

Table S1. Overview of plant species (grasses, legumes and herbs) cover (%) found per field and mean young (m Y) and old (m O) grasslands.

<i>Farm No.</i>	<i>Age class</i>	<i>Lolium perenne</i>	<i>Phleum pratense</i>	<i>Poa trivialis</i>	<i>Poa pratensis</i>	<i>Elymus repens</i>	<i>Holcus lanatus</i>	<i>Alopecurus pratensis</i>	<i>Alopecurus geniculatus</i>	<i>Agrostis stolonifera</i>	<i>Poa annua</i>	<i>Trifolium repens</i>	<i>Ranunculus repens</i>	<i>Persicaria maculosa</i>	<i>Taraxacum officinale</i>	<i>Rumex acetosella</i>	<i>Rumex obtusifolius</i>	<i>Stellaria media</i>
1	O	87	0	4	1	5	0	0	0	0	0	2	0	0	0	0	0	1
1	Y	93	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0
2	O	87	0	1	0	1	0	0	0	0	0	1	10	0	0	0	0	0
2	Y	94	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0
3	O	72	0	8	0	3	10	0	0	0	0	0	1	0	0	6	0	0
3	Y	97	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0
4	O	78	0	15	0	0	0	0	0	0	0	0	0	0	4	2	1	0
4	Y	97	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0
5	O	90	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Y	85	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	O	73	8	15	1	0	0	0	0	1	0	1	0	0	1	0	0	0
6	Y	65	4	25	2	0	0	0	0	2	0	2	0	0	0	0	0	0
7	O	80	5	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Y	71	3	15	8	0	0	0	0	0	1	1	0	0	0	0	0	1
8	O	35	25	30	9	0	0	0	0	0	1	0	0	0	0	0	0	0
8	Y	79	8	7	0	0	0	5	0	0	0	1	0	0	0	0	0	0
9	O	95	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Y	90	2	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0
10	O	92	0	5	2	0	0	0	1	0	0	0	0	0	0	0	0	0
10	Y	71	12	14	2	0	0	0	0	0	0	0	0	0	0	0	1	0
<i>m Y</i>		84	3	9	2	1	0	1	0	0	0	1	0	0	0	0	0	0
<i>m O</i>		79	4	10	1	1	1	0	0	0	0	0	1	0	1	1	0	0

Table S2. Pearson's correlations (r; n=20) between topsoil quality parameters for all grasslands, parameters are described in Table 1.

	SOM	C _{total}	C % of SOM	HWC	N _{total}	C:N -ratio	PMN	Ca _{total}	pH _{kcl}	SWC	Grass age	Clay	Silt
Soil organic matter (SOM)	--												
C _{total}	0.99**	--											
C percentage of SOM	0.82**	0.88**	--										
Hot-water extractable C(HWC)	0.97**	0.98**	0.90**	--									
N _{total}	0.99**	1.00**	0.87**	0.98**	--								
C:N-ratio	0.73**	0.74**	0.74**	0.71**	0.69**	--							
Potentially mineralizable N (PMN)	0.88**	0.90**	0.86**	0.90**	0.88**	0.81**	--						
Ca _{total}	-0.24	-0.30	-0.44	-0.30	-0.31	-0.18	-0.31	--					
pH _{kcl}	-0.22	-0.20	0.02	-0.20	-0.23	0.21	0.12	-0.04	--				
Soil water content (SWC)	0.82**	0.82**	0.72**	0.83**	0.81**	0.64**	0.75**	-0.14	-0.07	--			
Grass age	0.51*	0.54*	0.61**	0.58**	0.53*	0.53*	0.62**	0.03	-0.18	0.52*	--		
Clay (% part. < 2 µm)	0.42	0.33	-0.04	0.26	0.33	0.24	0.19	0.30	-0.22	0.25	-0.09	--	
Silt (% part. 2–50 µm)	0.46*	0.43	0.20	0.42	0.46*	0.04	0.24	-0.32	-0.54*	0.36	0.04	0.24	--
Sand (% part. > 50 µm)	-0.54*	-0.46*	-0.07	-0.40	-0.47*	-0.21	-0.26	-0.07	0.42	-0.37	0.05	-0.88**	-0.66**

*, 0.01 < P < 0.05; **, P < 0.01

Table S3. Overview of Pearson's correlations (r) between grass productivity parameters and topsoil (0-10 cm) parameters for all (n=20), young (n=10) and old (n=10) grasslands. Grass productivity parameters are described in Figure 1, topsoil parameters in Table 1. NSC: nitrogen supply capacity: calculated from N_{total} , corrected for grassland age according to the formulas of the Dutch grassland fertilization guideline based on Hassink [34].

	DMY _{N0}			DMY-res.			NY _{N0}			NY-res.		
	all	young	old	all	young	Old	all	young	old	all	young	old
DMY _{N0}	---	---	---									
DMY-res.	-0.76**	-0.83**	-0.55	---	---	---						
NY _{N0}	0.93**	0.96**	0.79**	-0.82**	-0.91**	-0.57	---	---	---			
NY-res.	0.03	0.26	-0.06	0.40	0.27	0.50	-0.01	0.06	0.16	---	---	---
Soil organic matter (SOM)	0.65 **	0.60	0.64 *	-0.78 **	-0.86 **	-0.60	0.75 **	0.74 *	0.68 *	-0.29	-0.38	-0.04
C _{total}	0.67 **	0.64 *	0.63 *	-0.77 **	-0.85 **	-0.64 *	0.77 **	0.77 *	0.67 *	-0.30	-0.32	-0.11
C percentage of SOM	0.66 **	0.69 *	0.43	-0.64 **	-0.67 *	-0.57	0.71 **	0.72 *	0.44	-0.25	-0.00	-0.37
Hot-water extr. C (HWC)	0.67 **	0.67 *	0.52	-0.76 **	-0.82 **	-0.65 *	0.77 **	0.78 **	0.63	-0.26	-0.24	-0.08
N _{total}	0.70 **	0.68 *	0.63	-0.79 **	-0.87 **	-0.64 *	0.80 **	0.80 **	0.72 *	-0.28	-0.30	-0.10
N supply capacity (NSC)	0.71**	0.70*	0.63	-0.81**	-0.89**	-0.64*	0.81**	0.82**	0.72*	-0.27	-0.31	-0.10
C:N-ratio	0.29	0.12	0.29	-0.46 *	-0.45	-0.35	0.30	0.22	-0.03	-0.38	-0.41	-0.22
Pot. Min. N (PMN)	0.55 *	0.48	0.52	-0.62 **	-0.59	-0.66 *	0.60 **	0.57	0.36	-0.32	-0.13	-0.36
Soil water content (SWC)	0.67 **	0.67 *	0.61	-0.78 **	-0.75 *	-0.83 **	0.72 **	0.72 **	0.69 *	-0.14	0.01	-0.05
Ca _{total}	-0.32	-0.52	-0.20	0.42	0.30	0.68*	-0.29	-0.51	-0.14	0.30	-0.12	0.61
Silt (% particles 2 - 50 μm)	0.34	0.30	0.62	-0.43	-0.46	-0.53	0.39	0.42	0.74*	0.04	-0.56	0.28
Sand (% particles < 50 μm)	-0.28	-0.15	-0.67*	0.44	0.63*	0.39	-0.29	-0.29	-0.63	0.13	0.72*	-0.12

*: 0.01 < P < 0.05; **: P < 0.01