Appendix A

Procedure for Extrapolating Steady State Concentrations

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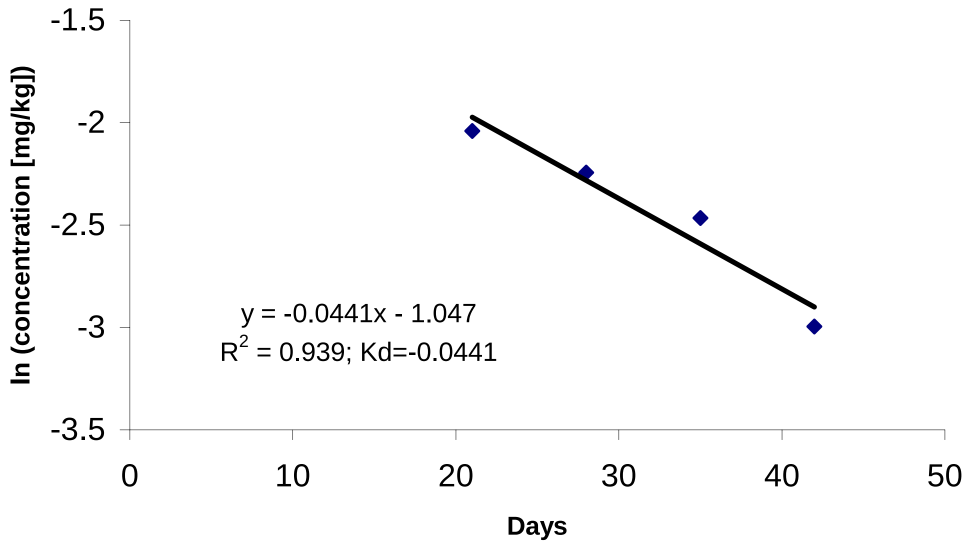
1. Take the natural log of the concentrations (ppm) measured on or after the last day of feeding. Conduct a linear regression analysis where day is the independent variable and ln (concentration) is the dependent variable. The slope of this line is the depuration rate, kd (d^{-1}).



2. Estimate the tangent, dC/dt , for each point of the uptake curve using an exponential fit of the uptake data.

3. Estimate the uptake rate, ku, using each point during uptake and the last day of feeding using the following equation:

$$ku_t = \frac{\frac{dC}{dt} + kd \times Ct}{CIR}$$

where

ku_t = Uptake rate based on some time t (kg^{-1}),

CIR = Chemical intake rate (mg/d),

Ct = Concentration at some time t (mg/kg), and

kd = Depuration rate (d^{-1}).

4. Average each value of ku_t to get the best overall estimate of ku.

5. Estimate the steady state concentration, Css (mg/kg) using the following equation:

$$C_{SS} = \frac{ku}{kd} \times CIR\,.$$

6. Estimate the biotransfer factor (BTF) ([mg/kg]/[mg/d]) using the following equation:

$$BTF = \frac{C_{SS}}{CIR}\,.$$

7. Estimate the half-life of the chemical using the following equation:

$$t_{1/2} = \frac{\ln(2)}{kd}$$

where

$t_{1/2}$ = half life of the chemical (d), and

kd = depuration rate (d^{-1}).

8. Estimate the time required to reach steady state using the following equation:

$$t_{ss} = 5 \times t_{1/2}$$

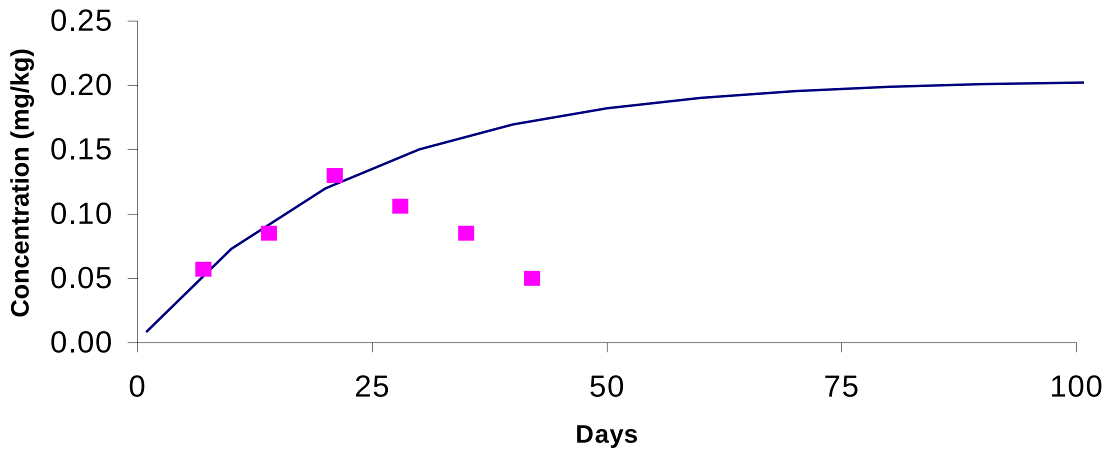
where

t_{ss} = time to reach steady state (d), and

$t_{1/2}$ = half life of the chemical (d).

9. Compare the raw data to the steady-state prediction by plotting the two where the y-axis is concentration and the x-axis is time. Estimate concentrations during uptake using the following equation:

$$C_t = C_{SS} \times \left(1 - e^{-kd \times t}\right).$$

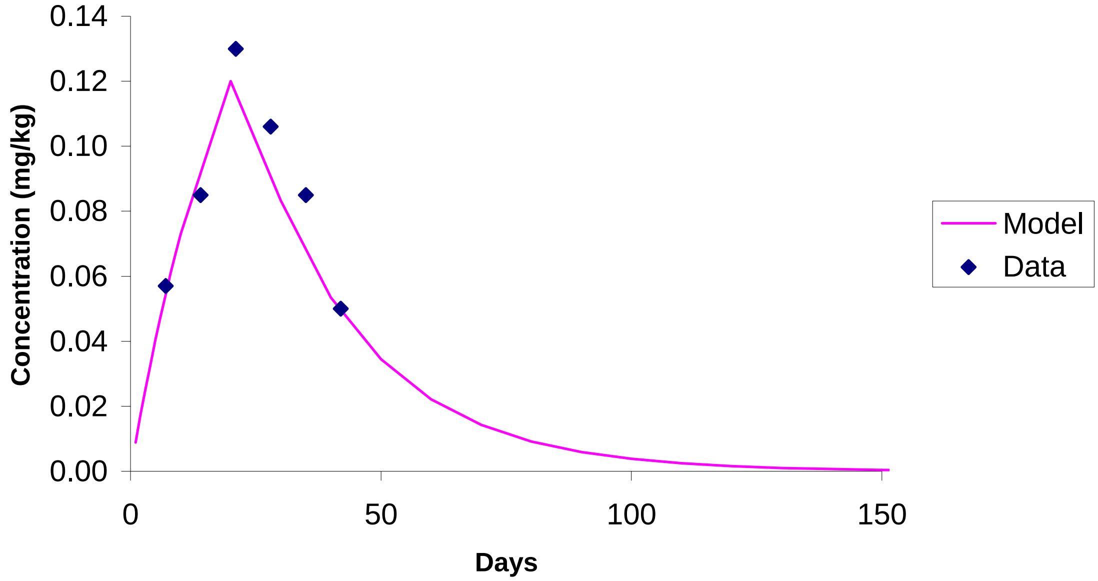


10. Compare the kinetic model's prediction to the actual data. Calculate concentrations during uptake using the equation provided in Step 9. Calculate concentrations during depuration as follows:

$$C_t = C_{last} \times e^{-kd \times (t - t_{dosed})}$$

where

C_t	= Concentration at time t (mg/kg milk),
C_{last}	= Predicted concentration on last day of dosing (mg/kg milk),
kd	= Depuration rate (d^{-1}),
t	= Time, $\geq$ days dosed (d), and
t_{dosed}	= Days dosed (d).



Reference

Rand, G.M and S.R. Petrocelli. 1985. Fundamentals of Aquatic Toxicology: Methods and Application. Hemisphere Publishing Corporation: New York.