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**Policy analysis of the transformation
of the EU's agri-food sector:
A review of model capabilities and an
outlook for future research**

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Introduction

- **Sustainability challenges in the EU agri-food sector**
 - Trade-off between natural resource and biodiversity protection
↔ resource efficient food, fiber and biomass production
 - Resource efficiency along the value chains
 - Consumption habits
 - Human rights and social justice
 - Animal welfare
 - One Health: animal-food-human health nexus
- Several of these topics picked up in **Green Deal proposal**, mainly F2F, but also Biodiversity Strategy and others
- **Economic impact modelling** important element in formation of political will and decision-making

Our study

- **Objective: review** research topics and economic model capabilities of most common simulation models used for agricultural policy analysis and **analyse how they match** the policy agenda of the EU's Green Deal / Farm-to-Fork strategy
- **Approach:** using Scopus database, we analyze the existing literature of model applications published between 2000 and 2022 (advance access)
- **Selected model types:**
 - Single farm or multi-agent models (various ones)
 - Partial equilibrium models (e.g. CAPRI, ESIM, AgMemod)
 - Economy wide models (e.g. GTAP, MAGNET)
- **Further characteristics:**
 - EU-focused
 - Economic-focused
- **Sample size:** 96 journal articles

What has been the dominant focus of past model applications?



Farm level simulation
models: n=31



CGE model: n = 25



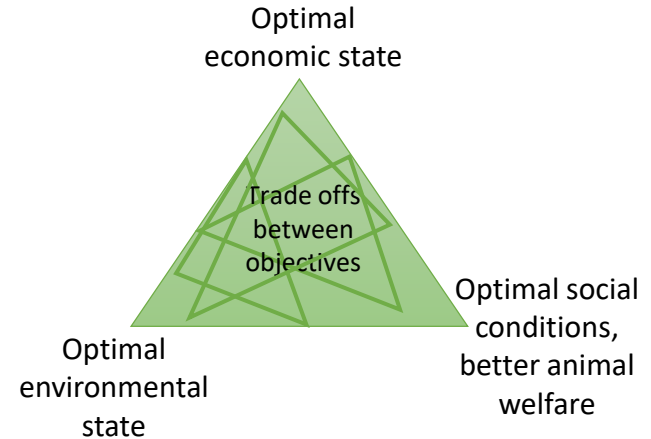
Partial equilibrium simulation
models: n=46

Policy agenda for sustainability transition: EU Green Deal and related strategies (F2F, Biodiv)

Proposed elements

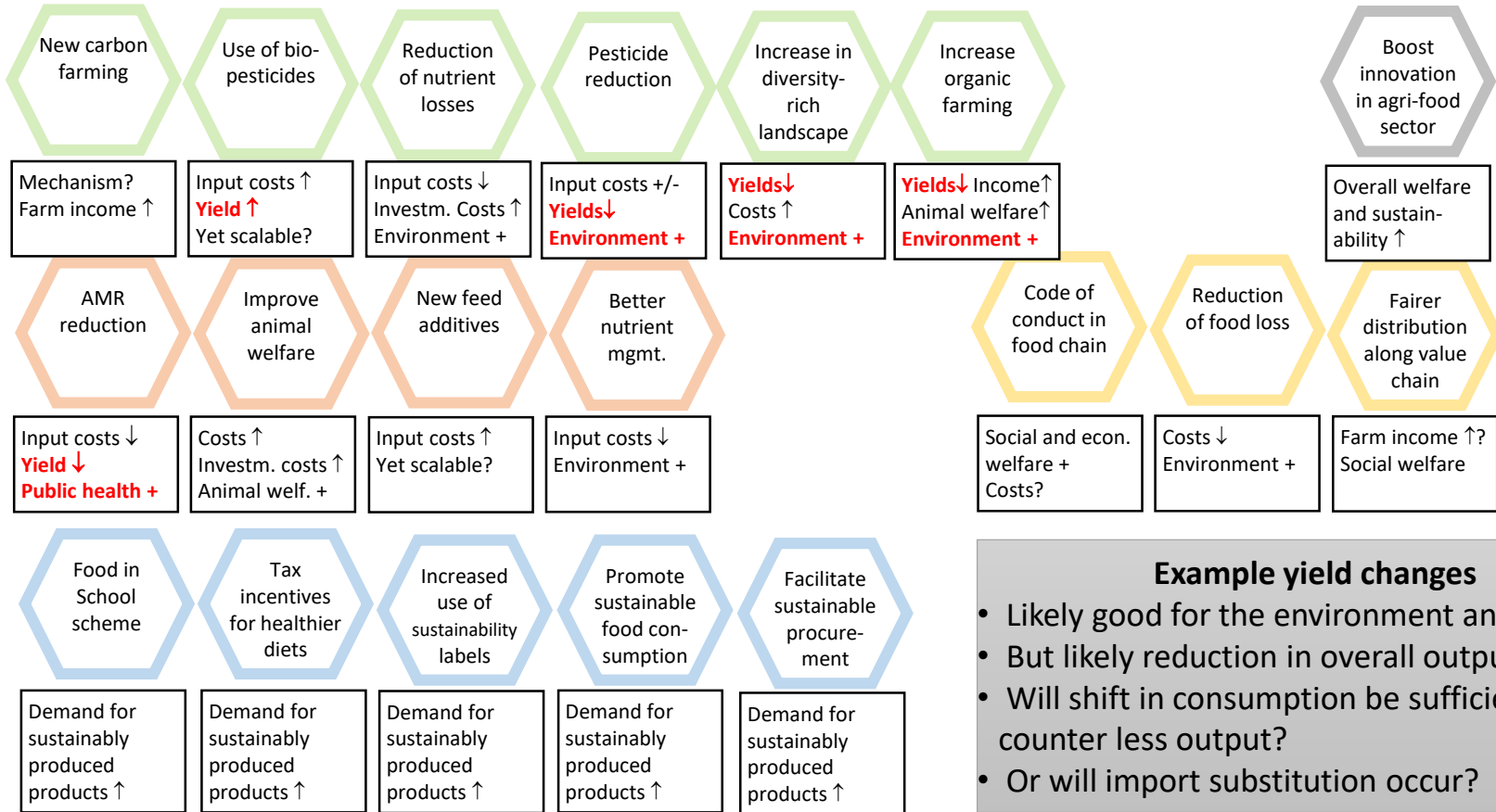


Potential trade offs



- Change in production **and** consumption pattern needed
- Danger that instead of changes in consumption, **production leakage** and **import substitution** occurs

Policy priorities: Trade offs between objectives; costs and benefits, ambiguities call for economic impact modelling



Example yield changes

- Likely good for the environment and biodiv,
- But likely reduction in overall output
- Will shift in consumption be sufficient to counter less output?
- Or will import substitution occur?

Policy priorities: Limitations in model capabilities

Proposed elements



Limitations in model capabilities

- Missing data on
 - Detailed pesticide use
 - Animal welfare status and compliance level
- Intra-EU data on trade and demand of organic products very weak
 - Also holds for sustainability labels
- Modelling positive effects of biodiversity measures require high spatial resolution
 - Ecological mechanisms need to be incorporated (e.g., higher pollination/pest-control) services due to diversity-rich landscapes
 - Challenge to bridge market-level and landscape-level
- Power asymmetries along food chains: aggregation issues

Conclusions

- Sustainability transition of agri-food system involves many trade offs and offer new challenges for economic impact modelling
- Benefits and costs of the transition need to be depicted in models in order to be able to analyse these trade offs
- Where impacts are ambiguous...
 - ...use **transdisciplinary approaches to close knowledge** gaps on impacts,
 - ...**”refine” modelling approaches** e.g. through model linkages
- Demand side of models need more attention (food policies, food loss and waste, social/health dimension, valuation of animal welfare, household disaggregation)
- External (non-EU) dimension need to be considered



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**We thank all modelers and authors for
publishing timely and interesting journal
articles!**

Thank you for your attention!

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