Evaluating environmental impacts of selection for residual feed intake in pigs

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To perform a sensitivity analysis, it is necessary to have a parametric model in which all parameters are mathematically interlinked. We used the following formulations for developing a parametric model to incorporate intended traits in our life cycle assessment (LCA) calculations.

eBW= 5.969\*BP 0.944 + 0.854 \* BL 0.944  (van Milgen et al., 2008)

Lean meat percentage= 72.58 – 43.49 \* BL/ eBW (van Milgen et al., 2008)

N Body = e^(-0.9892 – 0.0145 Lean%) \* eBW^(0.7518 + 0.0044 Lean%) / 6.25

 (Dourmad et al., 1992)

N Intake = Feed Intake \* N Feed

N Excreted = N Intake – N Retained

P Body (g)= 5.39\*eBW (Rigolot et al., 2010a)

Ca Body (g)= 8.56\*eBW (Rigolot et al., 2010a)

K Body (g)= - 0.0041\*eBW2 + 2.68\*eBW (Rigolot et al., 2010a)

Cu Body (mg)= 1.1\*eBW (Rigolot et al., 2010a)

Zn Body (mg)= 20.6\*eBW (Rigolot et al., 2010a)

N20= 0.002\*N Excreted (Rigolot et al., 2010b)

N2= 5\*N20 (Rigolot et al., 2010b)

NH3 Building (kg) = 17/14\*0.24\*N Excreted (Rigolot et al., 2010b)

ResD= Feed intake \*residue feed

ECH4 growing = ResD\*670 J/g (Rigolot et al., 2010a)

CH4 Emitted= ECH4 / 56.65 MJ/kg (Rigolot et al., 2010a)

CH4 Housing (kg) = VS\*B0\*MCF (Rigolot et al., 2010b)

OM Faeces = Feed\*OMfeed \*(1 – dCOM) (Rigolot et al., 2010a)

dCOM Grow = (0.744 + (14.69 DE – 0.50 NDF – 1.54 MM) / DM) / (OM / DM) (Rigolot et al., 2010a)

eBW = empty body weight ; BP = body protein ; L = body lipid; N Body = nitrogen content of body; N Intake = total uptaken nitrogen; N Feed = notrogen content of 1kg feed; N Excreted = total excreted nitrogen; NRetained = nitrogen ratained in the body; OM = organic matter; MM = mineral mater; DM = dry matter; dCOM = feed organic matter digestibility coefficient; NDF = Neutral detergent fiber; B0 = maximum CH4 producing capacity; MCF = methane conversion factor; ResD = digsted fibre ingested.CH4 = methane; N = nitrogen; Ca = calcium; P = phosphorus; K = potassium; Cu = copper; Zn = zinc.