**Simulation : No metabolic interactions – only direct substrate competition**

**Primary kinetic parameters**

|  |  |  |
| --- | --- | --- |
|  | PVE | PPU |
| Mu-max (h-1) | 0.72 | 1.1 |
| Kappa\_3 | Mu\_max/0.4 – Mu\_max | Mu\_max/0.56 – Mu\_max |
| Stat phase mass (g) | 2.96E-13 | 2.78E-13 |
| Filename | \_random\_pos\_no\_interactions |  |

**Uptake and utilization matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 1E-7 | 0 | 0 | 1E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 2.5E5 | 0 | 0 | 0 |
| Mu-rel | 0.6 | 0 | 0.4 | 0 | 0 | 0 |
| Diff | 5.76E6 | 1.8E6 | 1.8E6 | 5.76E6 | 1.8E6 | 7.2E6 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 2.5E-7 | 0 | 0 | 5E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 0 | 2.5E5 | 0 | 0 |
| Mu-rel | 0.6 | 0 | 0 | 0.4 | 0 | 0 |
| Diff rate | 5.76E6 | 1.8E6 | 1.8E6 | 5.76E6 | 1.8E6 | 7.2E6 |

**Production matrices**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 1.2 | 0 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 0 | 1.2 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |

**Simulation : Metabolite sharing**

**Primary kinetic parameters**

|  |  |  |
| --- | --- | --- |
|  | PVE | PPU |
| Mu-max (h-1) | 0.72 | 1.1 |
| Kappa\_3 | Mu\_max/0.4 – Mu\_max | Mu\_max/0.56 – Mu\_max |
| Stat phase mass (g) | 2.96E-13 | 2.78E-13 |
| Filename | \_r100\_mu1-bp34\_r64\_smin |  |

**Uptake and utilization matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 1E-7 | 0 | 0 | 1E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 2.5E5 | 2.5E5 | 0 | 0 |
| Mu-rel | 0.6 | 0 | 0 | 0.4 | 0 | 0 |
| Diff | 5.76E6 | 1.8E6 | 1.8E6 | 5.76E6 | 1.8E6 | 7.2E6 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 2.5E-7 | 0 | 0 | 2.5E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 2.5E5 | 2.5E5 | 0 | 0 |
| Mu-rel | 0.6 | 0 | 0 | 0.4 | 0 | 0 |
| Diff rate | 5.76E6 | 1.8E6 | 1.8E6 | 5.76E6 | 1.8E6 | 7.2E6 |

**Production matrices**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 0 | 1.2 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 0 | 1.2 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |

**Simulation : Cross-feeding**

**Kinetic parameters**

|  |  |  |
| --- | --- | --- |
|  | PVE | PPU |
| Mu-max (h-1) | 0.72 | 1.1 |
| Kappa\_3 | Mu\_max/0.4 – Mu\_max | Mu\_max/0.56 – Mu\_max |
| Stat phase mass (g) | 2.96E-13 | 2.78E-13 |
| Filename | \_r100\_mu1-bp34\_r644\_641\_smin |  |

**Uptake and utilization matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 1E-7 | 0 | 0 | 1E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 5E5 | 2.5E5 | 0 | 0 |
| Mu-rel | 0.6 | 0 | 0.4 | 0.4 | 0 | 0 |
| Diff | 5.76E6 | 1.8E6 | 1.8E6 | 5.76E6 | 1.8E6 | 7.2E6 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 2.5E-7 | 0 | 0 | 5E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 2.5E5 | 1E4 | 0 | 0 |
| Mu-rel | 0.6 | 0 | 0.4 | 0.1 | 0 | 0 |
| Diff rate | 5.76E6 | 1.8E6 | 1.8E6 | 5.76E6 | 1.8E6 | 7.2E6 |

**Production matrices**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 20 | 1.2 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 1.2 | 4 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |

**Simulation : cross feeding and inhibition**

**Kinetic parameters**

|  |  |  |
| --- | --- | --- |
|  | PVE | PPU |
| Mu-max (h-1) | 0.72 | 1.1 |
| Kappa\_3 | Mu\_max/0.4 – Mu\_max | Mu\_max/0.56 – Mu\_max |
| Stat phase mass (g) | 2.96E-13 | 2.78E-13 |
| Filename | \_r100\_mu1-bp34\_r634\_smin\_inh2 |  |

**Uptake and utilization matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 1E-7 | 0 | 0 | 1E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 2.5E5 | 2.5E5 | 0 | 2.5E5 |
| Mu-rel | 0.6 | 0 | 0.3 | 0.4 | 0 | –0.1 |
| Diff | 5.76E6 | 1.0E6 | 1.8E6 | 5.76E6 | 1.8E6 | 1.0E6 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 2.5E-7 | 0 | 0 | 5E-7 | 0 | 0 |
| Uptake | 2.5E5 | 2.5E5 | 2.5E5 | 2.5E5 | 0 | 0 |
| Mu-rel | 0.6 | –0.1 | 0.4 | 0.1 | 0 | 0 |
| Diff rate | 5.76E6 | 1.0E6 | 1.8E6 | 5.76E6 | 1.8E6 | 1.0E6 |

**Production matrices**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0.05 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 1.2 | 1.2 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 1.2 | 1.2 | 0 | 0 |
| Res6 | 0.05 | 0 | 0 | 0 | 0 | 0 |

**Simulation : Metabolite dependency**

**Kinetic parameters**

|  |  |  |
| --- | --- | --- |
|  | PVE | PPU |
| Mu-max (h-1) | 0.72 | 1.1 |
| Kappa\_3 | Mu\_max/0.4 – Mu\_max | Mu\_max/0.56 – Mu\_max |
| Stat phase mass (g) | 2.96E-13 | 2.78E-13 |
| Filename | \_r100\_mu1-bp34\_dependency\_r64 |  |

**Uptake and utilization matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 1E-7 | 0 | 0 | 1E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 2.5E5 | 0 | 0 | 0 |
| Mu-rel | 0.6 | 0 | 0.4 | 0 | 0 | 0 |
| Diff | 5.76E6 | 1.8E6 | 1.8E6 | 5.76E6 | 1.8E6 | 7.2E6 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Threshold | 2.5E-7 | 0 | 0 | 5E-7 | 0 | 0 |
| Uptake | 2.5E5 | 0 | 0 | 2.5E5 | 0 | 0 |
| Mu-rel | 0.6 | 0 | 0 | 0.4 | 0 | 0 |
| Diff rate | 5.76E6 | 1.8E6 | 1.8E6 | 5.76E6 | 1.8E6 | 7.2E6 |

**Production matrices**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PVE | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 1.2 | 0 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Production\_PPU | Res1 | Res2 | Res3 | Res4 | Res5 | Res6 |
| Res1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res3 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| Res4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res5 | 0 | 0 | 0 | 1.2 | 0 | 0 |
| Res6 | 0 | 0 | 0 | 0 | 0 | 0 |