Productivity in patches of heterogeneous swards of continuous cattle pastures

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INTRODUCTION

In low-intensity grazing systems “patch grazing” leads to a mosaic structure of frequently and infrequently defoliated patches due to the animal preference for young plant material. We analyzed the productivity of three different patch types which are expected to vary in their productivities.

Hypotheses

1. **Short patches are more productive than tall patches!?**
2. **Grazing intensity influences the productivity of the patch types!?**

MATERIALS UND METHODES

Field experiment (Continuous cattle pasture):

Experimental design

Factor	Level
1. Grazing intensity	1.1 Moderate (6 cm CSH*) 1.2 Lenient (12 cm CSH) 1.3 Very lenient (18 cm CSH)
2. Patch type**	2.1 Short 2.2 Medium 2.3 Tall
Number of replications:	3
Number of paddocks:	9 à 1 ha
Measurements:	Compressed Sward Height (CSH), aboveground biomass (g m^{-2})
Statistical analyses:	ANOVA, Tukey test

Productivity measurement

1. CSH measurement in growth cages (temporary exclosures):	❑ From April to October 2013 ❑ 1 cage (2*1 m) per patch type and paddock each ❑ Repeated cage re-placement ❑ 6 periods (24 to 40 days) ❑ Measurement of CSH on two squares (0.25 m^2 each) consiting of 4 Rising-Plate-Meter-Measurements each before and after each growing period
2. Calibration of CSH und abovegroung biomass:	❑ Harvest of aboveground plant material on 5 dates from April to October 2013 on two squares (0.25 m^2 each) per paddock and patch type
3. Prediction of standing biomass :	❑ Models based on linear regression for each combination of block and date (r^2= 0.7054)
4. Annual growth rate:	❑ Sum of all (positive) differences of aboveground biomass between two measurement dates

**Compressed Sward Height, ** Definition of patch types (sward heights): short (<0.33 quantile of sward height measurements), medium (middle quantile) and tall (>0.67 quantile)*

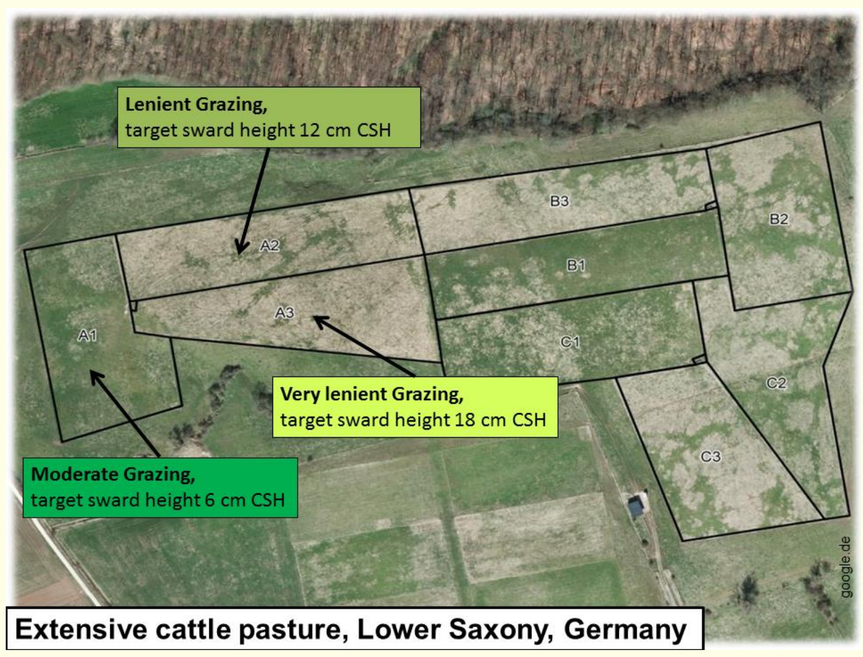

Fig 1. Overview and design of the experimental area. Grazing intensities: moderate (target sward height 6 cm Compressed Sward Height), lenient (12 cm CSH), very lenient (18 cm CSH).

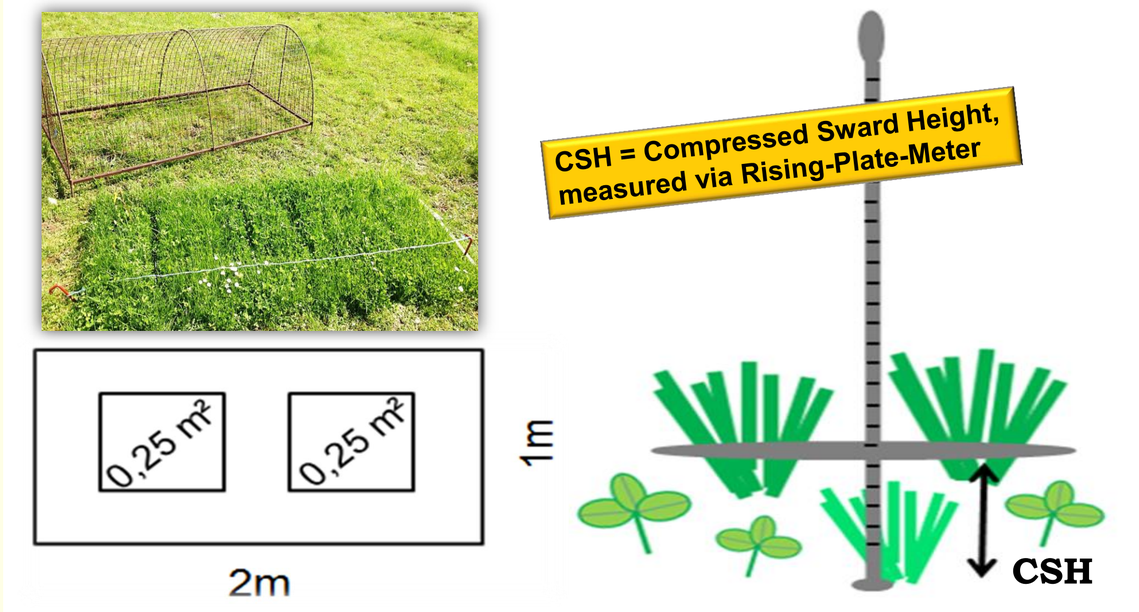

Fig 2. One growth cage (2*1 m) per patch type and paddock each (left). Measurement of Compressed Sward Height before and after each growing period on two squares (0.25 m^2 each) consiting of four Rising-Plate-Meter measurements each (right).

RESULTS

Hypothesis 1	Hypothesis 2
No, different patch types vary in their producivities, but:	**Yes**, due to different grazing intensities the patch types do vary in their productivities:
Tall > medium > short *(p = 0.001)*	**Moderate > lenient / very lenient** *(p = 0.025)*

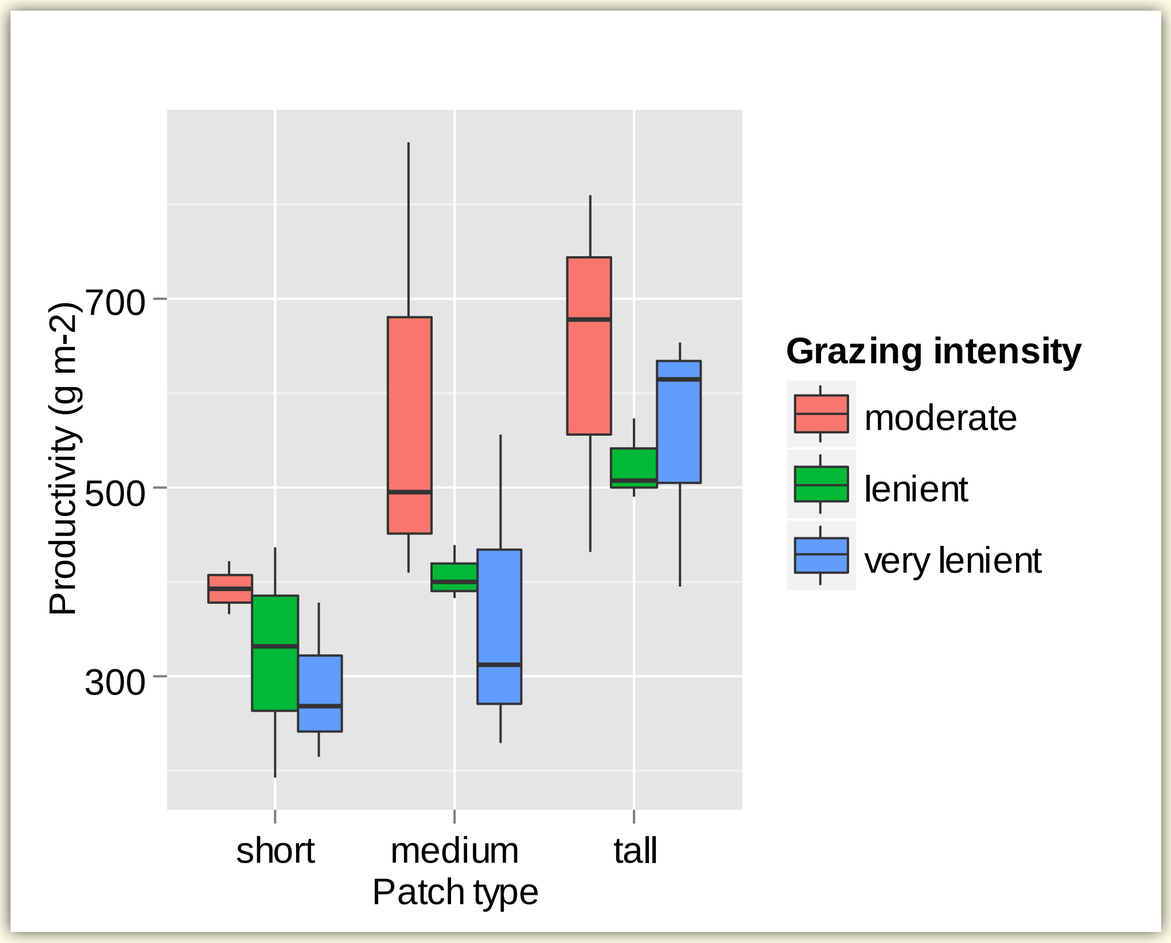

Fig 3. Productivity of aboveground biomass (g m^{-2}) of different patch types and grazing intensities from April 19th - October 30th 2013.

Conclusion

The results indicate that patch grazing leads to long-term nutrient re-distribution from short to tall patches.

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