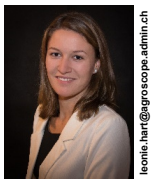
28th General Meeting of the European Grassland Federation

Reliable biomass estimates of multispecies grassland using a rising plate meter



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Introduction

Rising plate meters (RPM) are a powerful and easy-to-use tool for quantifying the available forage on pastures.

Today, semi-automated systems convert compressed sward height measurements into a biomass estimate in real-time and even georeferenced. However, species-rich pastures can contain very heterogeneous biomass.

Hypothesis

Only one standard conversion equation, such as the one defined by Murphy *et al.* (2019), does not allow for adequate prediction of standing biomass in different type of grasslands.

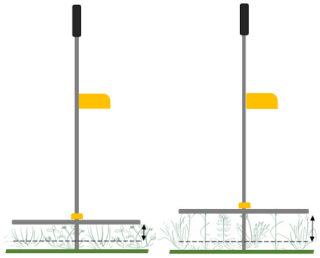


Figure 1. Sketches of Grasshopper® RPMs measuring two contrasting grasslands. Arrows indicate the considered compressed sward height.

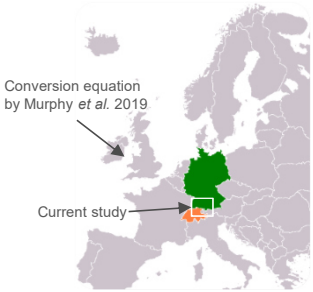
Aim

The effect of the botanical composition on the conversion equation for an RPM was studied.

Material and Methods

Field experiments in Southern Germany and Switzerland in 2019:

- 38 permanent multispecies grasslands at 15 sites
- Compressed sward height measured by using the Grasshopper®
- 3 to 5 measurements within sampling frame prior to and post cutting
- Botanical classification of all herbage samples (n = 1142)
- Reference method: Cutting and oven-drying to determine biomass as kg of dry matter per ha
- Linear regression analysis



Results

- Conversion equations of clover-rich grasslands and herb-rich grasslands with rigid plant material differ most.
- Herb-rich grasslands with rigid plant material were less densely compactable by the RPM. This needs to be considered in conversion equation development and real-time conversion via semi-automated RPMs.
- Ryegrass-based swards were in agreement with the Irish conversion equation (Murphy *et al.* 2019) that was based on sown perennial ryegrass.

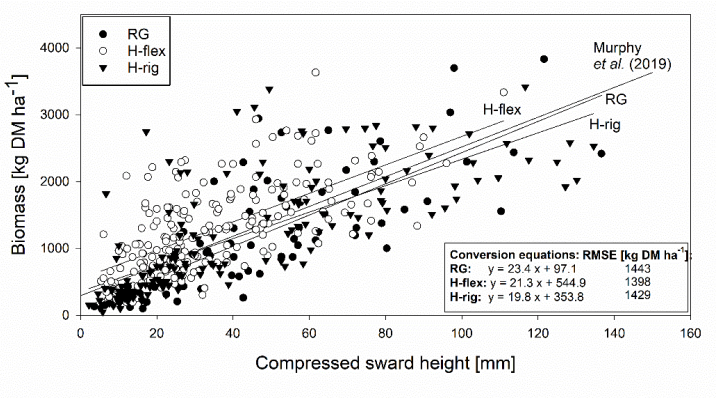


Figure 2. Linear regressions between compressed sward height (x) and dry herbaceous biomass (y). Symbols differentiate between ryegrass-based (RG), clover-rich (H-flex) and herb-rich swards with rigid plant material (H-rig).

Outlook

Studying seasonal and regional effects on the compressed sward height to biomass conversion as well as developing and validating specific conversion equations.

Conclusion

A standard calibration for estimating above-ground plant biomass from compacted sward height that was developed for homogenous ryegrass-based grasslands is not suitable for clover- and herb-rich permanent grasslands.

Biomass on herb-rich grasslands with rigid plant material is highly overestimated by only considering this standard calibration as compared to clover-rich grasslands with their less rigid biomass.

Reference:
Murphy, D., B. O`Brien, M. S. Askari, T. McCarthy, A. Magee, R. Burke, and M. Murphy. 2019. GrassQ - A holistic precision grass measurement and analysis system to optimize pasture based livestock production. ASABE 2019 Annual International Meeting.

Cooperating institutions:

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