

Ultrasonic sensing of sward height in different grassland species and species mixtures and its relationship to sward biomass and other sward parameters

Interdisziplinäres Projekt

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Abstract

The results of this study show that there is a positive linear relationship between sward mass and sward height measured with an ultrasonic sensor in different grassland swards over a whole growing season. This relationship becomes closer if the individual growth periods are regarded separately. It was outlined that overgrown swards have different structures that affect the relationship between sward mass and ultrasonic sward height, so that the correlation was highest when only sample dates of similar growth stages were pooled together. These periods of similar growth stages before a certain cut correspond to the growth periods that are common in practice.

For the first time ultrasonic sward height measurements were carried out in defined single-species swards and mixtures of these species. The different species characteristics such as leaf orientation (planophile or erectophile) and growth performance throughout the growing season result in slightly different regressions. The regression analyses of the pure swards showed, however, only weak relationships. The best results were obtained for the mixed swards and for the practice-related pooled data sets "white" composed of white clover and ryegrass and "red" composed of red clover and ryegrass.

The influence of other sward parameters on the relationship between sward mass and sward height such as legume and weeds content was investigated but could only be proved for certain combinations of experimental variant and sample period. A general significant influence of either legume or weeds content for all variants and sample periods could not be shown.

For practical applications the use of a simple linear regression with only sward mass and sward height as variables would be best for a range of grassland swards. Furthermore different equations should be applied for different growth periods (before a cut) and species mixtures dependent on the clover component.

There is, however, still a lot of research necessary, especially in the implementation of the ultrasonic field measurement system on a tractor and the validation of the findings of this study in trials for several years.