Genetic analysis of longitudinal measurements of feed intake in Piétrain sire lines

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Background

- Feed efficiency (FE) is of major importance in pigs production because of large feeding cost
- Selection strategies to improve FE should allow a reduction of feed intake (FI) with growth rate at least constant

Objectives

- To estimate genetic parameters for longitudinal measurements of feed intake in a crossbred population of pigs
- To develop a genetic evaluation for FE of Piétrain boars

Conclusions

- Heritability of FI is moderate and tends to increase with age
- High FI at the beginning does not necessarily match with high FI at the end
- FI seems to be influenced by different genes during the growth period

Data

- FI recorded every 15 days in test station between 2007 and 2012
- 4,095 records of cumulated FI
- 2,127 crossbred pigs Piétrain x Landrace K+
- 84 Piétrain boars with progeny recorded
- Standardization and pre-adjustment of data at 150 days of progeny-test due to variance heterogeneity

Model

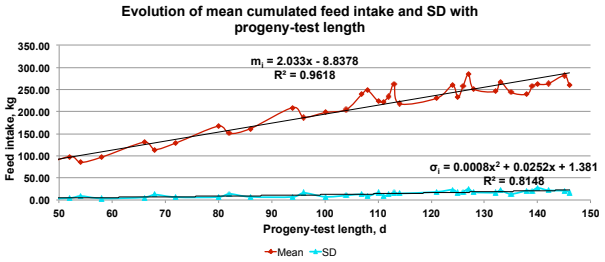
Random regression animal model

$$y = Xb + Za + Zp + Wl + e$$

y = observation of FI
b = fixed effects (sex and batch)
a = random additive genetic effect
p = random permanent environment
l = random pen effect
e = residual

} Modeled with quadratic Legendre polynomials

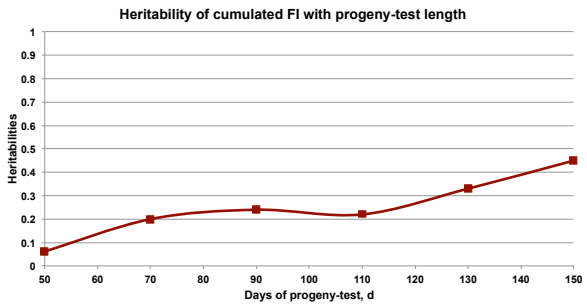
Results



- Estimated mean and SD based on the smoothing curves (x = day of test)
  $m_i = 2.033x - 8.8378$
  $\sigma_i = 0.0008x^2 + 0.0252x + 1.381$
- ➔ Standardized and pre-adjusted records:

$$y^*_{ij} = \frac{y_{ij} - m_i}{\sigma_i}\sigma_{150} + m_{150}$$

- h^2 increases between 50 and 150 days of progeny–test, from 0.06 to 0.45
- h^2 of FI between 50 and 150 days of test = 0.66



Days	70	90	110	130	150
50	0.76	0.54	0.25	-0.20	-0.65
70		0.96	0.82	0.49	0.01
90			0.95	0.72	0.28
110				0.90	0.57
130					0.87

- High genetic correlation between adjacent ages
- Decreasing genetic correlation with increasing age intervals
- Negative genetic correlations between the beginning and the end of the testing period➔border effect?

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