



Informing agricultural management – The challenge of modelling grassland phenology

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Grasslands represent roughly 70% of the agricultural land worldwide, are the backbone of animal husbandry and contribute substantially to agricultural income. At the farm scale a proper management of meadows and pastures is necessary to attain a balance between forage production and consumption. A good hold on grassland phenology is of paramount importance in this context, because forage quantity and quality critically depend on the developmental stage of the sward. Traditionally, empirical rules have been used to advise farmers in this respect. Yet the provision of supporting information for decision making would clearly benefit from dedicated tools that integrate reliable models of grassland phenology.

As with annual crops, in process-based models grassland phenology is usually described as a linear function of so-called growing degree days, whereby data from field trials and monitoring networks are used to calibrate the relevant parameters. It is shown in this contribution that while the approach can provide reasonable estimates of key developmental stages in an average sense, it fails to account for the variability observed in managed grasslands across sites and years, in particular concerning the start of the growing season. The analysis rests on recent data from western Switzerland, which serve as a benchmark for simulations carried out with grassland models of increasing complexity. Reasons for an unsatisfactory model performance and possibilities to improve current models are discussed, including the necessity to better account for species composition, late season management decisions, as well as plant physiological processes taking place during the winter season. The need to compile existing, and collect new data doe managed grasslands is also stressed.