

Topic: Climate change adaptation and mitigation at the farm scale

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Integrated assessment of farm level adaptation in Flevoland, the Netherlands: what did we learn from multiple methods and model chains?

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Climate change impact assessment requires farming systems analysis and integrated assessment. However, multiple models can be used to assess changes in drivers. In addition, farms are complex systems and many assumptions need to be made regarding objectives and constraints. Here, we evaluate the impact of different models and assumptions on impacts of climate change on arable agriculture in Flevoland, the Netherlands. We performed three studies. Firstly, we used the crop model WOFOST, market model CAPRI, and bio-economic farm model FSSIM. Secondly, we used the crop model SIMPLACE, an adapted version of CAPRI, and a different set up of FSSIM. Thirdly, we used the crop model WOFOST, estimates of impacts of extreme events by the Agro Climate Calendar, and the bio-economic farm model FarmDesign. In general, climate change is projected to have positive impacts. The first two studies however showed that impacts of technology and price changes are larger. But while changes in gross margins are more influenced by results from crop and market models, changes in farm plans are more influenced by assumptions regarding resources and constraints. Assumptions regarding the available land for rent largely influence results. The third study showed that when policy constraints are neglected, impacts on gross margin are more positive. Positive impacts of average climate change may however be counterbalanced by negative impacts of extreme events, but adaptation measures are available. When considering soil quality as important objective, adaptation at farm level will be different: instead of more potato or sugar beet, farms will grow more wheat. We conclude that climate change impacts depend on assumptions, but when making this transparent, it can inform adaptation.