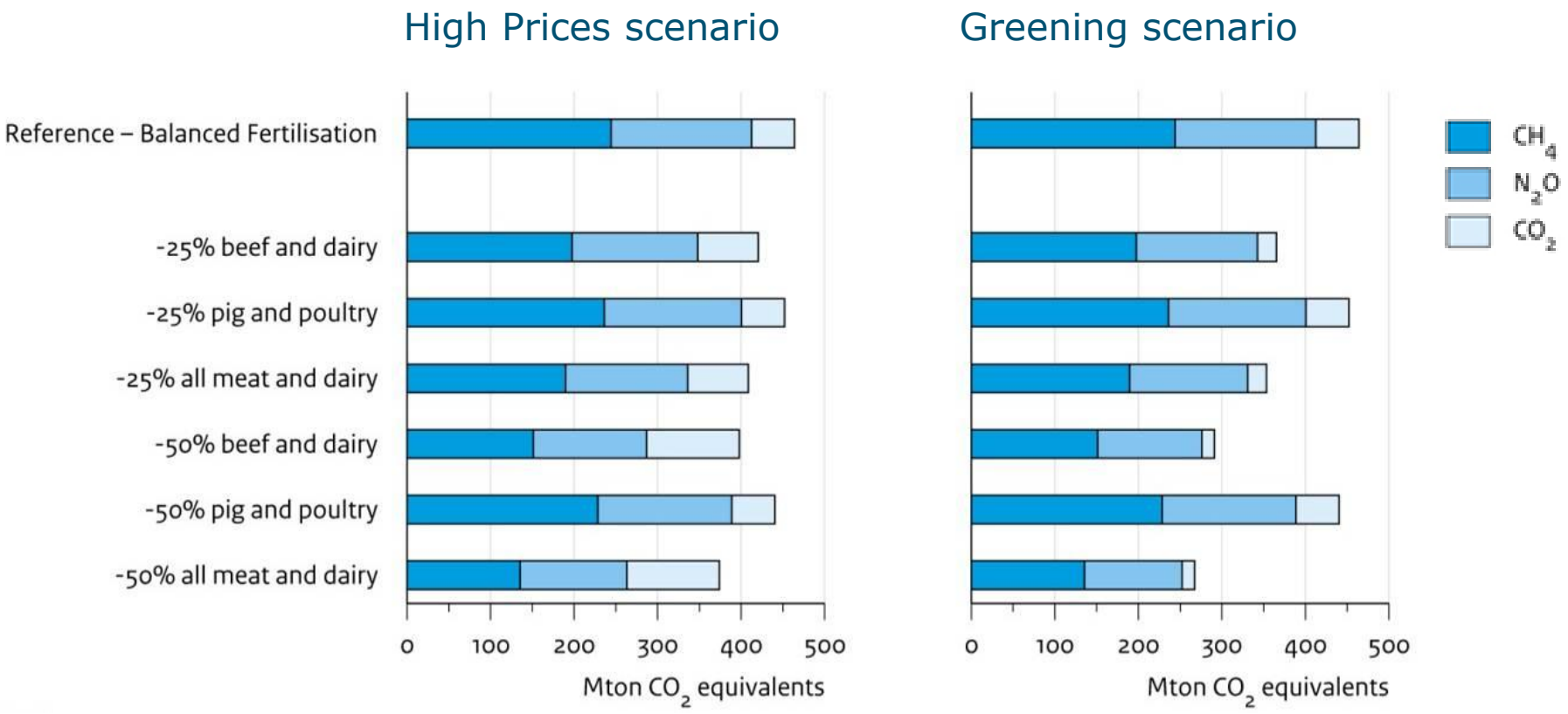
Per capita protein and fat intake EU-27



Reduction demand feed commodities



Results: GHG emissions EU-27



Additional effects of 50% reduction

- 75% reduction in soy meal use / import
- EU cereal export might increase from 20 to 200 million tons
- Environmental benefits, EU NH_3 emissions reduced by 40% and nitrate leaching by 30%

Health benefits

- Intake of saturated fat 38% lower - on the level of WHO recommended maximum dietary intake
- Intake of red meat close to maximum amount as advised by the World Cancer Research Fund

Discussion

- Simplification reduction in consumption is followed by reduction in production
- Substantial uncertainties (e.g. allocation of feed)
- Impact on farmers, but also opportunities
- Consumption seems difficult to change, however, historically large shifts → opportunities
- Currently, few/no policies are aiming at consumption
- Reduction possible in various ways
  - Frequency (shift to alternatives)
  - Portion size, hybrid products

Conclusions

- A 50% reduction in the livestock component of EU diets, with corresponding changes in agriculture, would have substantial environmental and health benefits
- The calculated impact on GHG emissions is larger than estimated mitigation potentials from technical measures
- While further analysis is needed, it is clear that food choices matter, both for our health and our environment

Thank you

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