

Selection for residual feed intake : correlated effects on (feeding behaviour and) growth and feed intake profiles in Large White pigs

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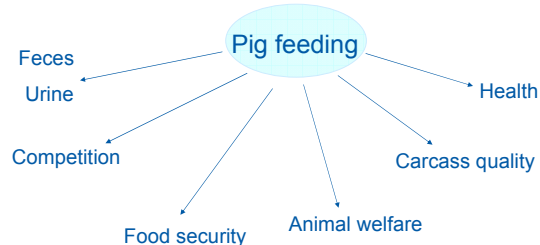
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Jouy-en-Josas ; [§]GEPA, Le Magneraud et Rouillé
[§]UEICP, Rouillé ; * SENAH, Saint-Gilles



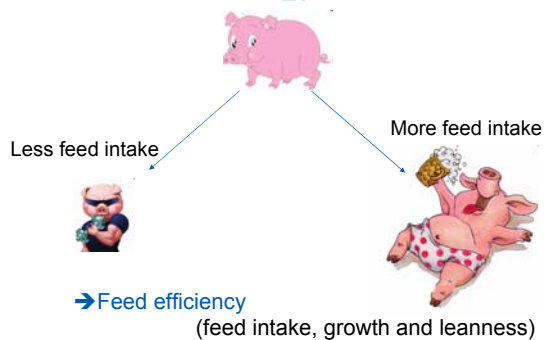
Feed intake as a major goal



EAAP 2009



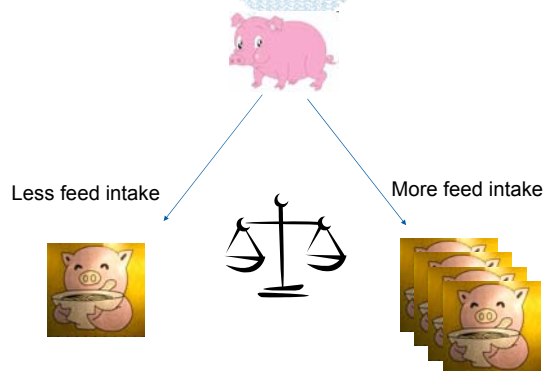
Feed intake genetic correlations



EAAP 2009



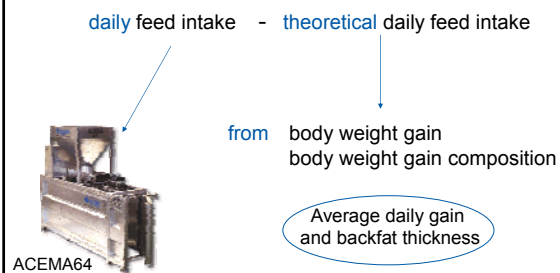
Feed intake and Residual Feed Intake



EAAP 2009



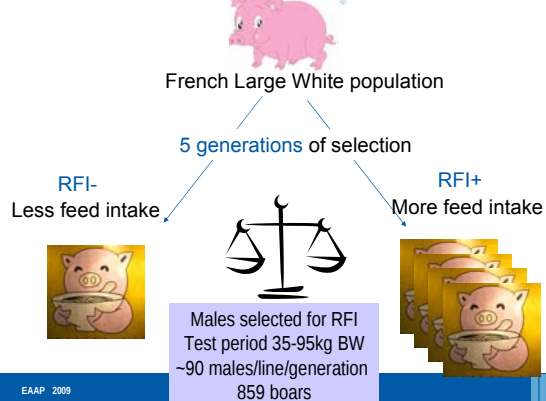
Residual Feed Intake = RFI



EAAP 2009



Feed intake and Residual Feed Intake



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RFI divergent selection

Traits and computations



Daily Feed Intake (DFI)
Eating Time per Day (ETD)
Rate of Feed Consumption (RFC)

+ BFT at 35kg, 65kg and 95kg

- RFI
- parameters describing growth and feed intake **profiles**

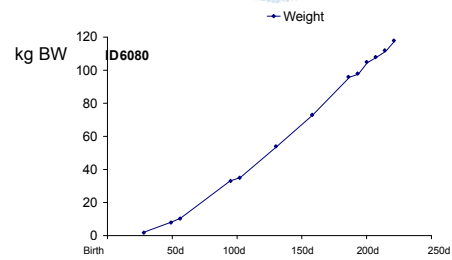


BW
Birth, 21d, 28d, 70d,
every week to 110kg

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Model for growth profiles



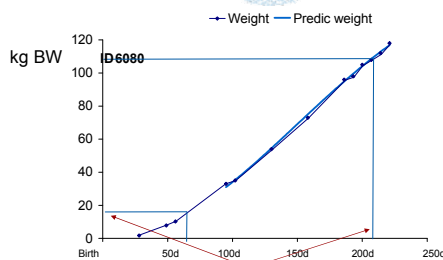
$$BW = f(\text{age}; B_{\text{Gompertz}}, \text{age}_{110\text{kg}}, BW_{65\text{d}})$$

→ $ADG_{65\text{d}_110\text{kg}}$

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Model for growth profiles



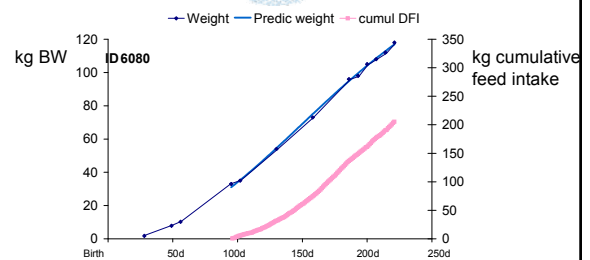
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Model for feed intake profiles



$$BW = f(\text{age}; B_{\text{Gompertz}}, \text{age}_{110\text{kg}}, BW_{65\text{d}})$$

$$DFI = a_{\text{intake}} \times BW^{\text{bintake}}$$

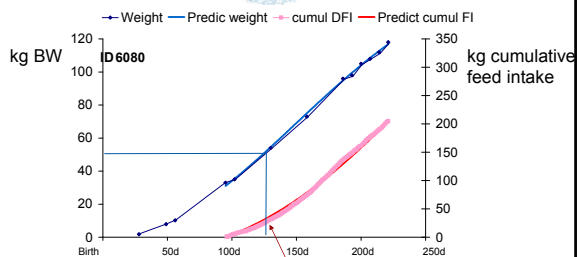
→ $ADG_{65\text{d}_110\text{kg}}$

→ Y_{50} = predicted FI at 50kg BW

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Models for feed intake profiles



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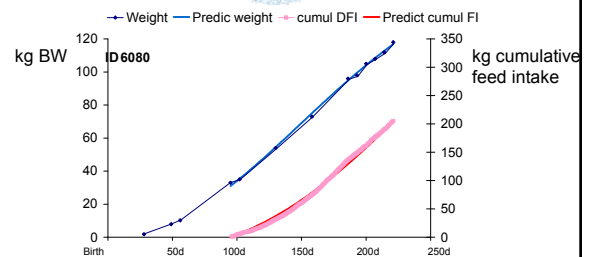
→ $ADG_{65\text{d}_110\text{kg}}$

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Models for growth and feed intake profiles



$$BW = f(\text{age}; B_{\text{Gompertz}}, \text{age}_{110\text{kg}}, BW_{65\text{d}})$$

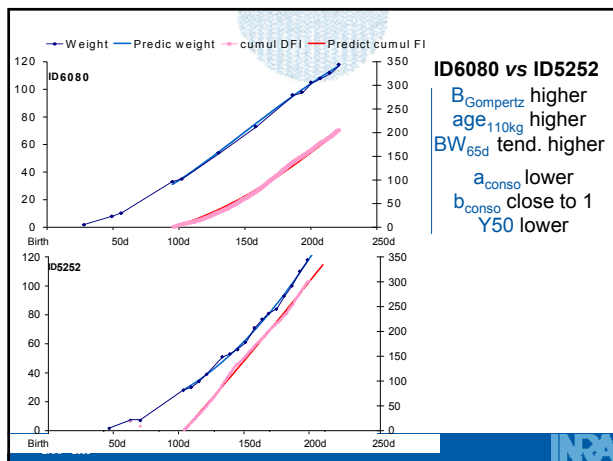
$$DFI = a_{\text{intake}} \times BW^{\text{bintake}}$$

→ $ADG_{65\text{d}_110\text{kg}}$

→ Y_{50} = predicted FI at 50kg BW

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Analyses

VCE4.5 (multitrait animal model):

genetic parameters

individual genetic values

→ test of responses to selection

Fixed effects

Batch: 25 levels

Number of pigs/pen: 5 levels ($\leq 8, 9, 10, 11$, or 12 pigs)

Herd of birth: 2 levels (Le Magneraud or Rouillé)

Heritabilities of growth and feed intake parameters

	h^2
$\text{ADG}_{65\text{d}-110\text{kg}}$	0.43
$\text{BW}_{65\text{d}}$	0.27
B_{Gompertz}	0.18
$\text{age}_{110\text{kg}}$	0.43
a_{intake}	0.16
b_{intake}	0.19
$Y50$	0.41

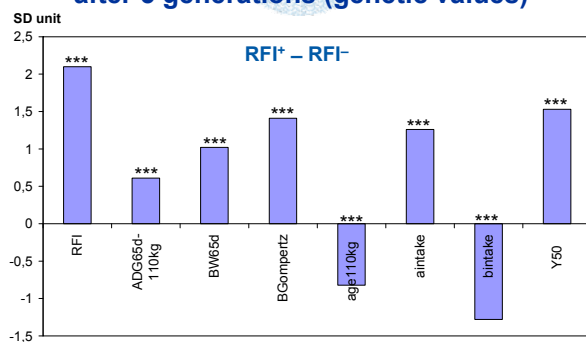
$SE = 0.03 \text{ to } 0.05$

Genetic correlations with RFI and feeding behaviour

	h^2	Residual Feed Intake	Daily Feed Intake	Eating Time per Day	Rate of Feed Cons.
$\text{ADG}_{65\text{d}-110\text{kg}}$	0.43	0.23	0.77	0.33	-0.04
$\text{BW}_{65\text{d}}$	0.27	0.21	-0.02	0.12	-0.11
B_{Gompertz}	0.18	0.27	0.57	0.23	-0.02
$\text{age}_{110\text{kg}}$	0.43	-0.34	-0.73	-0.34	-0.03
a_{intake}	0.16	0.24	0.34	0.15	0.01
b_{intake}	0.19	-0.15	-0.04	-0.03	0.02
$Y50$	0.41	0.61	0.95	0.36	0.02

$SE = 0.03 \text{ to } 0.16$

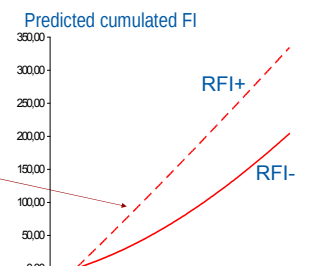
Responses to selection for RFI after 5 generations (genetic values)



Summary (1)

➤ Explicit parameters of growth and feed intake profiles are heritable

➤ Genetic correlations:
High RFI
high early growth
high and constant FI



Summary (2)

➤ Responses to selection: highly significant for parameters of growth and feed intake **profiles**

For **feeding behaviour** :heavier and longer meals, slower rate of food consumption for high RFI pigs

➤ **Y50** (predicted FI at 50kg BW): **heritable and genetically correlated to DFI and RFI**

→ **predictor** of feed intake, what about feed efficiency ?