Assessment of amino acid requirements by crossbreed and sex of growing pigs **based on sequential measurements of body weight and feed intake**

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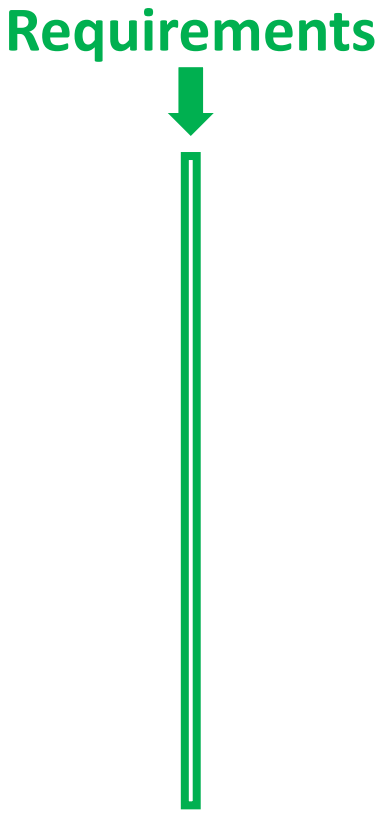
AXIOM LA GÉNÉTIQUE FRANÇAISE

"Nutritional Models development and applications in livestock farming"
Session 19 - Quiniou and Launay

Context: accounting for pigs'requirements when designing feeding strategies → amino acids (AA)[1]



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Other amino acids are supposed to be supplied proportionnally based on the ideal protein profile.

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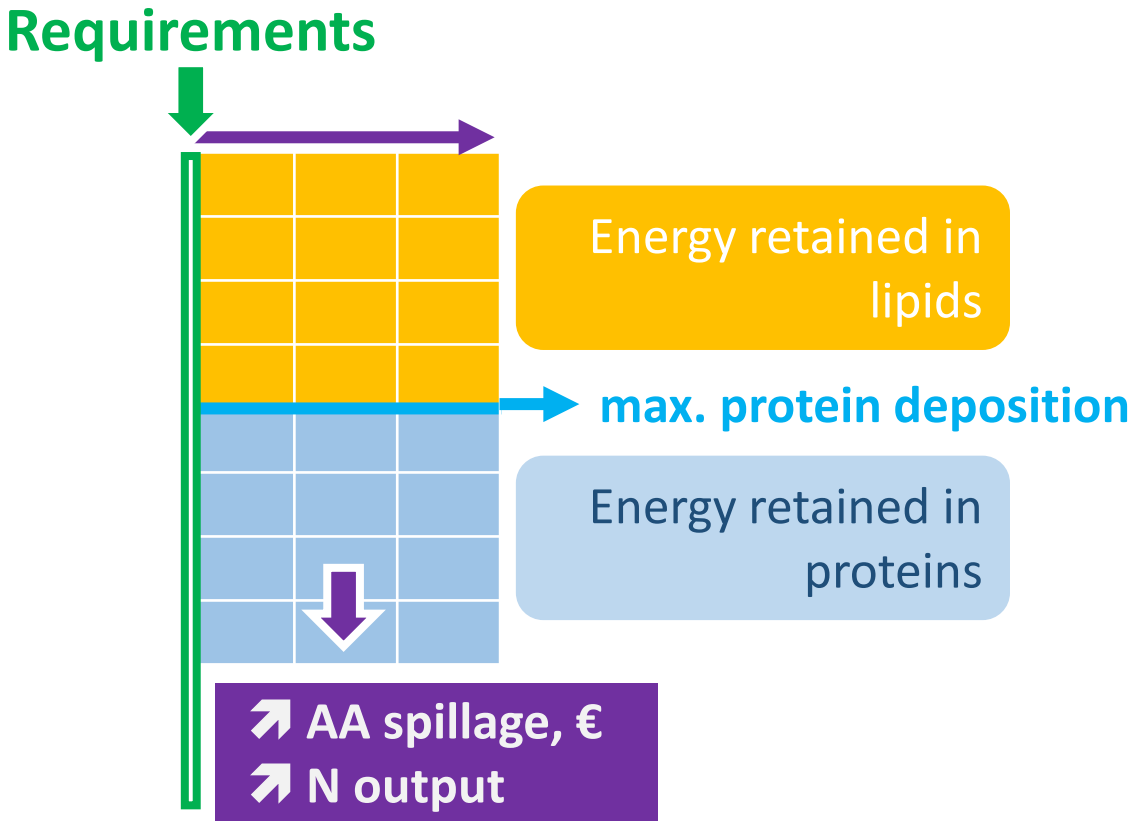
= excess



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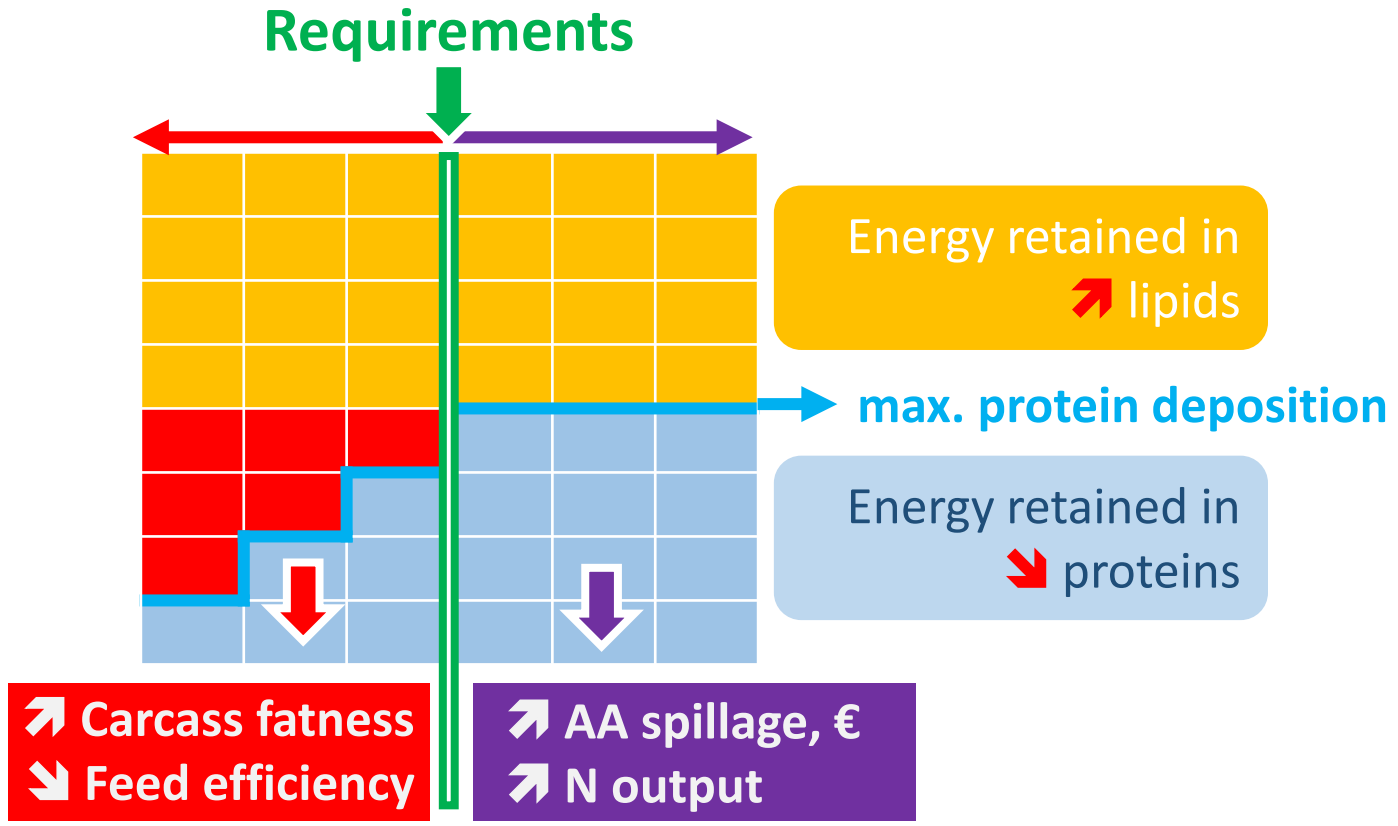

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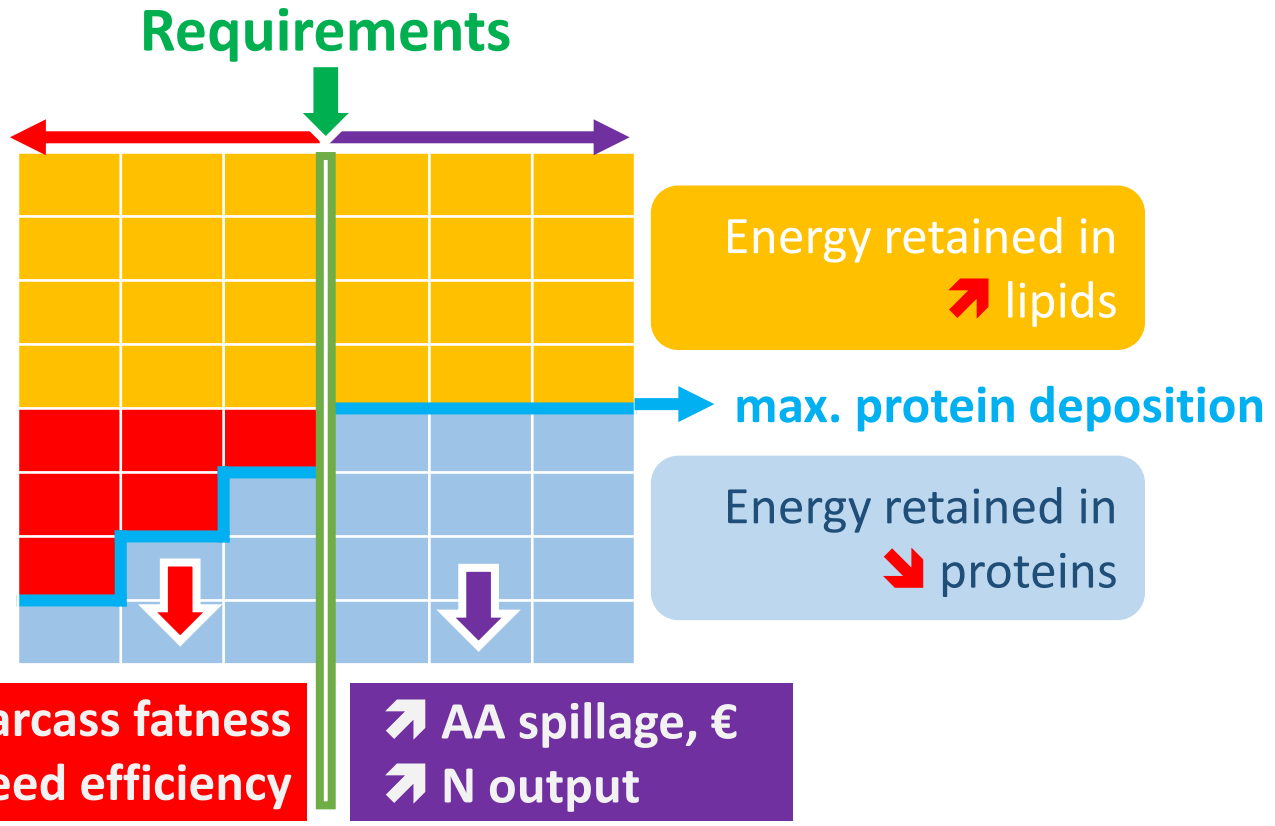
Assessment of requirements

Designing feeding strategies



Optimal resource utilisation for maximised performance

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Assessment of AA requirements with a modelling approach

Daily requirement (g/d) depends on

- the dynamic of BW → **BW = f°(age)**
- the composition of BW gain → **protein deposition**

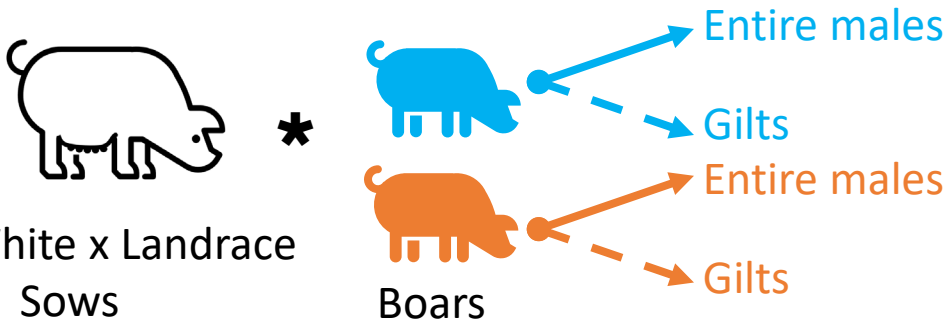
Requirement in g/kg (or g/MJ) depends also on

- the dynamic of feed (or energy) **intake = f°(BW)**

Relationships influenced by
- **extrinsic factors (rearing conditions…)**
- **intrinsic factors (crossbreed and sex)**

Aim of the study:

to assess the dynamic change in AA requirement of 4 different types of pigs from data collected every 3 weeks during fattening



BW: body weight

Experimental design

Type of boars used to inseminate the sows
Piétrain (P81) or Synthetic Line Excellium (P90)

Crossbreed (C)	**xPP**	**xSY**
Sex (S)	**Males** **Gilts**	**Males** **Gilts**

7 pens of 7 pigs per type of pigs
Feeding level: *ad libitum*
2-phase feeding - phase 1 (6 weeks): 0.99 g SID Lysine/MJ NE
- phase 2 : 0.90 g " "
} 9.75 MJ NE/kg

NE: net energy

Data collection and calibration of pig profile

Measures

Individual BW at:

- arrival
- 91 d (+3 wks)
- 112 d (+6 wks)
- 133 d (+9 wks)
- first delivery … +slaughter

Feed intake/pen:

Calculations

Average from 7 pens per type:
BW and cumulated feed intake/pig at different ages → first delivery

Calibration module of InraPorc® software

Characterisation of the growth profile

Growth curve = Gompertz		
Age initial, d	70	arrival
BW at initial age, kg		
Age final, d	141	first delivery to slaughter house
BW at final age, kg		
$B_{Gompertz}$, /d		
Mean protein deposition, g/d		
Feed intake = $a \cdot (b \cdot BW \cdot e^{-b \cdot BW}) + 1) \cdot 0.075 \cdot BW^{0.60}$		
a		
b		

Results - average performance from 70 d to slaughter

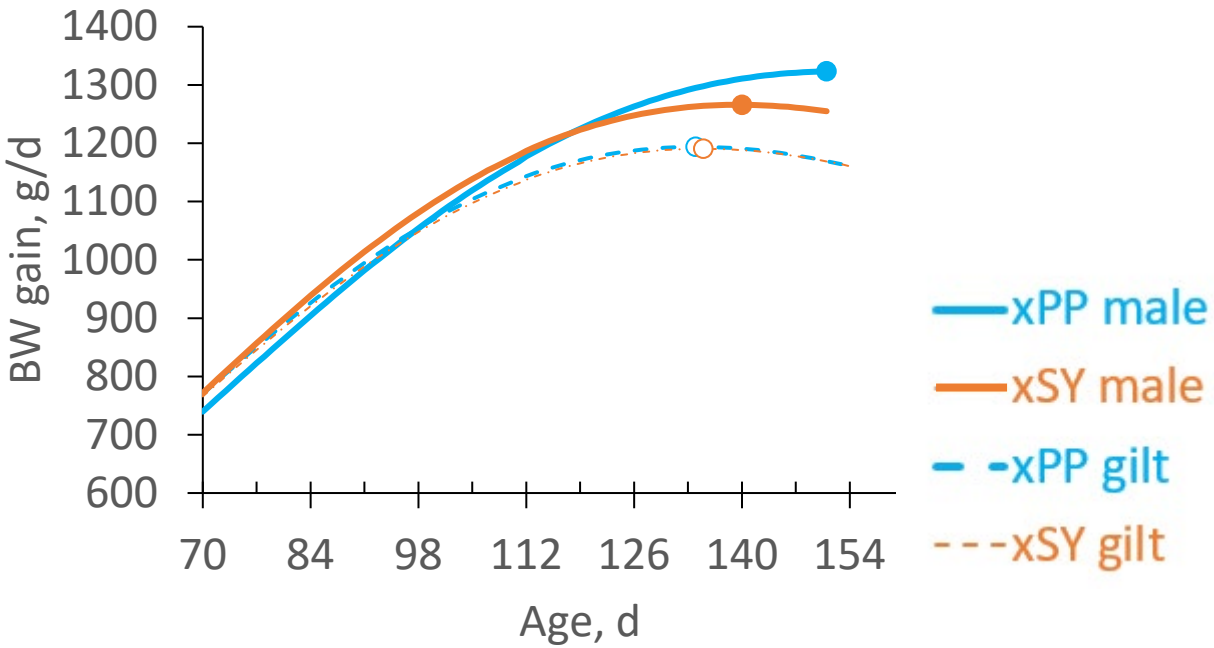
Crossbreed (C)	xPP		xSY			
Sex (S)	**Males**	**Gilts**	**Males**	**Gilts**	RSD	Effect
BW at arrival, kg	30.5	30.4	30.8	30.5	1.9	C^t
BW at slaughter, kg	118.7	115.6	117.2	115.4	60	S**
Feed intake, kg/d	2.54	2.63	2.50	2.60	0.07	S**
BW gain, g/d	1129	1064	1109	1061	78	S**
Feed conversion ratio, kg/kg	2.27	2.48	2.26	2.46	0.08	S**

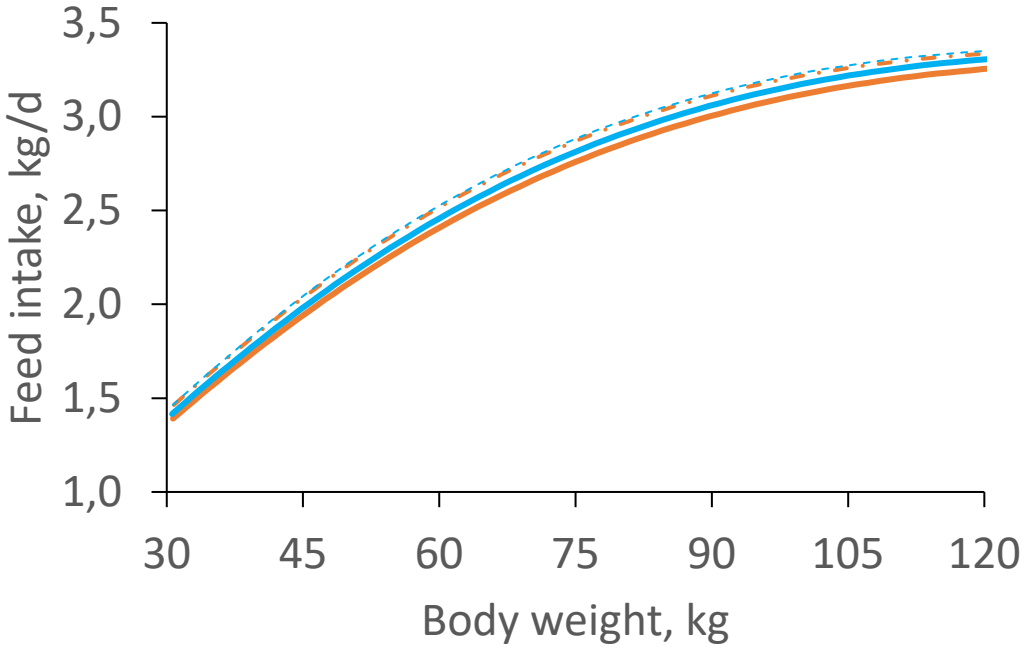
Similar average growth performance for both crossbreeds, differences observed between sexes only

RSD: residual standard deviation

*ANOVA (SAS v9.4, proc GLM) with the effects of C, S and CxS; **: P<0.01, *: P<0.05, t: P<0.10*

Results - dynamics of BW gain with age and intake with BW





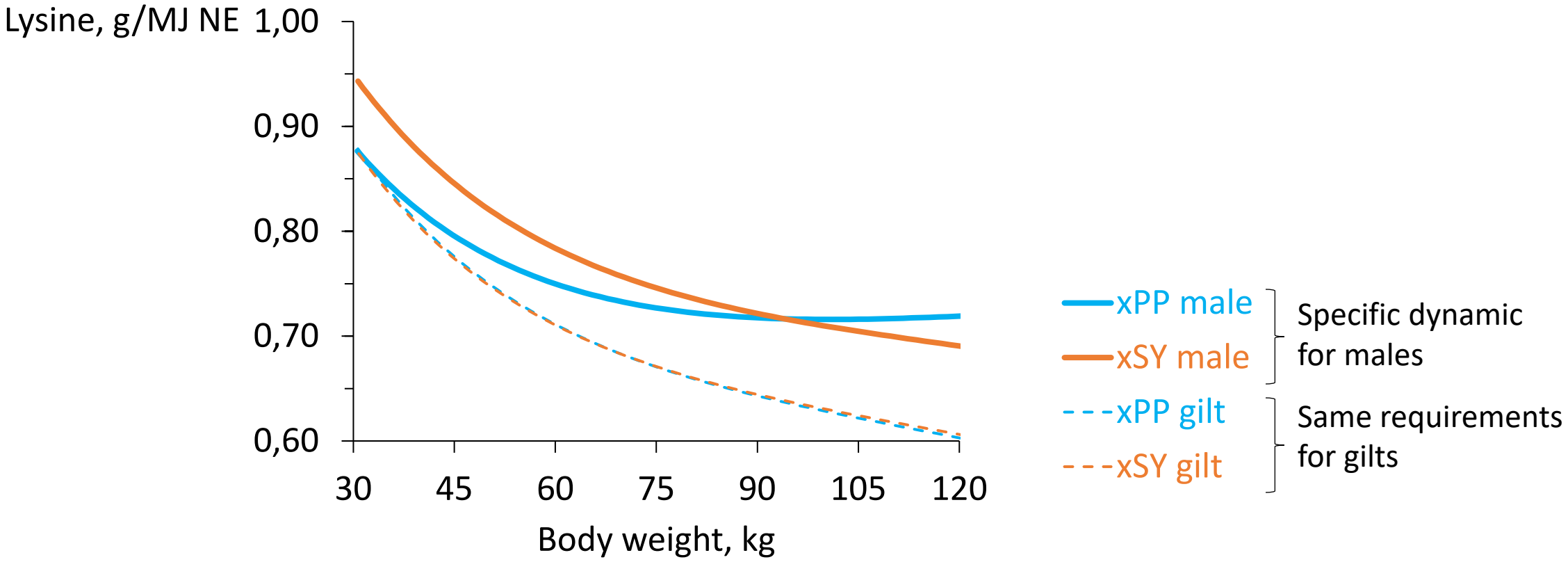
- Same curve for gilts
- xPP male matures later than xSY male

$B_{Gompertz}$	*0.00988*	*0.01145*

- Same curve for gilts
- When BW increases, appetite of xPP male increases more than that of xSY male

Parameters of each pig profile are avaible in appendix.

Results – dynamic change in lysine requirement



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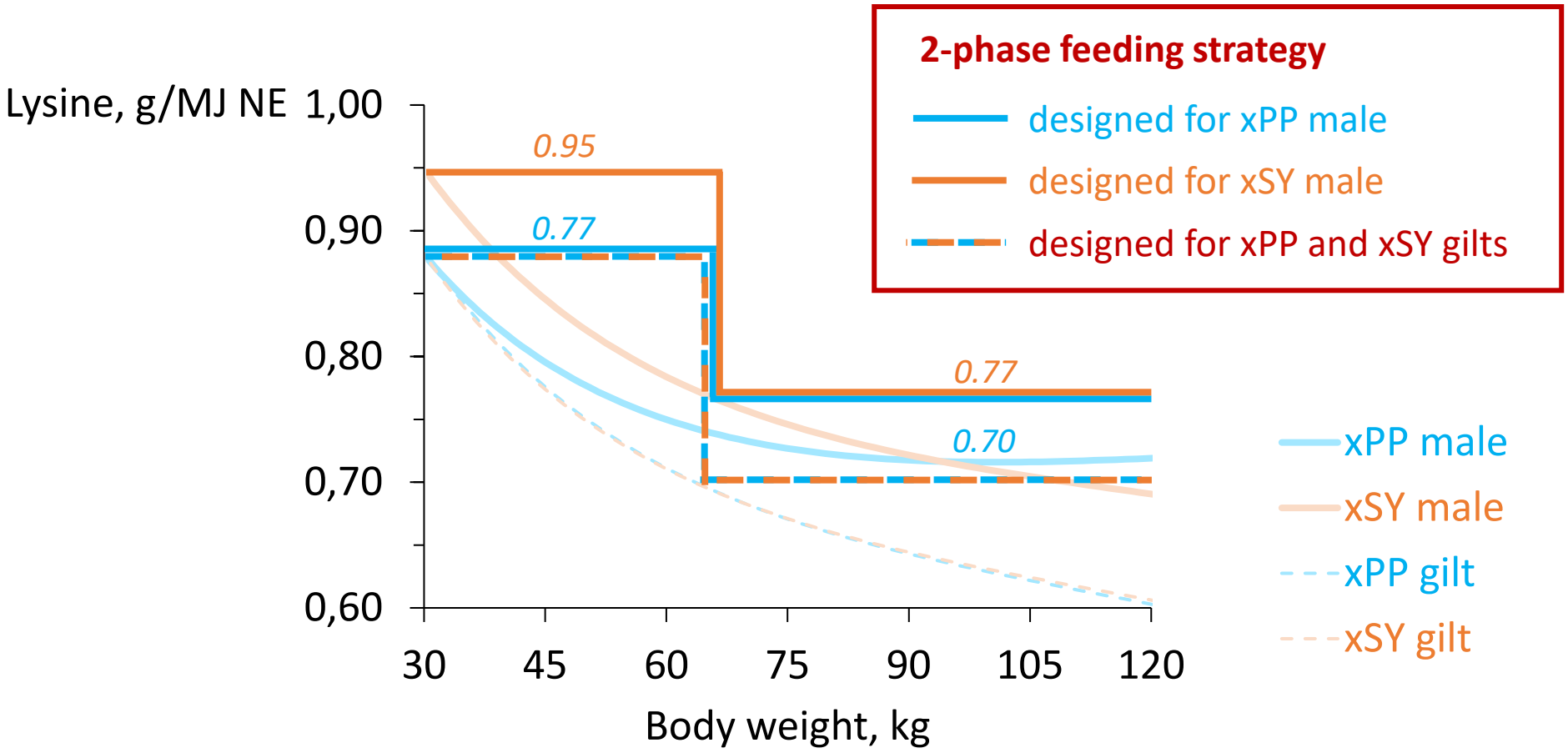

Conclusion

Similar average performance can be associated with **different** dynamics of BW gain and feed intake

- ➔ with consequences on the dynamics of nutritional requirements
- ➔ which are important to consider to implement the most adapted feeding strategy

In commercial farms, some of the pens in the fattening room can be used as sentinels

- ➔ body weight at the arrival, at one or more intermediate stages, at the first delivery
- ➔ feed delivered per pen (/number = /pig) from the arrival to each weighing

Tools are available to turn data into knowledge and advice

Thank you for your attention

Thanks to the technical **team**

Missing Loréna & Romain

Types of pigs - parameters of the BW and feed intake curves

Crossbreed (C)	xPP		xSY	
Sex (S)	**Males**	**Gilts**	**Males**	**Gilts**
BW at 141 d, kg	106.4	105.8	107.3	104.5
$B_{Gompertz}$, /d	0.00988	0.01192	0.01145	0.01175
Protein deposition, g/d	174	167	177	165
Feed intake a	4.9527	5.1561	4.8006	5.1212
Feed intake b	0.0148	0.0151	0.0147	0.0151

Growth and feed intake curves used to model the lysine requirement for each type of pigs with InraPorc®.