Assessing the impacts of climate and market changes on agrarian land use in Europe

Tia Hermans¹, Frank Ewert⁴, Mark Metzger¹, Jan Verhagen², Pieter Vereijken², Rene Verburg³, Geert Woltjer³, Harm Smit⁴, Han Naeff¹

¹Alterra, Wageningen UR, The Netherlands
²Plant Research International, Wageningen UR, The Netherlands
³LEI, Wageningen UR, The Netherlands
⁴Plant Production Systems, Department of Plant Sciences, Wageningen University, The Netherlands
Outline

- Background
- Estimating impacts of climate and market changes for selected crops (wheat and potatoes) and grassland/milk on
  - achievable production
  - demand (food and feed) and compare with production
  - regional changes in production area
- Concluding remarks
Background

- To develop strategies and action plans for agriculture in the Netherlands to adapt to both climate and market change, with NL-North as a pilot region;

- In the context of the EU27, and for two scenario’s (global economic scenario A1 and regional environmental scenario B2), for three crops relevant for NL-North (wheat, potatoes, grass/milk)
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Estimating impacts on achievable production

Climate effect on yield changes

Relative yield change (%)

A1 (2080), HadCM3

Technology effects on yield changes

Assumed future technology effects

Change in grain yield
2080 HadCM3 - A1fi

% change in yield
Value
167 %
78 %
< 10 % arable land in 1980

based on statistics and shifting agro-environmental zones

Ewert et al., 2005
Yield change as result of climate, CO$_2$ & technology
Achievable wheat productivity in 2005

A1

B2

<= 4 t/ha
4-8 t/ha
8-12 t/ha
12-16 t/ha
>16 t/ha

Country
nuts
Achievable wheat productivity in 2020

A1

B2

<= 4t/ha

4-8 t/ha

8-12 t/ha

12-16 t/ha

>16 t/ha

Country

nuts
Achievable wheat productivity in 2050

A1

B2
Achievable wheat production and demand

Surplus of land

Shortage of land

Verburg & Woltjer, based on GTAP
Estimating impact on land use change

Based on competitiveness of agriculture with 2 indicators

1) Regional ESU/holding
Estimating impact on land use change

Based on competitiveness of agriculture with 2 indicators.

2) Regional population pressure (inh/ha UAA)

- High
- Medium
- Low
- <0.1% of ESU

population pressure 1995 • idem 2005
Production regions in 2050

A1

Wheat

B2

Potato

Productivity x area
- High
- Medium
- Low
- <0.1% of production
Production regions in 2050

A1

B2

Milk

Productivity x area
- High
- Medium
- Low
- <0.1% of production
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Concluding remarks

- The **effects of technology and market change** are **more pronounced** than the effect of climate change;

- A **wide variability** in regional **production** in Europe is predicted, due to
  - differences in productivity of regions
  - differences in competitiveness of regions;

- **Surplus of land** is predicted in the global economic scenario **A1** and a **shortage of land** in the regional environmental scenario **B2**;

- Possible **policy responses should differ** depending on the region.