**Supplementary Table 1. Equations of the illustrative model for chlortetracycline concentrations in the small and large intestines of cattle when administered per os**

The legends above horizontal brackets specify the processes included. In squares are the parameters representing the variables related to the active intestinal antimicrobial concentrations; the parameter values were sampled from their assigned distributions (given in Table 1) for the model simulations.

|  |  |
| --- | --- |
| CTC amount ingested with feed | Where *t* – time in hours since the start of the 5-day therapy |
| Change in CTC amount in stomachs |  |
| Change in CTC concentration in plasma |  |
| Change in CTC amount in tissues |  |
| CTC amount excreted in bile |  |
| Change in CTC amount in the upper 1/3 of small intestine |  |
| Change in active CTC concentration in the lower 2/3 of small intestine |  |
| Change in active CTC concentration in large intestine |  |

**Supplementary Table 2. Equations of the illustrative model for antimicrobially-active ceftiofur metabolite concentrations in the small and large intestines of cattle when administered parenterally (CE – ceftiofur equivalents)**

The legends above horizontal brackets specify the processes included. In squares are the parameters representing the variables related to the metabolite active intestinal concentrations; the parameter values were sampled from their assigned distributions (given in Table 2) for the model simulations.

|  |  |
| --- | --- |
| CE amount in bile |  |
| Change in CE amount in the upper 1/3 of small intestine |  |
| Change in CE concentration in the lower 2/3 of small intestine |  |
| Change in CE concentration in large intestine |  |

*a* Estimates of ceftiofur metabolite concentration dynamics in the central circulation published by the drug manufacturer were used in the simulations.