The Effect of Kurzrasen and Strip-Grazing on Grassland Performance and Soil Quality of a Peat Meadow

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Supplementary Material

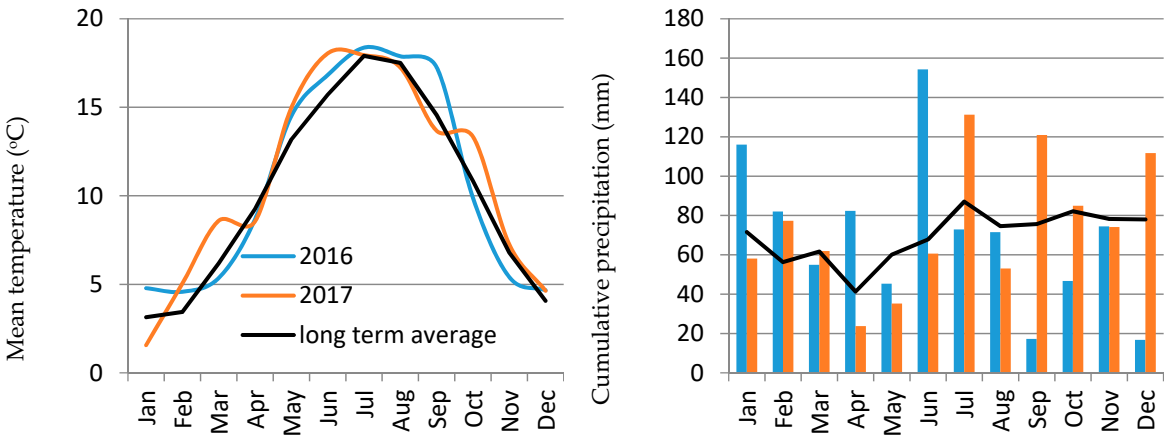

Figure S1. Mean monthly temperature and precipitation in 2016 and 2017 compared to the long term average (since 1980) for KTC Zegveld (KNMI weather station De Bilt).

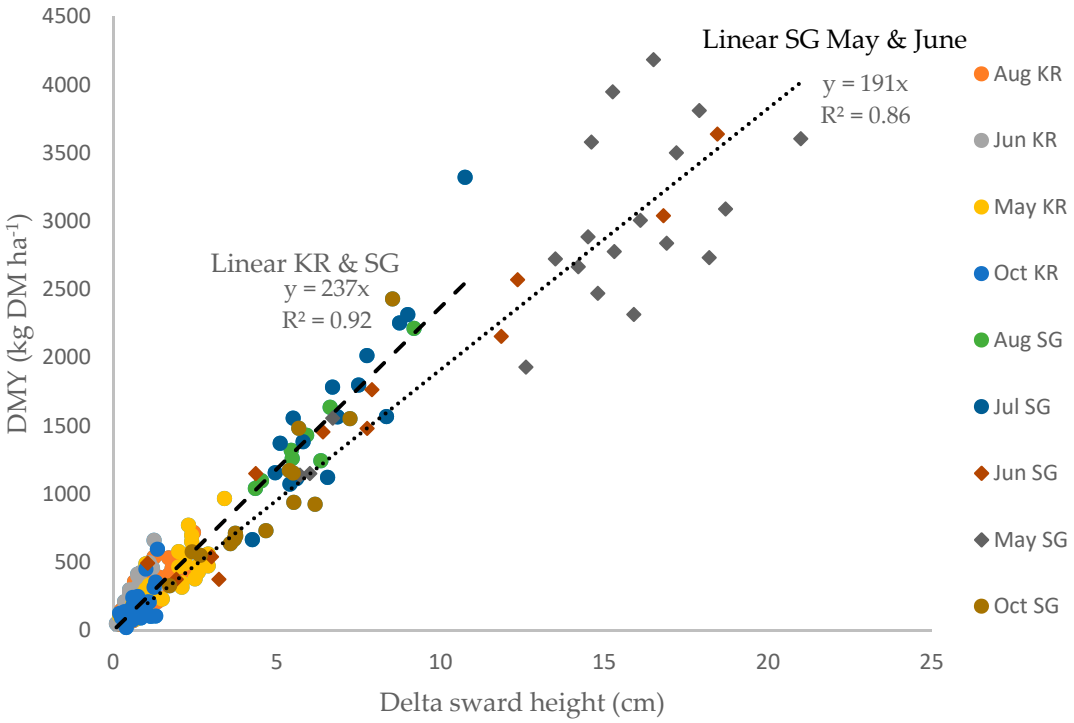

Figure S2. The correlation between sward height before and after cutting (delta sward height, cm) as measured with a Jenquip folding plate meter, and the DMY of the cut herbage in strips of appr. 0.5 × 4

m. We used multiple regression analyses to determine the calibration factor as a function of month and grazing system. The final model consisted of a single conversion factor for kurzrasen (KR) and strip-grazing (SG) for all months, except during May and June. During these two months, the conversion factor was significantly lower for SG, due to the generative growth.

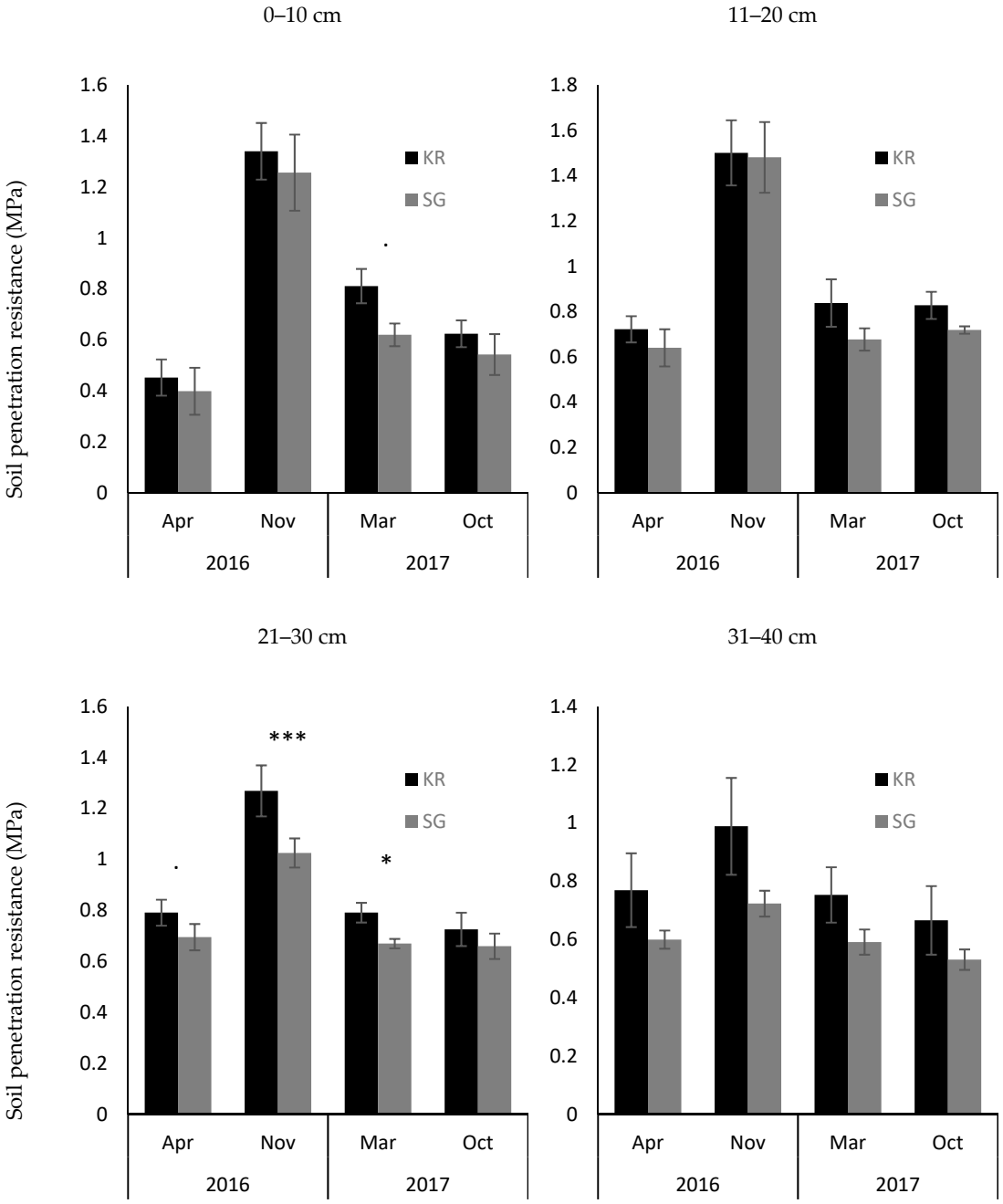

Figure S3. The penetration resistance (MPa) for the kurzrasen and strip-grazing systems during 2016 and 2017 at 0–10, 11–20, 21–30 and 31–40 cm soil depth. Error bar = 2SE, n = 4. Significant differences or trends between the grazing systems are denoted by · = P < 0.1; * = P < 0.05; ** = P < 0.01; *** = P < 0.001

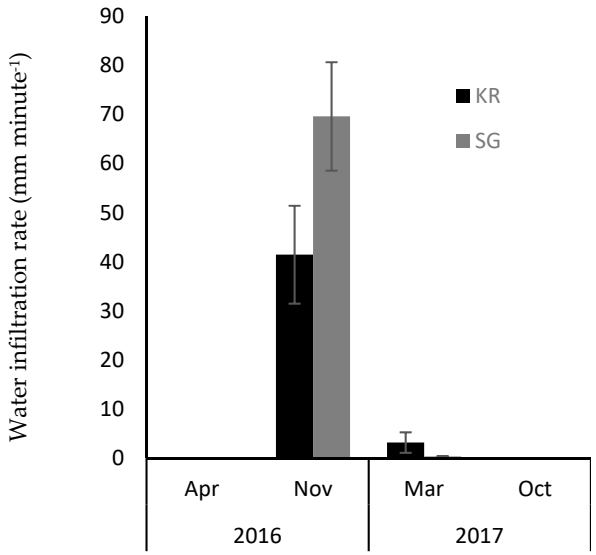

Figure S4. Water infiltration rate (mm minute^{-1}) for the kurzrasen (KR) and strip-grazing (SG) systems during 2016 and 2017. Error bars = 2SE, n = 4.

Table S1. Mean percentage of desirable grasses and dicots in the sward in April and December 2016 and October 2017 for kurzrasen en strip-grazing treatments (n = 2, SD in parentheses)

		2016				2017	
Species	**System**	**Apr**		**Dec**		**Oct**	
Desirable grasses	KR	67.5	(6.5)	54.0	(3.0)	51.5	(0.5)
	SG	78.0	(4)	65.3	(4.3)	65.0	(3.0)
Dicots	KR	0.0	(0)	0.5	(0.5)	4.3	(0.8)
	SG	0.8	(0.8)	1.5	(0.5)	3.0	(2.0)

Table S2a. Correlation matrix showing the r and p-values (.p < 0.1; *p < 0.05; **p < 0.01; ***p< 0.001) of the correlations between sward and soil characteristics during the measuring periods in 2016 (n=8).

	Load bearing capacity	Root density 10 cm	Root density 20 cm	Soil moisture content	Sward density	Penetration resistance 0-10 cm	Penetration resistance 11-20 cm	Penetration resistance 21-30 cm	Penetration resistance 31-40 cm
April 2016									
Root density 10 cm	0.01								
Root density 20 cm	0.28	*0.71·*							
Soil moisture content	0.44	0.41	0.54						
Penetration resistance 0-10 cm	0.14	0.03	0.39	−0.03					
Penetration resistance 11-20 cm	−0.15	−0.42	−0.19	−0.45		**0.78***			
Penetration resistance 21-30 cm	0.14	−0.44	0.03	−0.47		*0.67·*	**0.80***		
Penetration resistance 31-40 cm	0.40	−0.17	0.29	−0.35		0.30	0.20	*0.71·*	
May 2016									
Soil moisture content	**−0.82***								
July 2016									
Soil moisture content	**−0.91****								
Sward density	**0.74***			**−0.78***					
September 2016									
Soil moisture content	−0.06								
Sward density	0.27			**−0.79***					
November 2016									
Root density 10 cm	0.34								
Root density 20 cm	0.34	0.28							
Soil moisture content	−0.47	−0.19	0.15						
Sward density	0.65.	0.58	−0.14	−0.28					
Penetration resistance 0-10 cm	0.51	0.26	0.24	0.4	0.41				
Penetration resistance 11-20 cm	0.42	−0.17	−0.01	0.02	0.11	0.72			
Penetration resistance 21-30 cm	**0.82***	0.41	0.51	−0.15	*0.67·*	0.26	−0.11		
Penetration resistance 31-40 cm	*0.81·*	0.37	0.56	−0.17	0.56	0.17	−0.22	**0.94***	
Water infiltration rate	**−0.94***	−0.35	−0.39	0.34	*−0.70·*	−0.56	−0.43	**−0.78***	**−0.74***

Table S2b. Correlation matrix showing the r and p-values (·**p** < 0.1; *p < 0.05; **p < 0.01; ***p< 0.001) of the correlations between sward and soil characteristics during the measuring periods in 2017 (n = 8).

	Load bearing capacity	Root density 10 cm	Root density 20 cm	Soil moisture content	Sward density	Penetration resistance 0–10 cm	Penetration resistance 11–20 cm	Penetration resistance 21–30 cm	Penetration resistance 31–40 cm
March 2017									
Root density 10 cm	−0.43								
Root density 20 cm	−0.21	**0.75***							
Soil moisture content	**−0.74***	*0.63*·	0.58						
Sward density	0.60	−0.26	−0.37	−0.42					
Penetration resistance 0-10 cm	*0.71*·	*−0.70*·	*−0.72*·	**−0.86***	0.58				
Penetration resistance 11-20 cm	0.46	**−0.85***	**−0.84***	**−0.83***	0.41	**0.91****			
Penetration resistance 21-30 cm	**0.73***	**−0.76***	−0.43	**−0.84***	0.22	**0.83***	**0.80***		
Penetration resistance 31-40 cm	**0.84***	−0.12	0.13	−0.54	0.15	0.38	0.10	0.57	
Water infiltration rate	*0.64*·	−0.57	*−0.68*·	**−0.89***	**0.73***	**0.87***	**0.84***	*0.64*·	0.27
May 2017									
Soil moisture content	0.15								
Sward density	0			−0.55					
July 2017									
Soil moisture content	−0.48								
Sward density	**0.79***			**−0.86****					
September 2017									
Soil moisture content	0.12								
Sward density	−0.12			−0.19					
October 2017									
Root density 10 cm	−0.13								
Root density 20 cm	−0.42	**0.74***							
Soil moisture content	**−0.76***	0.53	0.42						
Sward density[1]	*0.70*·	−0.49	−0.45	*−0.64*·					
Penetration resistance 0-10 cm	0.26	−0.36	−0.36	−0.43	0.20				
Penetration resistance 11-20 cm	0.46	−0.30	−0.21	**−0.75***	0.26	**0.72***			
Penetration resistance 21-30 cm	0.31	−0.05	0.29	−0.38	0.55	−0.37	0.10		
Penetration resistance 31-40 cm	*0.64*·	−0.22	−0.17	−0.45	**0.90****	−0.09	−0.01	**0.72***	

[1]For sward density correlations, sward density values from September 2017 were used