A KINETIC MODEL OF SELENIUM METABOLISM IN STEERS TREATED WITH NARASIN

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Narasin and monensin increase whole-body retention of selenium in steers (Costa et al. 1985). The SAAM/CONSAM programme (Berman and Weiss 1978) has been used to develop a kinetic model of absorption and excretion of selenium in these steers.

Eight Friesian steers weighing approximately 120 kg were randomly allocated to two groups of four. Both groups had access to a hay and concentrate ration ad libitum. Narasin was administered to four steers (oral dose of 20-25 mg/day) for 27 days before the tracer study began. Fifty μCi $Na_2{}^{75}SeO_3$ was administered orally to each steer and whole body radioactivity was measured in the Compton whole-body counter for 20 days; plasma and blood samples were taken daily for 16 days. Cumulative excretion was calculated as: 100 minus normalised whole-body count (%dose). Mean stable Se values from plasma and blood were used as constraints in the model solution, and the steady state was assumed.

Plasma, blood and cumulative excretion of tracer in each steer were fitted to an eight compartment model. The model shown in Fig. 1 is compatible with tracer and stable Se data from all steers; it includes one plasma pool thought to represent a heterogenous population of Se species in plasma which were not resolved within the sampling schedule.

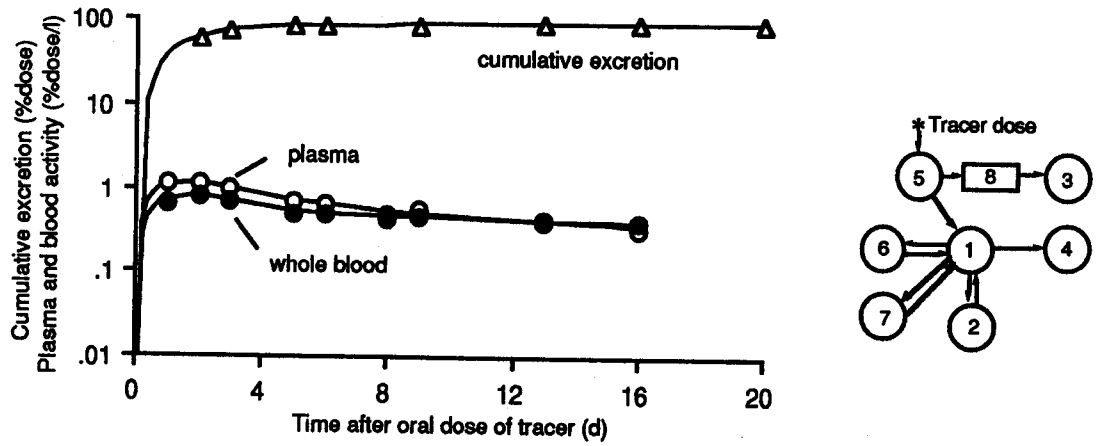

Fig. 1. Observed data (points) and model prediction (lines) in a representative steer. Inset shows structure of the model: 1=plasma, 2=blood cells, 3=faeces, 4=excretion (via all routes), 5=gut, 6=first tissue compartment, 7= second tissue compartment, 8=delay in large intestine.

Absorption of Se was calculated as: L(1,5)/(L(1,5)+L(8,5)), where L(i,j)=fractional transfer to compartment i from compartment j per day. Absorption was higher in narasin treated (29±1%) than control steers (16±3%)($P<0.05$). Fractional excretion from the plasma pool, L(4,1), did not differ between controls (mean 0.075±0.052/day) and narasin treated (0.095±0.027/day) steers.

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