Supplementary materials

Supplementary Table 1. *Mean alkane, long-chain alcohol (LCOH) and long-chain fatty acid (LCFA) concentrations (mg/kg DM) of the vegetation components consumed by sheep in each month*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Alkanes |  |  | LCOH |  |  |  |  |  | LCFA |  |  |  |  |  |
| Month |  | C27 | C29 | C31 | C20 | C22 | C24 | C26 | C28 | C30 | C20 | C22 | C24 | C26 | C28 | C30 |
|  | *L. chinensis* | 57 | 55 | 89 | 43 | 35 | 111 | 51 | 438 | 189 | 85 | 123 | 218 | 61 | 94 | 106 |
|  | *C. duriuscula* | 21 | 227 | 354 | 33 | 44 | 68 | 138 | 537 | 953 | 299 | 85 | 100 | 102 | 55 | 59 |
| June | *A. scoparia* | 18 | 88 | 90 | 72 | 354 | 673 | 158 | 213 | 213 | 214 | 329 | 318 | 163 | 228 | 103 |
|  | *P. communis* | 48 | 50 | 17 | 61 | 68 | 55 | 195 | 3035 | 3680 | 107 | 92 | 133 | 117 | 215 | 91 |
|  | *S. krylovii* | 65 | 204 | 1692 | 30 | 49 | 35 | 170 | 3831 | 322 | 113 | 120 | 145 | 55 | 153 | 160 |
|  | *T. mongolicum* | 75 | 69 | 51 | 40 | 48 | 52 | 227 | 438 | 468 | 124 | 135 | 175 | 79 | 355 | 321 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | *L. chinensis* | 40 | 120 | 1134 | 23 | 41 | 33 | 123 | 3235 | 209 | 96 | 112 | 126 | 55 | 125 | 117 |
|  | *C. duriuscula* | 18 | 176 | 338 | 38 | 42 | 48 | 88 | 384 | 690 | 325 | 130 | 191 | 47 | 73 | 112 |
| July | *A. scoparia* | 23 | 78 | 75 | 50 | 284 | 608 | 162 | 351 | 266 | 317 | 515 | 461 | 166 | 164 | 90 |
|  | *P. communis* | 34 | 22 | 9 | 63 | 75 | 51 | 209 | 2286 | 2959 | 109 | 91 | 116 | 96 | 117 | 38 |
|  | *S. krylovii* | 17 | 24 | 62 | 35 | 30 | 68 | 55 | 310 | 152 | 99 | 150 | 259 | 69 | 88 | 150 |
|  | *T. mongolicum* | 43 | 98 | 44 | 30 | 38 | 43 | 320 | 557 | 409 | 136 | 215 | 294 | 111 | 316 | 384 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | *L. chinensis* | 14 | 26 | 58 | 21 | 25 | 52 | 33 | 347 | 137 | 117 | 168 | 277 | 82 | 119 | 202 |
|  | *C. duriuscula* | 15 | 149 | 297 | 20 | 24 | 29 | 63 | 351 | 711 | 330 | 146 | 207 | 48 | 73 | 111 |
| August | *A. scoparia* | 60 | 95 | 104 | 121 | 353 | 559 | 144 | 293 | 318 | 257 | 515 | 457 | 152 | 216 | 116 |
|  | *P. communis* | 45 | 79 | 28 | 59 | 71 | 64 | 261 | 2920 | 2094 | 136 | 92 | 120 | 147 | 324 | 175 |
|  | *S. krylovii* | 38 | 136 | 1158 | 28 | 54 | 42 | 164 | 3773 | 339 | 121 | 141 | 151 | 59 | 159 | 191 |
|  | *T. mongolicum* | 57 | 118 | 78 | 26 | 34 | 45 | 340 | 639 | 440 | 160 | 223 | 277 | 99 | 311 | 397 |

Supplementary Table 2. *The faecal alkane, alcohol and fatty acids recovery rates (mean ± SE，n=6) of sheep*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Alkanes | Recovery rate | LCOH | recovery rate | LCFA | Recovery rate |
| C27 | 0.72±0.031 | C20 | 0.71±0.063 | C20 | 0.59±0.010 |
| C29 | 0.76±0.022 | C22 | 0.82±0.054 | C22 | 0.63±0.021 |
| C31 | 0.77±0.021 | C24 | 0.47±0.011 | C24 | 0.70±0.013 |
|  |  | C26 | 0.75±0.012 | C26 | 0.96±0.035 |
|  |  | C28 | 0.82±0.023 | C28 | 1.28±0.042 |
|  |  | C30 | 0.87±0.025 | C30 | 1.09±0.064 |

Supp. Fig. 1 Two-dimensional plot of the first two components from a principle component analysis (PC1 and PC2) of combination of the three markers (e.g. alkanes, long-chain alcohols and long-chain fatty acids) used for diet composition determination in (*a*) June (alkane + LCOH), (*b*) July (alkane+LCOH) and (*c*)August (alkane+LCOH )



(*b*)

(*a*)

(*c*)

Supp. Fig. 1.