Pig Scenario Description

1. Model-Data Scenario

A pregnant sow of the Belgische Landras strain, weighing about 180 kg, was given feed contaminated with organically bound tritium (OBT) for 84 days before delivery. The food had an average concentration of 577 Bq/g dry matter (dm) and was composed of a mixture of milk powder, potato powder and dried algae, as shown in Table 1.

Table 1. Composition of the sow diet

Food composition	Milk powder	Algal powder	Potato powder	Minerals
Amount (%)	41	2.3	51	5.7
Activity (%)	45.2	12.3	42.5	0
Concentration (Bq/g dm)	636.1	3085.7	480.8	0

As the pregnancy progressed, the amount of food given to the sow increased as shown in Table 2. Throughout the period, water was offered *ad libitum* but intake was not monitored. Literature values for pregnant sows indicate a water consumption of 6-8 L/d. The sow was sacrificed at birth and the tritium activity in various organs was measured. In the 84-day contamination period, urine and faeces were also monitored for tritium content.

Table 2. Amount of feed given to the sow

Time interval (days after start of contamination)	Amount of feed (kg dm/d)
0 - 21	1.86
22 - 46	2.06
47 - 79	2.31
80 - 84	3.01

Modellers are asked to predict the following:

1. Total tritium concentration in urine and HTO and OBT concentrations in faeces at the times shown in Table 3.

Table 3. Times at which predictions in urine and faeces are requested.

Day following start of contamination	Urine (Bq/ml total tritium)	Faeces HTO in water fraction (Bq/ml)	Faeces OBT in dry fraction (Bq/g dm)
7			
14			
21			
28			
36			
42			
49			
56			

2. HTO and OBT concentrations in the organs shown in Table 4 at delivery (84 days after the start of contamination)

Table 4. Organs for which predictions are requested at delivery.

Organ	Dry Matter (%)	HTO (Bq/ml)	OBT (Bq/g dm)
Heart	21.70		
Lungs	23.45		
Liver	26.09		
Jejunum	22.40		
Ileum	20.16		
Colon	24.26		
Kidney	23.68		
Muscle	26.98		
Brain	22.16		
Blood	18.54		

Modellers are also asked to provide

(i) estimates of the 95% confidence intervals on all predictions, and
(ii) descriptions of the models they used following the EMRAS template.

2. Model Intercomparisons

The above test is not appropriate for animals used for human consumption since pigs are sacrificed near 110 kg. In the absence of other experimental observations, two exercises based on hypothetical data are proposed:

2.1 Exercise 1: Long-term HTO Intake

A pig of conventional strain was given uncontaminated food and water for the first 55 days of its life, at which point it weighed 20 kg. It was then fed food and water contaminated with HTO at a level of 10,000 Bq/L for 50 days. Its feed was uncontaminated for the next 50 days, at which point it was 155 days old and weighed 110 kg, and was sacrificed. At no time was any of the feed given to the pig contaminated with OBT. Modellers are asked to predict the total tritium in urine, HTO and OBT in faeces and OBT in muscle from the time the pig was 55 to 155 days old (50 days of contaminated diet and 50 days of clean) for the times given in Table 5. Estimate also the 95% confidence intervals of all predictions.

Table 5. Times at which predictions in urine and faeces are requested.

Day following start of contamination	Urine (Bq/ml total tritium)	Faeces HTO in water fraction (Bq/ml)	Faeces OBT in dry fraction (Bq/g dm)	Meat OBT (Bq/kg fw)
7				
14				
21				
42				
50				
60				
70				
100				

2.2 Exercise 2: Short-Term OBT Intake

All animals on a large pig farm are fed OBT-contaminated food for a single day at a level of 1 MBq/kg dm. Modellers are asked to predict the meat and liver OBT concentrations at sacrifice (body mass 110 kg) for the following pig mass on the day of contamination: 20, 40, 60, 80 and 100 kg.

One of the aims of Exercise 2 is to determine if accurate results can be obtained by considering a single generic pig or if the specific strain and diet of the pig must be taken into account. Accordingly, the modellers are asked to assess the influence of growth rate and genotype on their results by carrying out calculations for their default pig (and default diet) and for slow-growth and fast-growth pigs, as defined below:

- A slow growth genotype needs about 165 days to grow from 20 to 110 kg. For a moderate fatness, the adipose mass is near 30% of empty body mass and the meat near 25%. (Empty body mass is the live body mass minus the content of the gastrointestinal tract.)

- Modern commercial pigs needs about 110 days to grow from 20 to 110 kg. Depending on genotype, muscle mass can be high (63%) or low (45%). Accordingly, the adipose mass fraction can vary between 15 and 28%.

Generic intakes for slow-growth and fast-growth pigs are shown in Table 6. These intakes assume an *ad libitum* diet based on barley (20%), corn (60%) and soybean meal (20%) that contains 21% crude protein, 1% lysine and 14.4 MJ metabolisable energy per kg on a dry mass basis.

Table 6. Generic feed intake

	Intake (kg dm/d)				
Body mass (kg)	20	35	50	80	110
Intake for slow growth	1	1.4	1.66	1.9	2
Intake for modern commercial growth	0.95	1.48	1.9	2.35	2.7

Total water intake is $0.3BM^{0.71}$ L/d, where BM is body mass in kg.

All assumptions regarding pig genotype, diet and intake rates should be fully documented in the model descriptions.