

**Table S3. Raw metabolite concentrations from NMR analysis**

RAW metabolite concentrations (mM.kg-1)

|                               | Age       | Young      | Young   | Young   | Young   | Young   | Young   | Young   | Young       | Young       |
|-------------------------------|-----------|------------|---------|---------|---------|---------|---------|---------|-------------|-------------|
|                               | Timepoint | Pre<br>Abx | Pre Abx | Pre Abx | Pre Abx | Pre Abx | Pre Abx | Pre Abx | Post<br>FMT | Post<br>FMT |
| Ethanol                       |           | 41.844     | 63.5166 | 40.7656 | 38.2291 | 41.5772 | 38.5548 | 32.8597 | 56.9137     | 43.0271     |
| Methanol                      |           | 3.2521     | 6.1410  | 3.6632  | 2.4511  | 2.0960  | 4.0370  | 1.9865  | 4.9635      | 3.0999      |
| Aspartate                     |           | 10.351     | 14.0415 | 4.2613  | 6.1437  | 1.8476  | 1.1081  | 1.5593  | 12.2900     | 2.7394      |
| Alanine                       |           | 2.0799     | 11.8468 | 2.7608  | 2.0239  | 1.4632  | 2.2241  | 1.3670  | 4.1385      | 1.8290      |
| Citrulline                    |           | 0.0000     | 8.6027  | 1.7195  | 0.0000  | 2.0506  | 2.2562  | 1.8877  | 2.7074      | 2.7795      |
| Lysine                        |           | 1.1908     | 10.9844 | 1.5219  | 0.0000  | 1.2843  | 0.8838  | 1.0573  | 2.7101      | 1.5620      |
| Leucine                       |           | 0.5901     | 10.0072 | 0.8330  | 0.3284  | 0.0000  | 1.1668  | 1.1668  | 1.6394      | 0.7743      |
| Valine                        |           | 0.6435     | 6.9927  | 0.8731  | 0.5313  | 0.0000  | 0.8651  | 0.2670  | 1.2736      | 0.6915      |
| Tyrosine                      |           | 0.0000     | 7.5107  | 0.9479  | 1.0493  | 0.0000  | 1.0867  | 0.0000  | 1.5513      | 0.9212      |
| Threonine                     |           | 0.0000     | 2.5979  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 1.2576      | 2.3763      |
| Glycine                       |           | 0.9078     | 5.2225  | 0.8304  | 0.9025  | 0.4940  | 0.5527  | 0.5660  | 1.5459      | 0.6595      |
| Isoleucine                    |           | 0.3711     | 4.0744  | 0.4699  | 0.3444  | 0.0000  | 0.4940  | 0.4245  | 1.1801      | 0.6595      |
| Methionine                    |           | 0.3498     | 4.3067  | 0.7983  | 0.6675  | 0.0000  | 0.6168  | 0.3711  | 1.1481      | 0.5340      |
| Glutamine                     |           | 2.8516     | 2.8249  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.0000      |
| Phenylalanine                 |           | 0.0000     | 5.3854  | 0.6114  | 0.0000  | 0.0000  | 0.6408  | 0.0000  | 1.1908      | 0.8411      |
| Ornithine                     |           | 0.0000     | 2.7234  | 0.3177  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.4486      |
| Tyramine                      |           | 0.9505     | 2.5232  | 0.9585  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.0000      |
| β-Alanine                     |           | 0.0000     | 1.5219  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.0000      |
| Putrescine                    |           | 0.0000     | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.6622      | 0.0000      |
| Cadaverine                    |           | 0.0000     | 1.2736  | 0.0000  | 0.9532  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.0000      |
| Dimethylglycine               |           | 0.0000     | 0.3044  | 0.0561  | 0.0961  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.0000      |
| Taurine                       |           | 7.1075     | 10.0953 | 12.9548 | 30.6383 | 4.4562  | 0.6942  | 3.7567  | 25.9684     | 2.2802      |
| Choline                       |           | 0.4886     | 1.7061  | 0.0000  | 0.4859  | 0.3257  | 0.5073  | 0.3311  | 0.7983      | 0.3925      |
| Tauro-conjugated bile acids   |           | 0.0000     | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.0000      |
| Methylamine                   |           | 0.4032     | 1.8476  | 0.2857  | 0.2563  | 0.2083  | 0.3952  | 0.3791  | 0.7449      | 0.5100      |
| Trimethylamine                |           | 0.1175     | 1.1588  | 0.1789  | 0.2350  | 0.2056  | 0.1602  | 0.1068  | 0.4753      | 0.3231      |
| Dimethylamine                 |           | 0.1789     | 0.4779  | 0.1655  | 0.2750  | 0.0000  | 0.3845  | 0.1976  | 0.4753      | 0.0881      |
| Glutamate                     |           | 9.4411     | 65.3002 | 5.7031  | 9.0353  | 9.7455  | 4.4108  | 5.3026  | 11.1125     | 6.2024      |
| 2-Oxoglutarate                |           | 0.0000     | 1.3430  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.4005      | 0.0000      |
| Uracil                        |           | 0.8731     | 9.3824  | 1.4471  | 2.5819  | 1.3537  | 1.4071  | 1.4258  | 1.9571      | 1.1748      |
| Hypoxanthine                  |           | 0.0000     | 8.6054  | 0.9345  | 0.0000  | 1.0733  | 0.8918  | 0.0000  | 0.8971      | 0.8624      |
| Cytidine phosphate            |           | 0.0000     | 5.3907  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 1.5833      | 0.0000      |
| Guanosine phosphate           |           | 0.0000     | 1.5299  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 1.3857      | 0.0000      |
| Xanthine                      |           | 0.0000     | 6.2558  | 0.0000  | 0.0000  | 0.0000  | 1.5326  | 0.0000  | 0.0000      | 0.0000      |
| Uridine phosphate             |           | 0.0000     | 2.4564  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.7449      | 0.0000      |
| Adenosine phosphate           |           | 0.0000     | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 1.1214      | 0.0000      |
| Creatinine                    |           | 0.0000     | 1.0199  | 0.0000  | 0.2136  | 0.0000  | 0.0000  | 0.1388  | 0.0000      | 0.0000      |
| Creatine                      |           | 0.0614     | 0.0000  | 0.0000  | 0.0908  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.0000      |
| 4-Hydroxyphenylacetate        |           | 1.5353     | 1.9518  | 1.1081  | 1.6260  | 0.0000  | 0.9639  | 0.0000  | 3.2521      | 0.8063      |
| Formate                       |           | 2.2722     | 3.9783  | 2.1093  | 1.7916  | 0.0000  | 5.5376  | 1.7435  | 1.2522      | 0.9986      |
| Lactate                       |           | 0.6568     | 7.2384  | 0.4352  | 0.8784  | 0.0000  | 1.3751  | 0.4833  | 0.9105      | 0.0000      |
| 3-(3-Hydroxyphenyl)propanoate |           | 0.0000     | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000      | 0.0000      |
| Acetate                       |           | 91.551     | 336.956 | 63.2683 | 33.9571 | 30.6863 | 58.9403 | 20.7566 | 64.9291     | 27.3381     |
| Propionate                    |           | 28.061     | 72.5679 | 23.2477 | 13.8012 | 9.2168  | 17.2749 | 9.7775  | 20.0010     | 12.7226     |
| Butyrate                      |           | 19.087     | 186.144 | 13.0670 | 6.5175  | 9.3530  | 9.3210  | 5.1985  | 8.6428      | 4.8167      |
| Succinate                     |           | 4.6805     | 3.6499  | 3.6419  | 1.9384  | 0.4325  | 2.9637  | 1.3751  | 3.2307      | 0.9879      |
| 5-Aminovalerate               |           | 1.6741     | 1.9651  | 1.5166  | 1.6955  | 0.3338  | 0.0000  | 0.0000  | 4.0210      | 0.0000      |
| Valerate                      |           | 0.5046     | 6.9046  | 0.4940  | 0.8117  | 0.9078  | 0.3151  | 0.3151  | 0.9398      | 0.6995      |
| Fumarate                      |           | 1.2309     | 2.2802  | 0.8864  | 0.7102  | 0.0000  | 0.4406  | 0.0000  | 2.8329      | 0.3097      |
| Isobutyrate                   |           | 0.7449     | 3.6659  | 0.6942  | 0.9772  | 0.3364  | 0.7636  | 0.0000  | 1.1935      | 1.4525      |
| Malate                        |           | 0.0000     | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 3.2868      | 0.0000      |
| Isovalerate                   |           | 0.4486     | 0.6809  | 0.0935  | 0.1629  | 0.2189  | 0.2296  | 0.0614  | 0.4245      | 0.2964      |
| 2-methylbutyrate              |           | 0.0000     | 1.6768  | 0.1495  | 0.2056  | 0.0721  | 0.0000  | 0.0000  | 0.4619      | 0.2590      |
| Malonate                      |           | 0.0000     | 1.7836  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.2830      | 0.0000      |
| Glucose                       |           | 19.587     | 112.543 | 28.1338 | 15.0855 | 9.3290  | 27.7066 | 13.9988 | 40.2209     | 19.6272     |
| Xylose                        |           | 12.840     | 32.1094 | 24.6067 | 8.3090  | 6.3413  | 14.9493 | 10.5518 | 25.6320     | 12.9415     |

|                      |        |         |         |        |        |         |        |         |         |
|----------------------|--------|---------|---------|--------|--------|---------|--------|---------|---------|
| Sialate              | 2.1280 | 36.8594 | 10.1914 | 9.2783 | 4.4108 | 7.3772  | 2.0879 | 20.3721 | 15.7023 |
| Glycerol             | 9.0566 | 15.0695 | 10.3836 | 5.5162 | 2.2615 | 13.7558 | 6.4934 | 13.0349 | 8.2690  |
| Galactose            | 2.1947 | 10.9604 | 0.0000  | 0.7796 | 0.0000 | 6.4214  | 0.0000 | 6.3226  | 4.4509  |
| Arabinose            | 3.0198 | 6.0102  | 3.3135  | 1.8476 | 0.0000 | 6.2825  | 1.8824 | 4.7366  | 2.6967  |
| UDP-glucose          | 0.0000 | 20.5483 | 3.9783  | 0.0000 | 0.0000 | 0.0000  | 0.0000 | 0.0000  | 0.0000  |
| Galacturonate        | 0.0000 | 10.8989 | 0.0000  | 0.0000 | 0.0000 | 0.0000  | 0.0000 | 2.4270  | 0.0000  |
| Fucose               | 0.4646 | 3.0011  | 1.0013  | 0.0000 | 0.0000 | 1.2576  | 0.0000 | 2.5285  | 1.1561  |
| Maltose              | 4.7766 | 0.0000  | 4.3628  | 0.0000 | 0.0000 | 4.1946  | 2.4190 | 0.0000  | 1.5913  |
| 1,3-Dihydroxyacetone | 0.2270 | 0.7316  | 0.2884  | 0.3338 | 0.3097 | 0.3097  | 0.2483 | 0.4139  | 0.2857  |
| Sucrose              | 0.0000 | 2.8943  | 0.0000  | 0.0000 | 0.0000 | 0.0000  | 0.0000 | 2.3763  | 0.7796  |
| Nicotinate           | 0.0000 | 8.9605  | 0.0000  | 1.1534 | 0.0000 | 0.0000  | 0.0000 | 3.8742  | 0.0000  |

RAW metabolite concentrations (mM.kg-1)

|                               | Age       | Young    | Young    | Young    | Aged    | Aged    | Aged     | Aged     | Aged    | Aged     |
|-------------------------------|-----------|----------|----------|----------|---------|---------|----------|----------|---------|----------|
|                               | Timepoint | Post FMT | Post FMT | Post FMT | Pre Abx | Pre Abx | Pre Abx  | Pre Abx  | Pre Abx | Pre Abx  |
| Ethanol                       |           | 70.0608  | 54.2144  | 42.3195  | 41.1981 | 43.1953 | 44.9201  | 40.9044  | 40.1354 | 66.2961  |
| Methanol                      |           | 10.2021  | 5.8553   | 3.1666   | 0.0000  | 4.7473  | 3.3215   | 4.8781   | 3.7674  | 6.8165   |
| Aspartate                     |           | 11.6439  | 13.5262  | 3.3962   | 7.8979  | 7.7483  | 12.2366  | 6.7498   | 16.1028 | 9.8683   |
| Alanine                       |           | 10.4210  | 5.9755   | 2.1253   | 13.5636 | 3.0812  | 6.5228   | 2.0586   | 3.5645  | 9.9057   |
| Citrulline                    |           | 8.1462   | 3.8555   | 1.9171   | 11.6332 | 3.9116  | 5.2546   | 2.8729   | 2.8088  | 7.8391   |
| Lysine                        |           | 0.0000   | 0.0000   | 0.0000   | 10.2234 | 4.5363  | 3.9810   | 2.2375   | 2.7448  | 8.8110   |
| Leucine                       |           | 6.6590   | 1.8770   | 1.1561   | 5.5563  | 2.4804  | 3.0572   | 0.7156   | 1.8557  | 5.2332   |
| Valine                        |           | 5.4869   | 1.9865   | 0.7289   | 12.2046 | 2.0693  | 2.3176   | 1.0440   | 1.3831  | 4.9368   |
| Tyrosine                      |           | 4.6298   | 2.3870   | 0.8277   | 6.9874  | 1.8717  | 2.0345   | 0.6515   | 2.2001  | 3.9356   |
| Threonine                     |           | 0.0000   | 0.6435   | 0.8170   | 39.6281 | 0.0000  | 0.0000   | 0.0000   | 0.6835  | 0.0000   |
| Glycine                       |           | 3.8795   | 2.6460   | 0.5020   | 0.0000  | 1.9144  | 2.4324   | 1.1641   | 0.9639  | 4.2640   |
| Isoleucine                    |           | 3.7113   | 1.8530   | 0.7209   | 4.3201  | 1.2362  | 1.4044   | 0.5340   | 1.2816  | 2.8195   |
| Methionine                    |           | 3.4123   | 1.3590   | 0.4245   | 2.2909  | 1.1828  | 1.2309   | 0.1255   | 1.1321  | 2.9744   |
| Glutamine                     |           | 4.5123   | 0.0000   | 0.0000   | 16.1588 | 1.3510  | 0.0000   | 3.3268   | 1.5887  | 0.0000   |
| Phenylalanine                 |           | 3.1800   | 1.7622   | 0.8784   | 2.9664  | 1.5112  | 1.8743   | 0.0000   | 0.9318  | 2.6593   |
| Ornithine                     |           | 1.9571   | 1.5620   | 0.3017   | 0.0000  | 0.5367  | 0.9398   | 0.0000   | 0.6221  | 0.0000   |
| Tyramine                      |           | 0.0000   | 0.0000   | 0.0000   | 0.0000  | 1.8370  | 0.0000   | 1.1534   | 0.6595  | 2.6006   |
| β-Alanine                     |           | 1.1214   | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 0.0000   | 0.0000   | 0.0000  | 1.0253   |
| Putrescine                    |           | 0.5954   | 2.0666   | 0.4005   | 0.0000  | 0.6835  | 0.0000   | 0.0000   | 0.0000  | 1.8209   |
| Cadaverine                    |           | 0.0000   | 0.0000   | 0.2964   | 0.0000  | 0.0000  | 0.0000   | 0.0000   | 0.5393  | 0.0000   |
| Dimethylglycine               |           | 0.1709   | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 0.1228   | 0.0000   | 0.0481  | 0.2216   |
| Taurine                       |           | 70.4213  | 31.6956  | 10.6747  | 4.0077  | 13.7825 | 0.0000   | 0.0000   | 56.0753 | 26.1633  |
| Choline                       |           | 1.7302   | 1.2816   | 0.4005   | 29.1858 | 0.9852  | 0.0000   | 0.8197   | 0.6328  | 1.1962   |
| Tauro-conjugated bile acids   |           | 0.0000   | 0.0000   | 0.0000   | 7.9272  | 0.0000  | 0.0000   | 0.0000   | 0.0000  | 0.0000   |
| Methylamine                   |           | 2.0746   | 0.9265   | 0.5847   | 0.0000  | 0.7209  | 1.6741   | 0.7796   | 0.5500  | 1.2095   |
| Trimethylamine                |           | 3.4123   | 0.5420   | 0.1976   | 0.2270  | 0.2376  | 1.2229   | 0.4859   | 0.3284  | 2.3469   |
| Dimethylamine                 |           | 0.6355   | 0.7983   | 0.1549   | 0.0000  | 0.1522  | 0.0000   | 0.0000   | 0.3524  | 0.2723   |
| Glutamate                     |           | 20.6418  | 12.2873  | 4.2773   | 14.2017 | 10.9176 | 26.4383  | 14.1403  | 14.4928 | 32.4859  |
| 2-Oxoglutarate                |           | 0.7156   | 0.0000   | 0.0000   | 0.7503  | 0.0000  | 0.0000   | 0.5073   | 0.0000  | 1.1134   |
| Uracil                        |           | 4.4456   | 2.2642   | 0.9051   | 0.0000  | 1.3110  | 2.8088   | 0.9505   | 1.5353  | 11.1152  |
| Hypoxanthine                  |           | 2.9557   | 1.6394   | 0.5207   | 0.0000  | 1.7569  | 0.9345   | 1.3190   | 1.2709  | 5.8046   |
| Cytidine phosphate            |           | 3.8715   | 2.0826   | 0.0000   | 0.0000  | 2.7554  | 0.0000   | 0.0000   | 1.7462  | 4.8567   |
| Guanosine phosphate           |           | 3.1693   | 2.2295   | 1.5112   | 0.0000  | 2.5712  | 0.0000   | 0.0000   | 2.1040  | 0.0000   |
| Xanthine                      |           | 0.0000   | 1.8049   | 0.0000   | 0.0000  | 0.0000  | 0.5447   | 0.0000   | 0.0000  | 2.8756   |
| Uridine phosphate             |           | 2.2588   | 0.9265   | 0.0000   | 0.0000  | 1.0039  | 0.0000   | 0.0000   | 0.0000  | 1.6127   |
| Adenosine phosphate           |           | 1.7756   | 0.8651   | 0.4806   | 0.0000  | 0.0000  | 0.0000   | 0.0000   | 1.4632  | 0.6141   |
| Creatinine                    |           | 1.0920   | 0.0000   | 0.0000   | 6.5308  | 0.0000  | 0.0000   | 0.0000   | 0.0000  | 0.0000   |
| Creatine                      |           | 2.4724   | 0.4486   | 0.0000   | 3.2547  | 0.0000  | 0.0000   | 0.1682   | 0.0000  | 0.0000   |
| 4-Hydroxyphenylacetate        |           | 3.3642   | 3.2547   | 1.7489   | 0.0000  | 0.9185  | 0.7983   | 1.0894   | 2.6406  | 6.5068   |
| Formate                       |           | 2.0586   | 1.8503   | 1.0867   | 1.5913  | 1.7195  | 1.6607   | 1.3911   | 1.9731  | 0.0000   |
| Lactate                       |           | 3.0812   | 1.0173   | 0.9932   | 0.0000  | 4.1812  | 1.7355   | 0.8224   | 0.6782  | 2.6166   |
| 3-(3-Hydroxyphenyl)propanoate |           | 0.5153   | 0.9559   | 0.6008   | 0.0000  | 1.3430  | 0.0000   | 0.0000   | 0.0000  | 0.0000   |
| Acetate                       |           | 197.6628 | 104.9043 | 54.5721  | 0.0000  | 97.7140 | 103.5212 | 111.1094 | 59.0791 | 302.5511 |
| Propionate                    |           | 67.2146  | 41.7054  | 17.7902  | 0.0000  | 27.1058 | 26.9109  | 29.9975  | 21.0663 | 100.9580 |
| Butyrate                      |           | 37.5322  | 26.4837  | 10.1914  | 0.0000  | 21.3039 | 16.2229  | 32.5446  | 8.5413  | 67.2920  |
| Succinate                     |           | 7.0274   | 16.4552  | 4.3521   | 0.4993  | 26.9056 | 0.9852   | 1.1134   | 3.2975  | 7.0088   |
| 5-Aminovalerate               |           | 10.0499  | 11.4970  | 1.7008   | 0.0000  | 7.3105  | 1.3217   | 1.0947   | 1.0680  | 2.3069   |

|                      |          |         |         |        |         |         |         |         |         |
|----------------------|----------|---------|---------|--------|---------|---------|---------|---------|---------|
| Valerate             | 2.5685   | 0.8411  | 0.8811  | 0.0000 | 2.0132  | 1.7969  | 1.4285  | 2.0559  | 8.8297  |
| Fumarate             | 4.0771   | 3.6179  | 0.6034  | 0.0000 | 0.5474  | 1.5246  | 0.6061  | 2.7661  | 1.0199  |
| Isobutyrate          | 1.2122   | 2.2081  | 1.6207  | 0.0000 | 0.8517  | 0.0000  | 0.0000  | 0.7289  | 5.0490  |
| Malate               | 2.7608   | 4.9822  | 1.7969  | 0.0000 | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  |
| Isovalerate          | 0.8784   | 0.6969  | 0.2723  | 0.0000 | 0.3444  | 0.4886  | 0.1522  | 0.4779  | 3.5965  |
| 2-methylbutyrate     | 0.7129   | 0.5020  | 0.1228  | 0.0000 | 0.3498  | 0.2189  | 0.2643  | 0.2029  | 1.9384  |
| Malonate             | 0.0000   | 0.5340  | 0.3017  | 0.0000 | 0.3845  | 0.8437  | 0.4459  | 0.4779  | 1.1081  |
| Glucose              | 112.8956 | 66.4136 | 22.3853 | 9.7589 | 53.6270 | 29.3727 | 29.2071 | 26.9083 | 83.0263 |
| Xylose               | 53.4134  | 42.8321 | 18.8475 | 0.0000 | 36.8754 | 31.1269 | 22.0729 | 15.9719 | 58.7000 |
| Sialate              | 52.1184  | 24.8390 | 13.1204 | 7.2357 | 15.8999 | 32.2269 | 6.1437  | 26.1820 | 68.0396 |
| Glycerol             | 29.7491  | 21.9527 | 8.9498  | 0.0000 | 17.5926 | 13.0323 | 19.7046 | 9.3931  | 26.3930 |
| Galactose            | 12.8400  | 6.0903  | 4.1732  | 7.8738 | 4.5684  | 3.6205  | 2.0185  | 3.2414  | 8.2877  |
| Arabinose            | 12.5437  | 9.0540  | 3.7220  | 3.8501 | 7.6122  | 3.8688  | 5.5242  | 2.3977  | 10.0819 |
| UDP-glucose          | 9.3210   | 3.9650  | 0.0000  | 0.0000 | 1.6474  | 6.1357  | 3.2547  | 6.8005  | 18.3669 |
| Galacturonate        | 7.8525   | 0.0000  | 0.0000  | 0.0000 | 1.5166  | 0.0000  | 0.0000  | 5.6150  | 7.3131  |
| Fucose               | 6.4881   | 3.1426  | 1.7115  | 0.0000 | 1.2175  | 2.1574  | 0.9158  | 1.0173  | 4.3815  |
| Maltose              | 0.0000   | 4.6965  | 2.9664  | 0.0000 | 0.0000  | 1.8290  | 5.4735  | 0.0000  | 0.0000  |
| 1,3-Dihydroxyacetone | 0.6061   | 0.5313  | 0.3551  | 0.0000 | 0.2910  | 0.3952  | 0.3791  | 0.3311  | 0.6542  |
| Sucrose              | 1.5086   | 0.0000  | 0.0000  | 0.0000 | 0.8651  | 0.0000  | 0.0000  | 0.0000  | 0.0000  |
| Nicotinate           | 2.4991   | 2.5552  | 0.0000  | 0.0000 | 0.0000  | 2.6647  | 1.5459  | 1.2469  | 5.0009  |

# RAW metabolite concentrations (mM.kg-1)

|                             | Age<br>Timepoint | Aged<br>Pre Abx | Aged<br>Pre Abx | Aged<br>Post FMT | Aged<br>Post FMT | Aged<br>Post FMT | Aged<br>Post FMT | Aged<br>Post FMT | Aged<br>Post FMT | Aged<br>Post FMT |
|-----------------------------|------------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Ethanol                     |                  | 45.2485         | 45.0643         | 42.3248          | 70.5628          | 49.6246          | 42.3542          | 48.8503          | 60.1711          | 88.7054          |
| Methanol                    |                  | 4.1732          | 5.0249          | 4.9796           | 10.3035          | 2.5205           | 5.3747           | 6.7391           | 5.9408           | 17.4671          |
| Aspartate                   |                  | 7.8445          | 12.5837         | 6.4347           | 18.7674          | 4.5764           | 8.9792           | 8.8003           | 7.2277           | 29.3059          |
| Alanine                     |                  | 1.3751          | 6.2398          | 4.7553           | 24.4145          | 5.2439           | 6.9927           | 4.4108           | 3.3642           | 18.2067          |
| Citrulline                  |                  | 0.0000          | 4.8621          | 5.3453           | 12.0364          | 3.5191           | 5.9701           | 4.3761           | 4.1919           | 10.0499          |
| Lysine                      |                  | 1.7141          | 7.8498          | 4.1225           | 12.0844          | 5.8660           | 7.3345           | 3.5297           | 3.2147           | 11.1713          |
| Leucine                     |                  | 0.5500          | 4.7366          | 2.7047           | 8.7736           | 2.6513           | 4.4696           | 1.2976           | 1.8290           | 11.0164          |
| Valine                      |                  | 0.4592          | 3.1186          | 2.4457           | 8.3731           | 2.3176           | 3.8368           | 0.9879           | 1.5299           | 9.3797           |
| Tyrosine                    |                  | 0.4406          | 4.0344          | 2.5739           | 8.1488           | 2.9904           | 3.1319           | 2.1146           | 1.3430           | 8.4425           |
| Threonine                   |                  | 0.0000          | 0.0000          | 0.0000           | 2.6540           | 2.3603           | 0.0000           | 1.3724           | 0.0000           | 11.8655          |
| Glycine                     |                  | 0.8597          | 2.6700          | 1.3297           | 6.3653           | 1.9144           | 2.7020           | 2.0879           | 1.4712           | 10.7921          |
| Isoleucine                  |                  | 0.5794          | 2.2562          | 2.0906           | 5.3987           | 0.8063           | 2.3736           | 0.8544           | 0.9238           | 5.2065           |
| Methionine                  |                  | 0.4112          | 3.2627          | 1.8049           | 6.3893           | 1.4632           | 2.0773           | 1.4044           | 1.1695           | 5.2332           |
| Glutamine                   |                  | 3.4443          | 1.4231          | 1.7275           | 4.1198           | 0.0000           | 1.3857           | 0.0000           | 0.0000           | 0.0000           |
| Phenylalanine               |                  | 0.0000          | 2.6673          | 1.9144           | 5.4148           | 1.3804           | 2.3549           | 0.8971           | 0.6248           | 3.6606           |
| Ornithine                   |                  | 0.0000          | 1.2255          | 1.1134           | 2.1040           | 1.3697           | 1.4552           | 1.1775           | 0.5313           | 4.6058           |
| Tyramine                    |                  | 0.0000          | 1.0974          | 0.0000           | 1.3697           | 0.0000           | 0.0000           | 1.5860           | 0.7182           | 3.1079           |
| β-Alanine                   |                  | 0.0000          | 0.9959          | 0.0000           | 2.6433           | 4.0985           | 1.3003           | 0.0000           | 0.0000           | 1.8530           |
| Putrescine                  |                  | 0.0000          | 0.0000          | 0.8224           | 1.6127           | 0.5821           | 0.0000           | 1.0787           | 0.4459           | 1.5780           |
| Cadaverine                  |                  | 0.0000          | 0.9372          | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 1.2522           |
| Dimethylglycine             |                  | 0.0000          | 0.1175          | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.2376           |
| Taurine                     |                  | 25.5119         | 6.7551          | 0.0000           | 15.2350          | 0.0000           | 0.0000           | 42.7787          | 49.1333          | 74.7680          |
| Choline                     |                  | 0.3311          | 0.7236          | 0.8063           | 2.1520           | 0.6168           | 1.0360           | 1.0840           | 0.7423           | 0.0000           |
| Tauro-conjugated bile acids |                  | 0.0000          | 0.0000          | 1.4018           | 2.2321           | 0.8170           | 0.9398           | 0.0000           | 0.0000           | 4.2720           |
| Methylamine                 |                  | 0.4005          | 0.9131          | 0.5714           | 1.5887           | 0.5393           | 0.8704           | 0.3845           | 0.4539           | 1.2736           |
| Trimethylamine              |                  | 0.2537          | 1.0440          | 0.3284           | 1.1454           | 0.4619           | 1.0093           | 0.3605           | 0.3444           | 1.1027           |
| Dimethylamine               |                  | 0.0000          | 0.3231          | 0.0000           | 0.0000           | 0.0000           | 0.1362           | 0.1736           | 0.1442           | 0.7957           |
| Glutamate                   |                  | 9.8363          | 35.2600         | 9.4358           | 46.3218          | 27.4529          | 43.3902          | 14.0095          | 8.2343           | 47.8918          |
| 2-Oxoglutarate              |                  | 0.7743          | 0.0000          | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           |
| Uracil                      |                  | 0.0000          | 4.7366          | 2.0960           | 10.8002          | 8.0234           | 3.5965           | 3.4470           | 1.7141           | 8.9819           |
| Hypoxanthine                |                  | 0.0000          | 4.6698          | 0.7449           | 3.7781           | 5.1958           | 2.9050           | 1.2843           | 1.7061           | 4.6965           |
| Cytidine phosphate          |                  | 0.0000          | 5.3347          | 0.0000           | 10.1727          | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 9.8657           |
| Guanosine phosphate         |                  | 0.0000          | 0.0000          | 1.5593           | 7.5428           | 0.0000           | 0.0000           | 1.1748           | 1.5780           | 5.2946           |
| Xanthine                    |                  | 0.0000          | 4.9609          | 2.0559           | 4.0210           | 0.0000           | 2.5338           | 1.1161           | 0.0000           | 3.5057           |
| Uridine phosphate           |                  | 0.0000          | 2.0372          | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 5.7005           |
| Adenosine phophate          |                  | 0.0000          | 1.3270          | 0.0000           | 1.7222           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 3.3535           |
| Creatinine                  |                  | 0.0000          | 0.6568          | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           |
| Creatine                    |                  | 0.0000          | 0.0000          | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           | 0.0000           |
| 4-Hydroxyphenylacetate      |                  | 0.9505          | 3.4310          | 1.1801           | 4.3788           | 0.0000           | 0.0000           | 2.6940           | 3.8101           | 17.1227          |

|                               |         |          |          |          |          |          |          |          |          |
|-------------------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|
| Formate                       | 1.6180  | 1.1348   | 1.5326   | 3.3589   | 0.0000   | 1.6821   | 0.9906   | 1.5246   | 3.6899   |
| Lactate                       | 0.0000  | 2.3229   | 1.4979   | 2.2989   | 0.0000   | 2.3923   | 0.0000   | 0.6542   | 0.0000   |
| 3-(3-Hydroxyphenyl)propanoate | 0.0000  | 0.3685   | 0.6782   | 1.6234   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   |
| Acetate                       | 87.6187 | 216.4569 | 115.9821 | 451.2220 | 197.9138 | 295.3581 | 150.3664 | 133.1689 | 483.2620 |
| Propionate                    | 23.4186 | 55.6214  | 22.5989  | 115.9234 | 18.2842  | 28.8387  | 39.3291  | 44.9414  | 159.6927 |
| Butyrate                      | 15.3018 | 38.8912  | 11.7934  | 76.0817  | 50.3776  | 44.5570  | 16.6154  | 24.6121  | 53.3867  |
| Succinate                     | 2.1600  | 4.5604   | 5.1478   | 13.3313  | 1.1988   | 1.0867   | 6.7284   | 9.5960   | 12.9228  |
| 5-Aminovalerate               | 0.5741  | 2.0399   | 0.8624   | 5.4441   | 0.9532   | 2.0105   | 0.9906   | 6.6376   | 24.8016  |
| Valerate                      | 1.3110  | 5.1131   | 1.8156   | 7.5347   | 0.0000   | 3.6953   | 1.7675   | 2.6513   | 10.5892  |
| Fumarate                      | 0.6648  | 2.4858   | 0.8544   | 5.8019   | 0.2590   | 0.7316   | 2.6219   | 1.9277   | 14.6957  |
| Isobutyrate                   | 0.8678  | 2.8916   | 1.2149   | 5.7779   | 0.0000   | 1.2976   | 2.2428   | 2.0746   | 7.4920   |
| Malate                        | 0.0000  | 0.0000   | 0.0000   | 7.7216   | 0.0000   | 0.0000   | 2.7581   | 0.0000   | 11.8495  |
| Isovalerate                   | 1.7035  | 1.1615   | 0.2884   | 1.9758   | 0.0000   | 0.4406   | 0.7823   | 0.6675   | 3.8395   |
| 2-methylbutyrate              | 0.2350  | 1.2068   | 0.0801   | 1.5620   | 0.4299   | 0.2964   | 0.5981   | 0.6461   | 2.4110   |
| Malonate                      | 0.3391  | 1.5780   | 0.0000   | 2.2481   | 0.8411   | 0.8678   | 0.0000   | 0.0000   | 0.0000   |
| Glucose                       | 21.7365 | 49.3897  | 52.9648  | 114.8127 | 25.4665  | 60.6784  | 43.2727  | 43.7106  | 103.3958 |
| Xylose                        | 16.4953 | 24.8203  | 19.1092  | 88.4064  | 14.5835  | 22.8819  | 33.7755  | 20.6364  | 81.8542  |
| Sialate                       | 19.0905 | 41.9190  | 33.2896  | 79.8784  | 0.0000   | 0.0000   | 18.6820  | 26.7053  | 120.2435 |
| Glycerol                      | 10.0606 | 14.3192  | 16.0948  | 56.4251  | 6.5629   | 13.7959  | 18.9623  | 10.9657  | 39.4359  |
| Galactose                     | 2.7127  | 10.6640  | 4.5443   | 11.4944  | 3.0732   | 6.9794   | 4.1065   | 4.1465   | 29.1991  |
| Arabinose                     | 4.4509  | 3.7006   | 7.7991   | 17.4111  | 3.6766   | 8.1355   | 6.0075   | 2.6700   | 10.4611  |
| UDP-glucose                   | 0.0000  | 25.0019  | 4.8087   | 17.5312  | 14.2818  | 11.8575  | 0.0000   | 0.0000   | 0.0000   |
| Galacturonate                 | 0.0000  | 6.0956   | 3.7834   | 26.2728  | 3.7433   | 6.5549   | 0.0000   | 2.2642   | 26.4437  |
| Fucose                        | 1.1081  | 2.9610   | 1.6314   | 4.8113   | 1.3564   | 1.3217   | 1.7595   | 1.6928   | 11.3929  |
| Maltose                       | 0.0000  | 0.0000   | 0.0000   | 0.0000   | 2.5685   | 0.0000   | 0.0000   | 0.0000   | 0.0000   |
| 1,3-Dihydroxyacetone          | 0.3151  | 0.4993   | 0.2350   | 0.0000   | 0.1869   | 0.2670   | 0.4859   | 0.5340   | 1.7355   |
| Sucrose                       | 0.0000  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   |
| Nicotinate                    | 0.0000  | 3.9783   | 1.1641   | 8.2022   | 5.1184   | 3.9703   | 1.2469   | 1.8557   | 6.6002   |