Model inter-comparison on crop rotation effects – an intermediate report

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Data of diverse crop rotations from five locations across Europe were distributed to modelers to investigate the capability of models to handle complex crop rotations and management interactions. Crop rotations comprise various main crops (winter/spring wheat, winter/spring barley, rye, oat, maize, sugar beet, oil seed rape and potatoes) plus several catch crops. The experimental setup of the datasets included treatments such as modified soils, crops exchanged within the rotations, irrigation/rainfed, nitrogen fertilization, residue management, tillage and atmospheric CO_2 concentration. 19 modeling teams registered to model either the whole rotation or single crops. Models which are capable to run the whole rotation should provide transient as well as single year simulations with a reset of initial conditions. In the first step only initial soil conditions (water and soil mineral N) of the first year and key phenological stages were provided to the modelers. For calibration, crop yields and biomass were provided for selected years but not for all seasons. In total the combination of treatments and seasons results in 301 years of simulation.

Results were analyzed to evaluate the effect of transient simulation versus single-year simulation regarding crop yield, biomass, water and nitrogen balance components. Model results will be evaluated crop-specifically to identify crops with highest uncertainty and potential for model improvement. Full data will be provided to modelers for model-improvement and results will provide insights into model capabilities to reproduce treatments and crops. Further, the question of error propagation along the transient simulation of crop rotations will be addressed.

Building modelling capacity for livestock systems: progress in LiveM

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MACSUR provides an opportunity to connect disparate research groups and disciplines in livestock and grassland modelling. Within the livestock theme (LiveM) of MACSUR, grassland modelling capabilities have been significantly improved through joint modelling exercises, and grassland modellers have exploited their methodological overlaps with CropM to make important contributions to regional pilot studies. Animal health researchers have been contributing to the southern regional pilot, and modelling resources have been identified for livestock systems at the animal and farm-scales. Here, the priorities for the next steps for livestock and grassland modelling are discussed, and for the role of MACSUR in addressing the challenges facing the sector. While crop and grassland modelling deals with primary production, livestock modelling examines the complexity of secondary production. The unique position of livestock modelling presents challenges and opportunities. The diversity of livestock models (in scale and approach) makes model inter-comparisons and collaborative work challenging, while the range of variables involved in livestock systems provide many opportunities for increasing systemic efficiency and robustness to the impacts of climate change. Closer integration of experimental research and modelling