

1 **S1 Appendix**

2 Botanical composition of the herbage in all harvested plots was determined in 200-500 g
3 subsamples by hand-separation into individual species and dried at 80°C to constant dry weight.
4 Moreover, 80-100 g of each sown species was collected from the harvested material in spring
5 and August cuts in the 12-mix cut-only plots in 2007-2009 and oven-dried at 60°C.

6 **Table A.** Quarterly mean air temperature and precipitation over the experimental years.

7

| | 2007 | | 2008 | | 2009 | | 2010 | |
|---------|------|-----|------|-----|------|-----|------|-----|
| | °C | mm | °C | mm | °C | mm | °C | mm |
| Jan-Mar | 3.8 | 189 | 3.6 | 200 | 1.5 | 108 | -1.5 | 54 |
| Apr-Jun | 11.7 | 118 | 11.0 | 100 | 11.2 | 137 | 9.5 | 109 |
| Jul-Sep | 14.5 | 239 | 15.1 | 248 | 15.4 | 184 | 15.0 | 248 |
| Oct-Dec | 5.2 | 120 | 5.2 | 193 | 4.6 | 230 | 1.6 | 184 |

8

9 **Table B.** Summary of statistics for linear mixed-effects models.

| Model A ¹ | | Mix | Age | Slurry | Mix *Age | Mix *Slurry | Age*Slurry | Mix*Age*Slurry |
|-------------------------------------|-----------------------------|-----|-----|--------|----------|-------------|------------|----------------|
| Annual yield (t ha ⁻¹) | | *** | *** | *** | *** | NS | ** | * |
| Botanical composition (%) | Grass | *** | *** | *** | *** | NS | ** | NS |
| | Legume | *** | *** | *** | *** | NS | NS | NS |
| | Forb | *** | NS | NS | ** | NS | NS | NS |
| | Unsown species | *** | *** | ** | * | NS | *** | NS |
| Model B ² | | Mix | Age | Slurry | C/G | Mix*C/G | Age*C/G | Slurry*C/G |
| Yield per cut (t ha ⁻¹) | | NS | *** | ** | * | NS | NS | NS |
| Botanical composition (%) | Grass | *** | NS | *** | *** | * | *** | NS |
| | Legume | ** | * | *** | *** | NS | *** | NS |
| | Forb | * | * | NS | *** | *** | *** | NS |
| | Unsown species ³ | *** | * | NS | ** | NA | NA | NA |

10 ¹Model A refers to the linear mixed-effects model, which was used to examine the main and
 11 interactive effects of species diversity (Mix), grassland age (Age) and slurry application (Slurry)
 12 on annual yield and botanical composition of grass, legume and forb under the cutting regime.

13 ²Model B refers to the linear mixed-effects model, which was used to examine the main and
 14 interactive effects of species diversity (Mix), grassland age (Age), slurry application (Slurry) and
 15 cutting vs. grazing (C/G) on yield per cut and botanical composition of grass, legume and forb.

16 ³Unsown species, the Kruskal-Wallis test was conducted to analyze the effect of species
 17 diversity, grassland age, slurry application and defoliation (cutting or grazing) on botanical
 18 composition of unsown species, because the data of unsown species violated the normal
 19 distribution assumption even after log or squared transformation. *** $P < 0.001$; ** $P < 0.01$; P
 20 < 0.05 ; NS, not significant; NA, not applicable.

21 **Table C.** Botanical composition (% of DM) of three mixtures under cutting treatment with and without slurry application.

| Mix | Age | White clover | | Red clover | | Lucerne | | Birdsfoot trefoil | | Chicory | | Plantain | | Caraway | | Burnet | |
|------------|-----|--------------|------|------------|------|---------|------|-------------------|------|---------|------|----------|------|---------|------|--------|------|
| | | 0 N | 200N | 0 N | 200N | 0 N | 200N | 0 N | 200N | 0 N | 200N | 0 N | 200N | 0 N | 200N | 0 N | 200N |
| 3-mix | 1 | 22.9 | 15.1 | 35.8 | 21.6 | | | | | | | | | | | | |
| | 2 | 26.7 | 18.4 | 35.7 | 25.6 | | | | | | | | | | | | |
| | 3 | 28.7 | 25.6 | 19.3 | 13.5 | | | | | | | | | | | | |
| | 4 | 30.2 | 18.0 | 11.2 | 7.8 | | | | | | | | | | | | |
| 10-mix | 1 | 17.9 | 12.0 | 34.0 | 19.9 | | | 1.2 | 0.44 | 6.3 | 7.8 | 19.3 | 17.6 | 0.8 | 2.5 | 0.50 | 0.25 |
| | 2 | 23.8 | 14.5 | 31.1 | 25.4 | | | 0.29 | 0.08 | 9.9 | 11.1 | 9.1 | 6.3 | 4.7 | 7.1 | 0.04 | 0.07 |
| | 3 | 24.6 | 15.8 | 15.4 | 11.0 | | | 0.36 | 0.01 | 10.1 | 14.3 | 6.9 | 3.9 | 15.4 | 11.2 | 0.00 | 0.02 |
| | 4 | 25.6 | 15.4 | 7.9 | 7.7 | | | 0.10 | 0.00 | 6.0 | 8.4 | 10.6 | 2.3 | 8.4 | 17.7 | 0.02 | 0.00 |
| 12-mix | 1 | 15.2 | 8.0 | 13.7 | 8.7 | 19.0 | 9.8 | 0.98 | 0.35 | 6.0 | 6.7 | 16.3 | 12.7 | 1.3 | 2.4 | 0.43 | 0.91 |
| | 2 | 14.6 | 10.1 | 11.2 | 7.6 | 39.4 | 28.3 | 0.18 | 0.16 | 5.4 | 8.1 | 5.5 | 3.8 | 2.6 | 4.3 | 0.07 | 0.13 |
| | 3 | 4.0 | 6.0 | 4.7 | 2.8 | 65.2 | 40.7 | 0.03 | 0.00 | 1.7 | 7.4 | 2.9 | 2.0 | 6.6 | 11.9 | 0.16 | 0.09 |
| | 4 | 7.2 | 5.4 | 2.1 | 2.1 | 53.0 | 39.0 | 0.16 | 0.00 | 1.9 | 7.8 | 4.9 | 1.4 | 9.6 | 9.7 | 0.19 | 0.00 |
| Slurry | | *** | | *** | | * | | * | | * | | ** | | * | | NS | |
| Mix | | *** | | *** | | NA | | NS | | ** | | *** | | NS | | NS | |
| Age | | * | | *** | | *** | | * | | NS | | *** | | *** | | * | |
| Slurry*Mix | | NS | | NS | | NA | | NS | | NS | | NS | | NS | | NS | |
| Slurry*Age | | NS | | NS | | NS | | NS | | NS | | ** | | NS | | NS | |
| Mix*Age | | *** | | NS | | NA | | NS | | * | | * | | NS | | NS | |

22 Significance of main effects and interactions: ***P<0.001; **P<0.01; P<0.05; NS: not significant; NA: not applicable.

23 **Table D.** Botanical composition (% of DM) of three mixtures under cutting (C) and grazing (G) management.

| Mix | Age | White clover | | Red clover | | Lucerne | | Birdsfoot trefoil | | Chicory | | Plantain | | Caraway | | Salad burnet | |
|------------|-----|--------------|------|------------|------|---------|-----|-------------------|-----|---------|------|----------|------|---------|-----|--------------|-----|
| | | C | G | C | G | C | G | C | G | C | G | C | G | C | G | C | G |
| 3-mix | 1 | 17.1 | 18.3 | 37.2 | 32.7 | | | | | | | | | | | | |
| | 2 | 21.2 | 29.7 | 40.0 | 10.4 | | | | | | | | | | | | |
| | 3 | 25.1 | 26.8 | 23.4 | 3.0 | | | | | | | | | | | | |
| 10-mix | 1 | 11.6 | 14.3 | 33.4 | 24.4 | | | 1.3 | 0.9 | 7.6 | 10.3 | 20.7 | 13.2 | 1.2 | 1.0 | 0.5 | 0.6 |
| | 2 | 15.9 | 21.7 | 36.6 | 12.9 | | | 0.2 | 0.2 | 9.4 | 5.1 | 8.5 | 2.7 | 6.6 | 2.6 | 0.1 | 0.1 |
| | 3 | 19.7 | 18.4 | 20.5 | 2.4 | | | 0.6 | 0.0 | 6.2 | 1.4 | 5.7 | 0.6 | 15.7 | 4.2 | 0.1 | 0.0 |
| 12-mix | 1 | 8.9 | 12.3 | 15.7 | 18.4 | 18.3 | 6.4 | 0.9 | 1.4 | 6.3 | 9.1 | 15.4 | 12.1 | 0.9 | 0.7 | 0.7 | 0.2 |
| | 2 | 9.8 | 20.3 | 10.5 | 7.5 | 37.3 | 0.8 | 0.2 | 0.9 | 5.8 | 8.3 | 5.7 | 3.0 | 4.0 | 4.1 | 0.2 | 0.4 |
| | 3 | 6.5 | 19.3 | 6.9 | 2.1 | 42.7 | 0.2 | 0.1 | 0.1 | 3.0 | 3.5 | 3.7 | 0.7 | 9.7 | 4.1 | 0.2 | 0.1 |
| C/G | | ** | | *** | | *** | | NS | | NS | | *** | | *** | | NS | |
| Mix | | *** | | *** | | NA | | NS | | NS | | ** | | NS | | NS | |
| Slurry | | ** | | *** | | NS | | ** | | NS | | ** | | ** | | NS | |
| Age | | ** | | *** | | NS | | ** | | *** | | *** | | *** | | NS | |
| C/G*Mix | | NS | | * | | NA | | ** | | * | | * | | * | | NS | |
| C/G*Slurry | | NS | | NS | | NS | | NS | | NS | | NS | | * | | NS | |
| C/G*Age | | NS | | *** | | *** | | NS | | ** | | NS | | *** | | NS | |

24 Significance of main effects and interactions: ***P<0.001; **P<0.01; P<0.05; NS: not significant; NA: not applicable.

25 **Table E.** Nutritive value of the single species and the functional groups averaged across slurry application in spring growth and
 26 summer (second) regrowth. IVOMD is shown in g kg⁻¹ OM and the others parameters in g kg⁻¹ DM.

| | Species | | | | | | | | Functional groups | | | Significance Species | | | Significance Functional groups | | |
|---------------|------------------|-------------------|------------------|------------------|------------------|-------------------|-------------------|------------------|-------------------|------------------|-------------------|----------------------|-----|-------|--------------------------------|----|-------|
| | WC ¹ | RC | LU | BT | CI | PL | CA | SB | GR ² | Leg | Forbs | Sp. | N | Sp.*N | Group | N | Gr.*N |
| Spring | | | | | | | | | | | | | | | | | |
| IVOMD | 815 ^b | 790 ^c | 712 ^e | 730 ^d | 842 ^a | 728 ^d | 833 ^a | 610 ^f | 831 ^{Aa} | 764 ^B | 767 ^B | * | NS | NS | * | NS | NS |
| NDF | 219 ^f | 265 ^d | 340 ^b | 267 ^d | 235 ^e | 338 ^b | 277 ^d | 301 ^c | 425 ^{Aa} | 273 ^B | 285 ^B | *** | NS | NS | *** | NS | NS |
| ADF | 193 ^f | 198 ^{ef} | 270 ^a | 219 ^d | 203 ^e | 275 ^a | 236 ^c | 256 ^b | 242 ^{Ac} | 220 ^B | 242 ^A | *** | ** | NS | * | NS | NS |
| ADL | 26 ^d | 24 ^{de} | 48 ^b | 44 ^{bc} | 22 ^e | 55 ^a | 26 ^d | 40 ^c | 18 ^{Bf} | 34 ^A | 35 ^A | *** | NS | NS | *** | NS | NS |
| CP | 213 ^a | 193 ^b | 204 ^b | 221 ^a | 105 ^c | 103 ^{cd} | 100 ^{de} | 97 ^e | 88 ^{Bf} | 208 ^A | 101 ^B | *** | NS | * | *** | NS | NS |
| Ash | 105 ^a | 84 ^c | 88 ^c | 89 ^c | 114 ^b | 89 ^c | 105 ^a | 88 ^c | 62 ^{Cd} | 92 ^B | 100 ^A | *** | *** | NS | *** | NS | NS |
| Summer | | | | | | | | | | | | | | | | | |
| IVOMD | 732 ^b | 704 ^c | 629 ^d | 630 ^d | 684 ^c | 575 ^e | 817 ^a | | 743 ^{Ab} | 677 ^B | 692 ^{AB} | *** | NS | NS | * | NS | NS |
| NDF | 304 ^e | 342 ^d | 402 ^c | 364 ^d | 352 ^d | 466 ^b | 236 ^f | | 517 ^{Aa} | 352 ^B | 351 ^B | *** | NS | NS | *** | NS | NS |
| ADF | 273 ^d | 265 ^d | 335 ^b | 321 ^b | 298 ^c | 370 ^a | 230 ^e | | 320 ^b | 300 | 300 | *** | NS | NS | NS | NS | NS |
| ADL | 49 ^b | 39 ^c | 66 ^a | 71 ^a | 38 ^c | 65 ^a | 30 ^d | | 25 ^{Ce} | 55 ^A | 44 ^B | *** | NS | NS | *** | NS | NS |
| CP | 235 ^a | 193 ^c | 213 ^b | 212 ^b | 134 ^f | 118 ^g | 161 ^e | | 177 ^{Bd} | 213 ^A | 138 ^C | *** | NS | NS | *** | NS | NS |
| Ash | 102 ^d | 87 ^e | 81 ^e | 81 ^e | 133 ^b | 109 ^c | 162 ^a | | 114 ^{Bc} | 88 ^C | 135 ^A | *** | NS | NS | *** | NS | NS |

27 ¹⁾ WC: white clover, RC: red clover, LU: lucerne, BT: birdsfoot trefoil, CI: chicory, PL: plantain, CA: caraway, SB: salad burnet, GR:
 28 grass; ADF: acid detergent fiber, ADL: acid detergent lignin.

29 ²⁾ Grass includes perennial ryegrass and festulolium. Grass is both included in the statistical calculations of species and functional
 30 groups

31 Different capital letters within functional groups indicate significant differences ($P<0.05$)

32 Different lower case letters within species indicate significant differences ($P<0.05$)

33 Significance of main effects and interactions: *** $P<0.001$; ** $P<0.01$; * $P<0.05$; NS: not significant