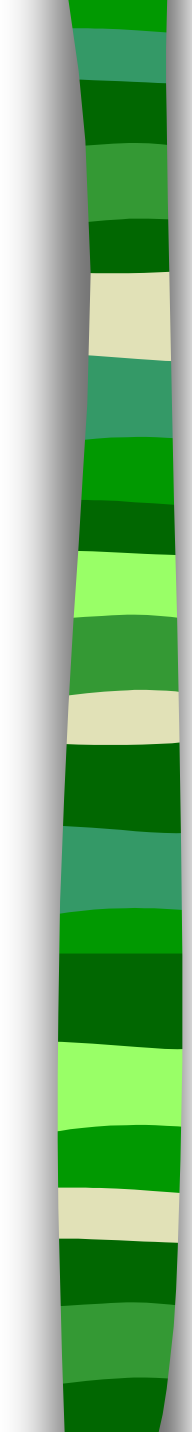


Assessing the world-wide effects of a shift towards vegetable proteins: a General Equilibrium Model of Agricultural Trade (GEMAT) and the Global Trade Analysis Project (GTAP)



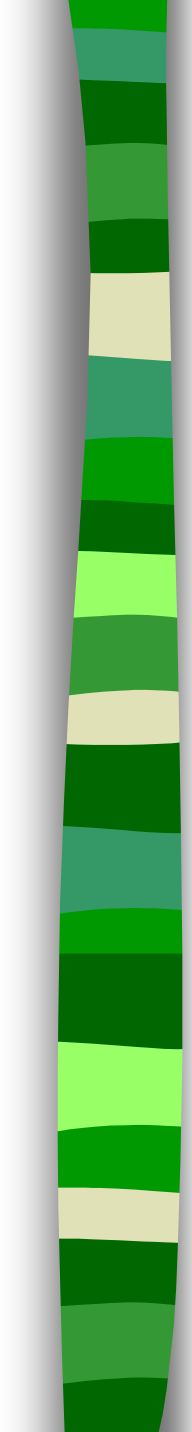
Lia van Wesenbeeck and Claudia Herok

Centre for World Food Studies (SOW-VU), Amsterdam and
Agricultural Economics Research Institute (LEI), The Hague



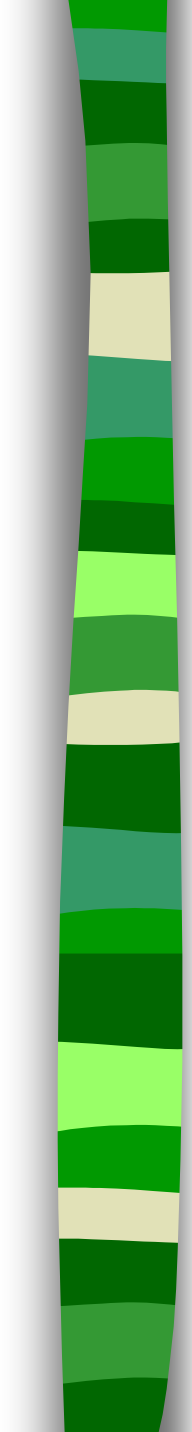
Introduction

- PROFETAS project
- Characteristics of the problem
- GEMAT: focus and description
- Some simulation results for GEMAT
- GTAP: focus and adjustments
- Some simulation results for GTAP
- Conclusion



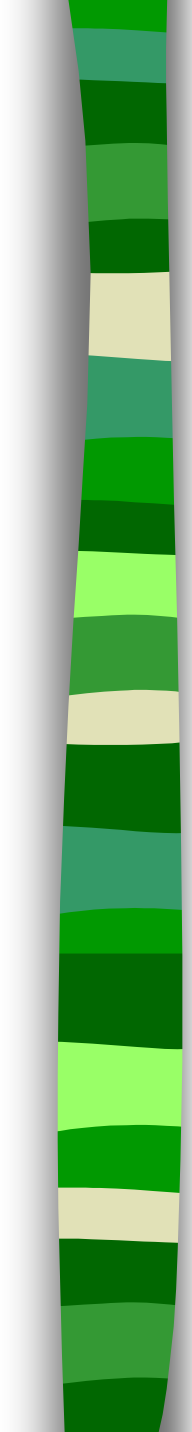
PROFETAS

- Meat demand will rise sharply in near future
- Feed demand will rise even more
- Price rises in meat will not be able to counter the increase in demand
- Therefore: lasting change in preferences is needed
- Start with transition in EU
- Therefore, PROtein Foods, Environment, Technology, And Society (PROFETAS) project



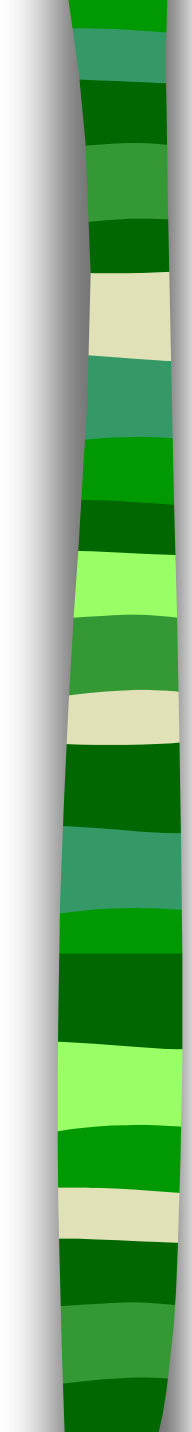
Characteristics of agricultural production

- land has to be made suitable for crop production
- maximum yield per ha; not possible to 'feed the world out of a flowerpot', by increasing the use of other inputs
- Because of dietary requirements of animals, substitution between feed inputs is limited
- the production of by-products is technically unavoidable
- The processing of crops and meat for human consumption leads to the production of byproducts that are not suited for human consumption



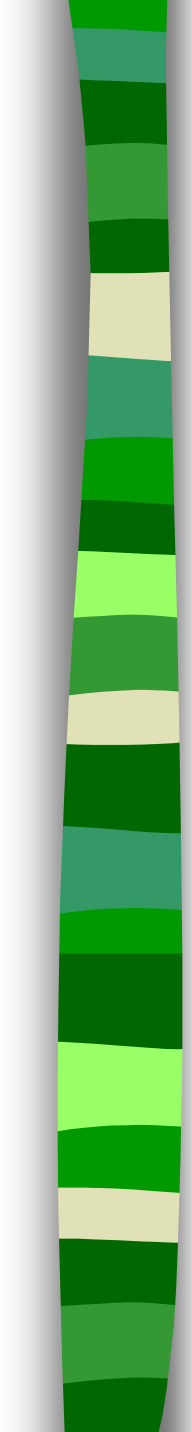
Characteristics of food consumption

- For meat demand, three regimes can be distinguished:
 - low incomes: low committed level, low elasticity
 - medium incomes: low committed level, high elasticity
 - high incomes: high committed level, low elasticity
- Demand for novel protein food is low in high-income countries



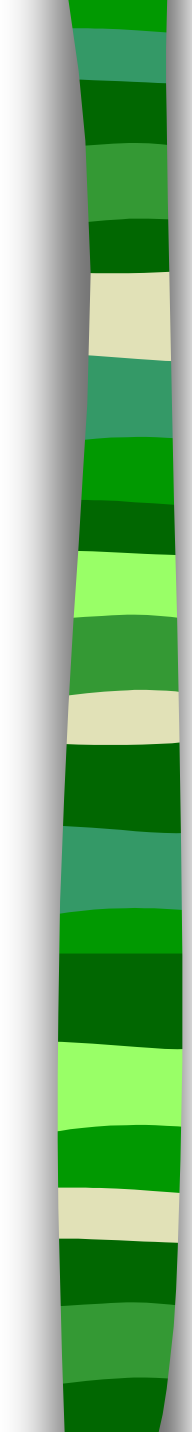
External environment

- Reform of the EU common agricultural policy
- Eastern enlargement of the EU
- Reform of WTO



GEMAT: focus and description

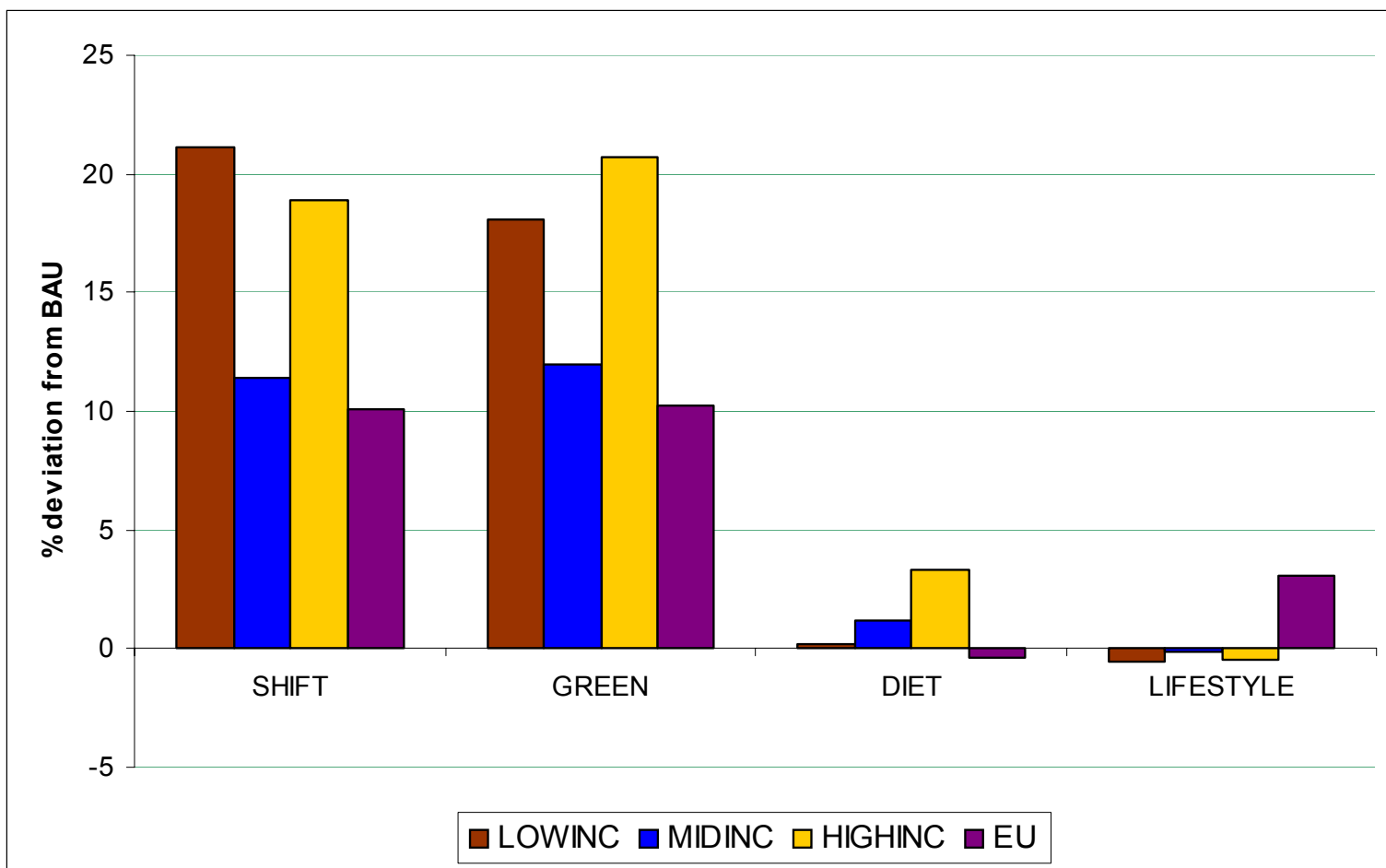
- Focus: production and consumption characteristics
- Description of major deviations from standard modeling
 - Investments in land are needed before crop production can start
 - Feed module is included to ensure dietary requirements of animals are met
 - Production of by-products is taken into account
 - Lifestyles are endogenous and react to changes in the distribution of income associated with increases in average per capita income



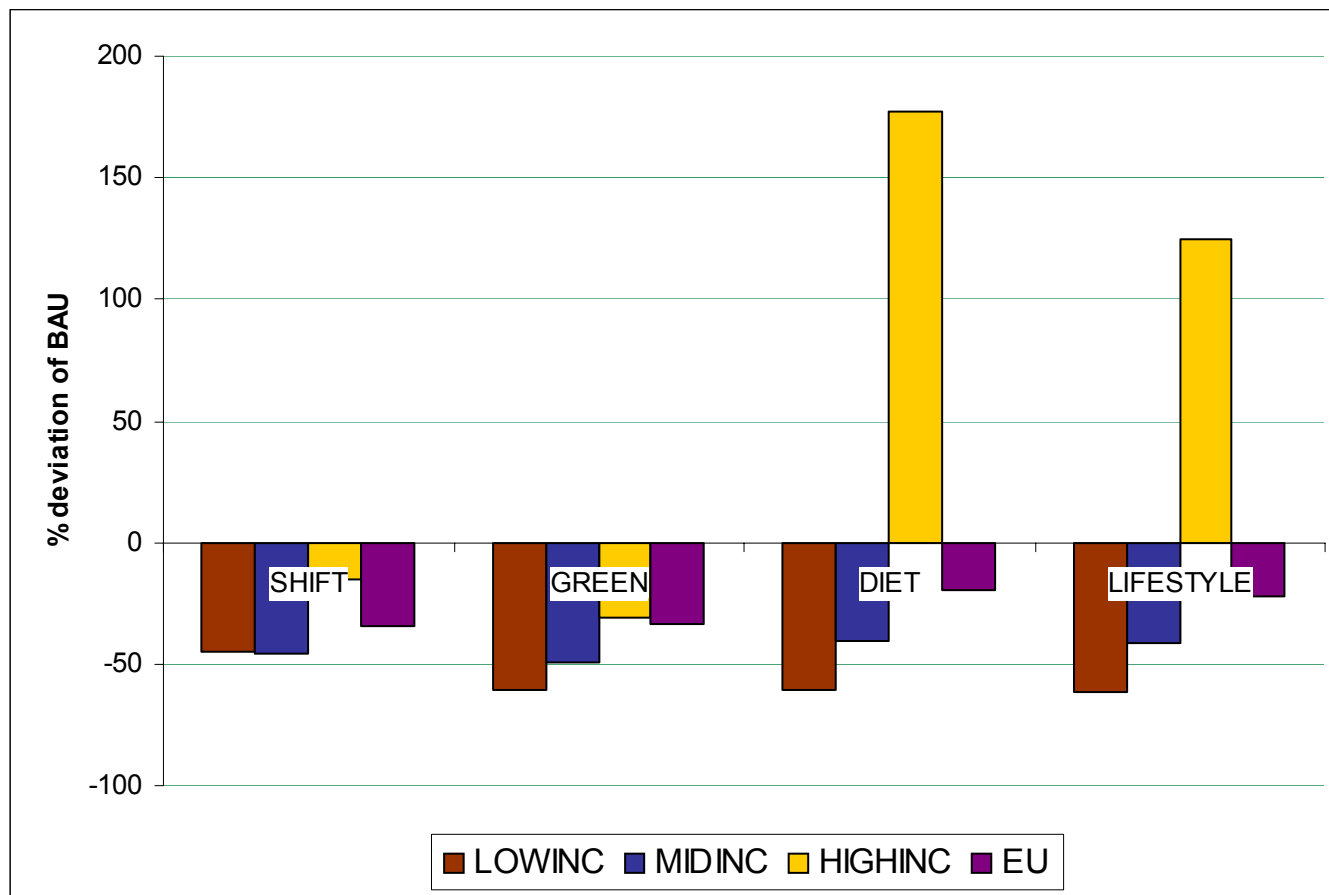
GEMAT model exercises

- BAU Business as Usual (reference)
- SHIFT (only shift in preference from meat to NPF)
- GREEN (SHIFT and increased preference for nice landscape)
- DIET (GREEN and respect for animal diets)
- LIFESTYLE (DIET and endogenous lifestyle shifts)

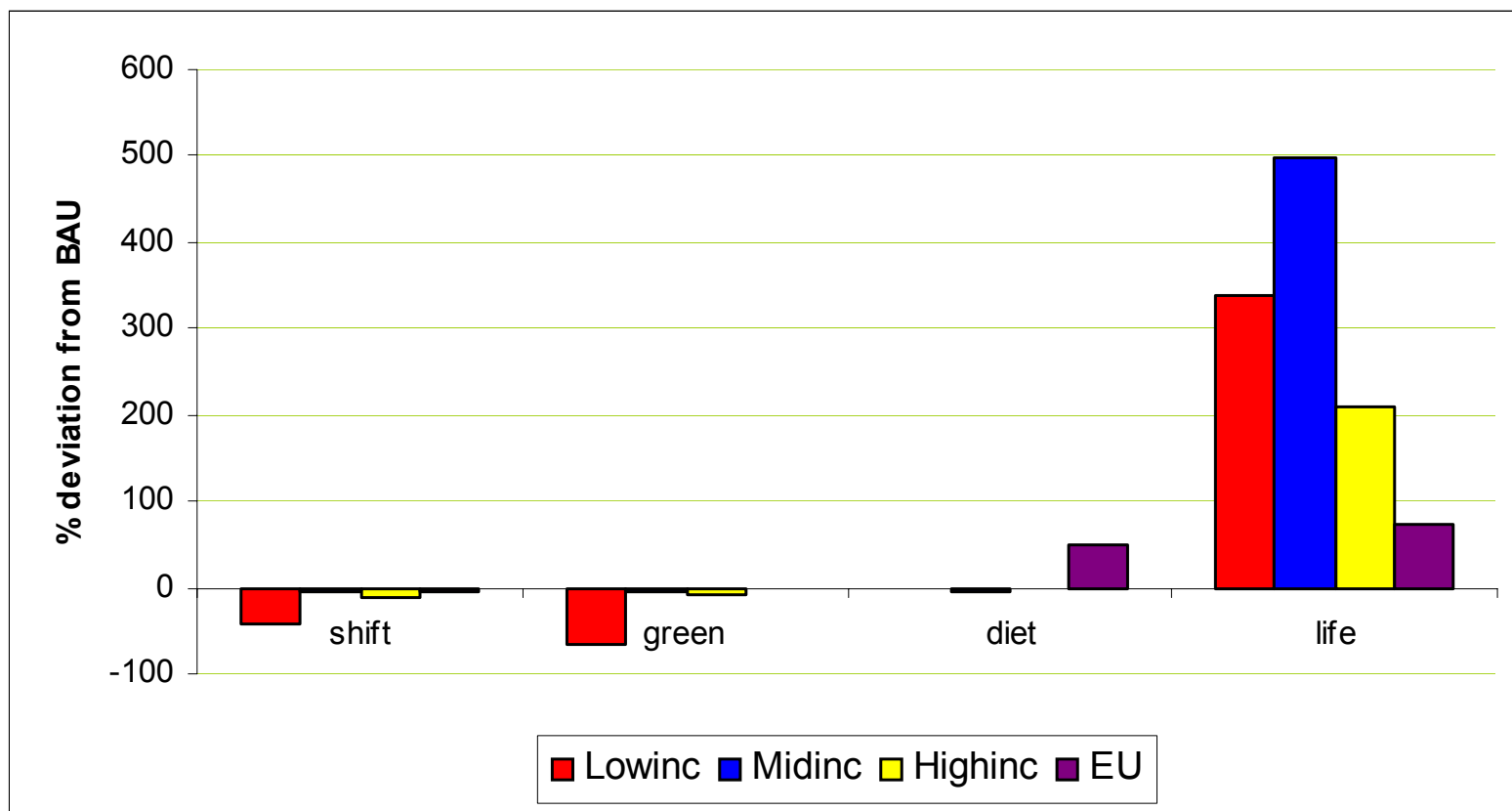
Some results: GDP per capita in 2020

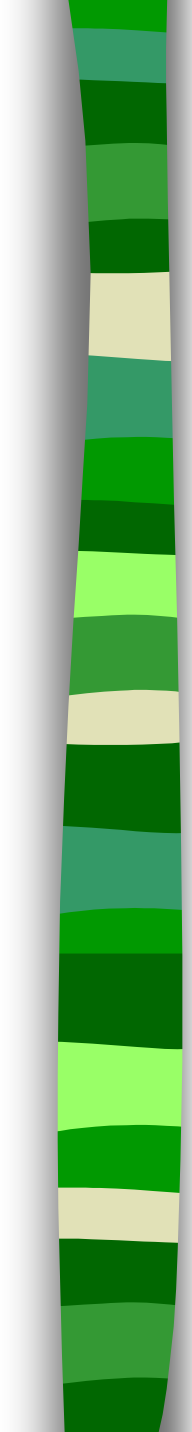


Some results: pressure on cropland in 2020



Some results: growth rate meat demand





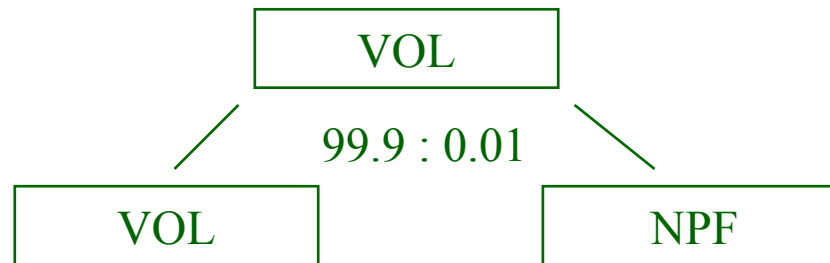
Conclusions for GEMAT

- Adding diet constraints heavily influences results
- Allowing for endogenous lifestyles also has a substantial impact
- Results should be interpreted cautiously because of institutional weakness and empirical shortcomings

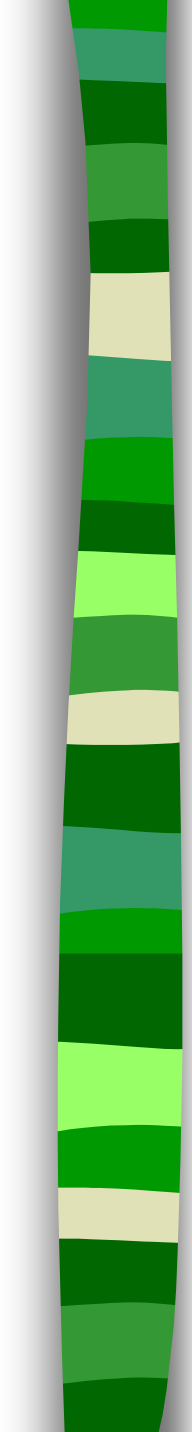
GTAP: focus and adjustments

- **Introduction of new product**

- Split in GTAP product VOL (vegetable oils and fats) using DAGG software



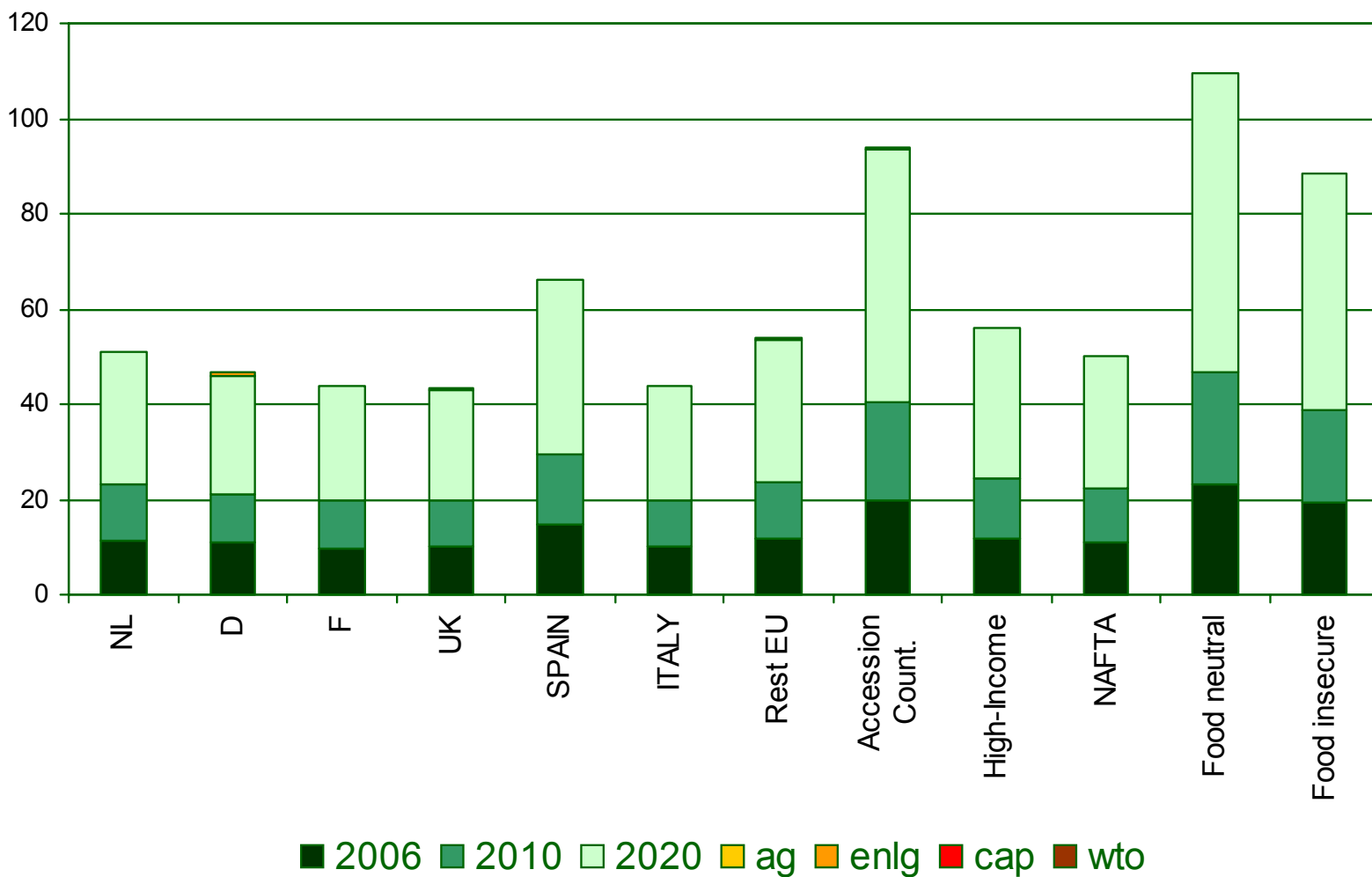
- Introduction of necessary elasticities (based on theoretical assumptions)
- Introduction of possible political measures (no political instruments in the baseline scenario)



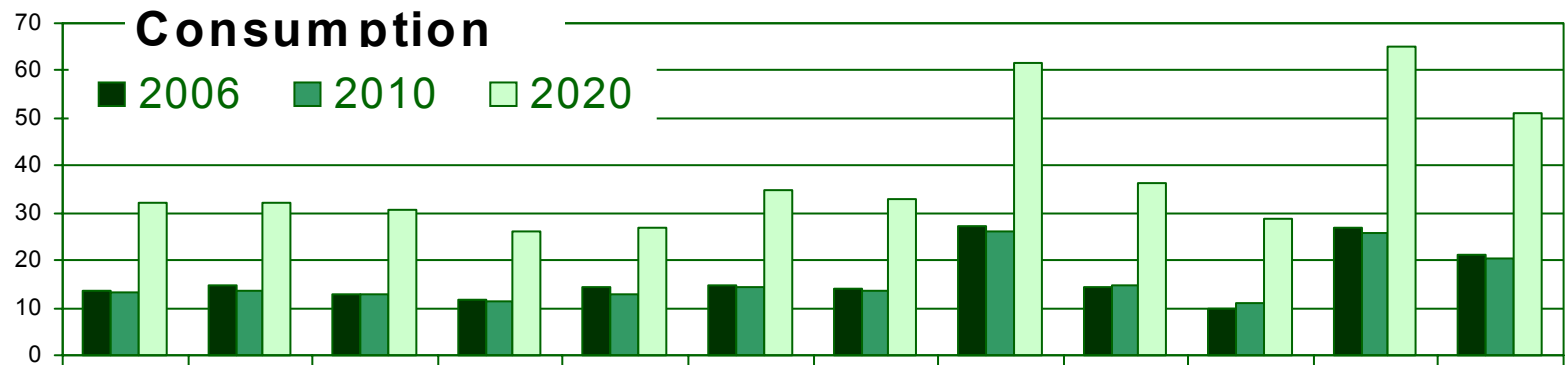
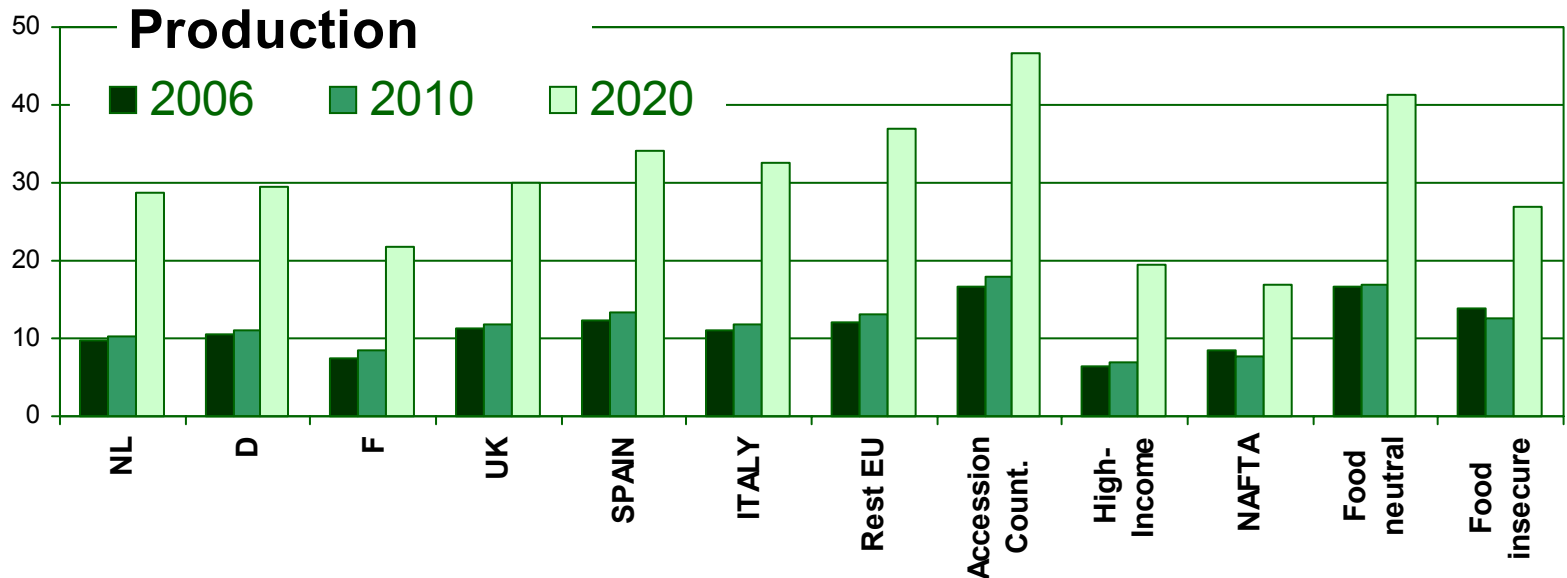
GTAP scenario description

- **AG** : Agenda 2000 reform package of the EU
- **2006**: macroeconomic projections for 2002-2006
- **ENLG**: Eastern enlargement of the EU:
 - adoption of all border and domestic instruments incl. direct payments
- **2010**: macroeconomic projections for 2007-2010
- **CAP**: possible Common Agricultural Policy reform:
 - reduction in direct payments by 30% and abolition of quotas
- **WTO**: possible next WTO round:
 - a reduction of all border instruments worldwide by 20%
- **2020**: macroeconomic projections for 2011-2020

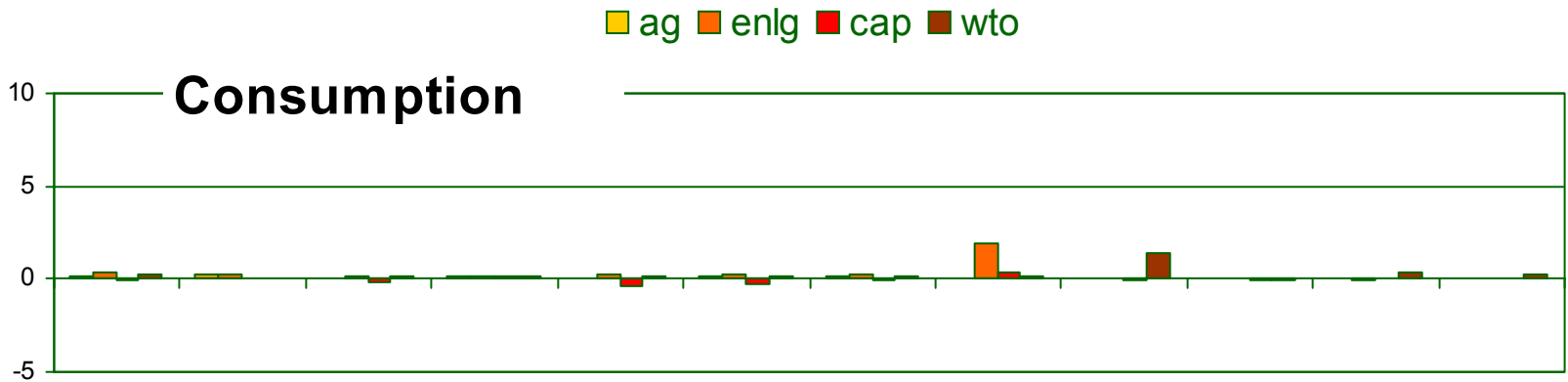
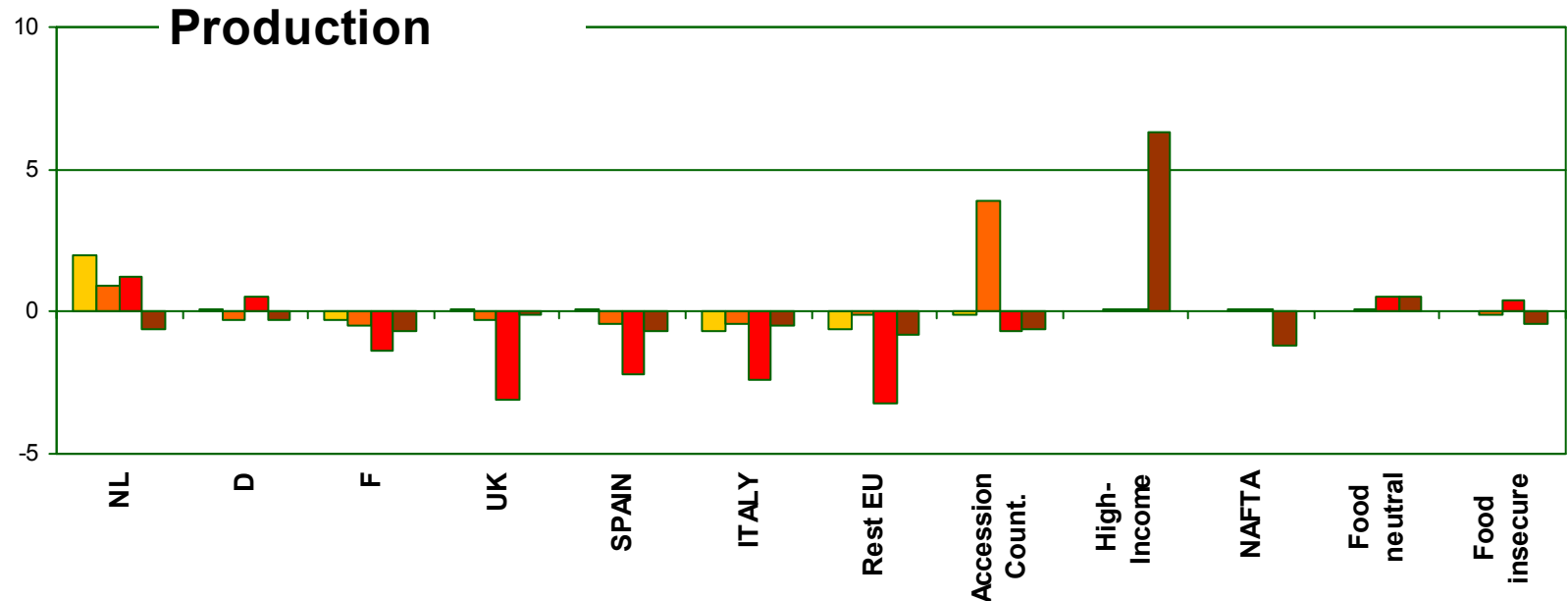
Some results: changes in GDP

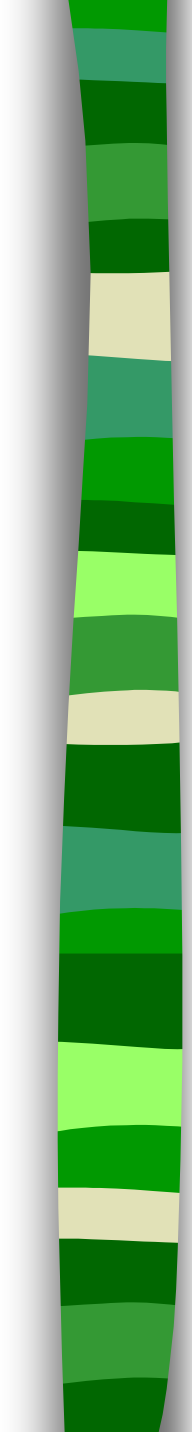


Some results: Changes in NPF (in %) under macro-economic projections



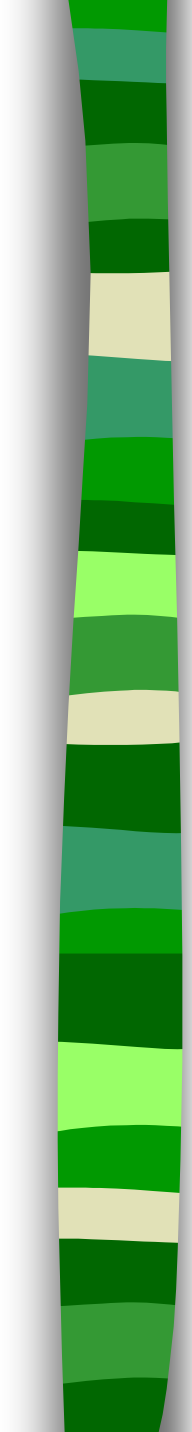
Some results: Changes in NPF (in %) due to political developments:





Conclusions for GTAP

- Macroeconomic projections have a strong impact on results
- Expected policy developments relevant for the agricultural sector have minor impacts on results for NPFs
- Next steps:
Improved simulation of diffusion process of NPFs
Introduction of NPF specific policy measures



Overall conclusions

- Methodological
 - “One size fits all” not capable of covering all aspects of a complex problem
 - Effects of alternative assumptions on model structure can be very large
- Policy conclusions
 - Policy measures seem to matter much less than macro-economic trends.