

Table S1. Parametric model fitted and the modelled parameters of short chain fatty acids profile. Short chain fatty acids (SCFAs), include acetate, propionate, butyrate and total SCFA of the 13 carbohydrates fermentation temporal patterns. ProRate: maximum production rate; Lag: lag phase in SCFAs production; MaxConc: maximum SCFAs concentration increase. Data are provided as mean and standard deviation for each combination of carbohydrates and SCFAs.

| CHO | SCFAs | model | ProRate(mM/hour) | ProRate_sd | Lag(hour) | Lag_sd | MaxConc(mM) | MaxConc_sd |
|-----------|-----------|--------------|------------------|------------|-----------|---------|-------------|------------|
| barley_bG | All | gompertz | 14.468 | 0.833 | 26.932 | 2.248 | 1236.164 | 39.933 |
| FOS | All | gompertz | 6.225 | 1.312 | 3.765 | 3.092 | 156.919 | 5.463 |
| glucose | All | gompertz | 1.054 | 0.245 | -12.075 | 7.55 | 65.669 | 3.929 |
| glycogen | All | gompertz | 5.288 | 0.73 | 0.609 | 0.611 | 219.502 | 6.548 |
| GOS | All | gompertz | 7.537 | 1.234 | 1.269 | 0.836 | 378.587 | 15.556 |
| inulin | All | logistic | 14.261 | 1.414 | 50.711 | 3.347 | 959.384 | 43.494 |
| lactose | All | gompertz | 17.534 | 3.945 | 5.546 | 3.718 | 482.193 | 17.918 |
| oat | All | gompertz | 1.927 | 0.538 | -1.561 | 0.711 | 49.162 | 2.096 |
| ptr | All | gompertz | 2.346 | 0.196 | 10.424 | 5.235 | 410.91 | 40.472 |
| starch | All | gompertz | 1.002 | 0.117 | -9.853 | 6.544 | 128.048 | 10.143 |
| sucrose | All | logistic | 4.073 | 0.314 | 28.991 | 2.573 | 249.832 | 7.254 |
| XOS | All | logistic | 3.678 | 0.271 | 55.45 | 4.501 | 563.074 | 47.432 |
| xylitol | All | logistic | 5.396 | 0.498 | 29.511 | 2.689 | 286.651 | 8.44 |
| barley_bG | Acetic | gompertz | 1.275 | 0.085 | 12.824 | 4.137 | 223.488 | 17.822 |
| FOS | Acetic | gompertz | 6.045 | 1.302 | 4.667 | 3.13 | 147.383 | 5.115 |
| glucose | Acetic | gompertz | 1.093 | 0.259 | -9.514 | 7.045 | 62.574 | 3.674 |
| glycogen | Acetic | gompertz | 5.089 | 0.704 | 1.276 | 0.61 | 209.995 | 6.235 |
| GOS | Acetic | gompertz | 7.547 | 1.246 | 1.486 | 0.837 | 375.826 | 15.458 |
| inulin | Acetic | logistic | 2.17 | 0.269 | 31.545 | 5.44 | 186.751 | 12.427 |
| lactose | Acetic | gompertz | 17.518 | 3.989 | 5.892 | 3.73 | 474.295 | 17.556 |
| oat | Acetic | gompertz | 2.031 | 0.596 | -0.634 | 0.677 | 47.545 | 2.021 |
| ptr | Acetic | gompertz | 0.356 | 0.053 | -21.3 | 12.042 | 77.927 | 15.369 |
| starch | Acetic | gompertz | 0.934 | 0.106 | -7.125 | 6.293 | 119.196 | 9.442 |
| sucrose | Acetic | logistic | 4.226 | 0.382 | 32.411 | 2.599 | 221.387 | 6.457 |
| XOS | Acetic | logistic | 0.895 | 0.085 | 34.264 | 12.042 | 211.675 | 44.362 |
| xylitol | Acetic | logistic | 4.169 | 0.452 | 29.631 | 3.094 | 216.359 | 7.292 |
| barley_bG | Butyric | gompertz | 10.73 | 0.653 | 26.614 | 2.285 | 869.024 | 28.232 |
| FOS | Butyric | logistic | 0.059 | 0.018 | -14.667 | 8.181 | 2.628 | 0.115 |
| glucose | Butyric | gompertz.exp | NA | NA | NA | NA | NA | NA |
| glycogen | Butyric | gompertz | 0.025 | 0.007 | -36.019 | 14.195 | 1.842 | 0.089 |
| GOS | Butyric | gompertz | 0.014 | 0.003 | -70.879 | 20.877 | 2.158 | 0.164 |
| inulin | Butyric | logistic | 3.685 | 0.796 | 61.062 | 6.813 | 239.739 | 23.902 |
| lactose | Butyric | gompertz | 0.013 | 0.005 | -87.648 | 40.554 | 2.68 | 0.46 |
| oat | Butyric | logistic | 0.005 | 0.001 | -178.023 | 48.985 | 1.638 | 0.194 |
| ptr | Butyric | gompertz | 2.241 | 0.661 | 18.405 | 3.453 | 56.913 | 2.433 |
| starch | Butyric | logistic | 0.016 | 0.003 | -55.213 | 21.387 | 3.336 | 0.504 |
| sucrose | Butyric | logistic | 0.196 | 0.043 | 30.229 | 13.338 | 27.703 | 4.856 |
| XOS | Butyric | gompertz | 3.227 | 2.68 | 277.227 | 130.946 | 3016.806 | 3303.965 |
| xylitol | Butyric | logistic | 1.083 | 0.222 | 33.642 | 5.805 | 55.934 | 3.678 |
| barley_bG | Propionic | logistic | 3.396 | 0.356 | 45.142 | 2.818 | 165.474 | 5.794 |
| FOS | Propionic | logistic | 1.486 | 1.033 | 5.192 | 2.979 | 6.571 | 0.246 |
| glucose | Propionic | logistic | 0.011 | 0.003 | -104.339 | 32.062 | 2.299 | 0.186 |
| glycogen | Propionic | logistic | 1.584 | 0.811 | 5.075 | 2.208 | 7.296 | 0.217 |
| GOS | Propionic | logistic | 0.005 | 0.001 | -20.472 | 9.641 | 0.551 | 0.04 |
| inulin | Propionic | logistic | 9.263 | 0.759 | 54.316 | 2.384 | 528.63 | 17.238 |
| lactose | Propionic | logistic | 0.475 | 0.225 | 1.279 | 0.586 | 5.37 | 0.229 |
| oat | Propionic | logistic | 0 | 0 | -262.348 | 125.664 | 0.231 | 0.063 |
| ptr | Propionic | gompertz | 1.651 | 0.151 | 36.441 | 4.894 | 272.079 | 30.212 |
| starch | Propionic | gompertz | 0.737 | 0.372 | 4.183 | 2.337 | 5.077 | 0.204 |
| sucrose | Propionic | gompertz | 0.132 | 0.043 | -2.668 | 1.303 | 4.98 | 0.324 |
| XOS | Propionic | gompertz | 2.381 | 0.276 | 65.7 | 4.15 | 249.709 | 19.241 |
| xylitol | Propionic | logistic | 0.194 | 0.038 | 12.722 | 7.727 | 14.349 | 1.13 |