Abstract 31478

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## Mineral precision feeding for gestating sows

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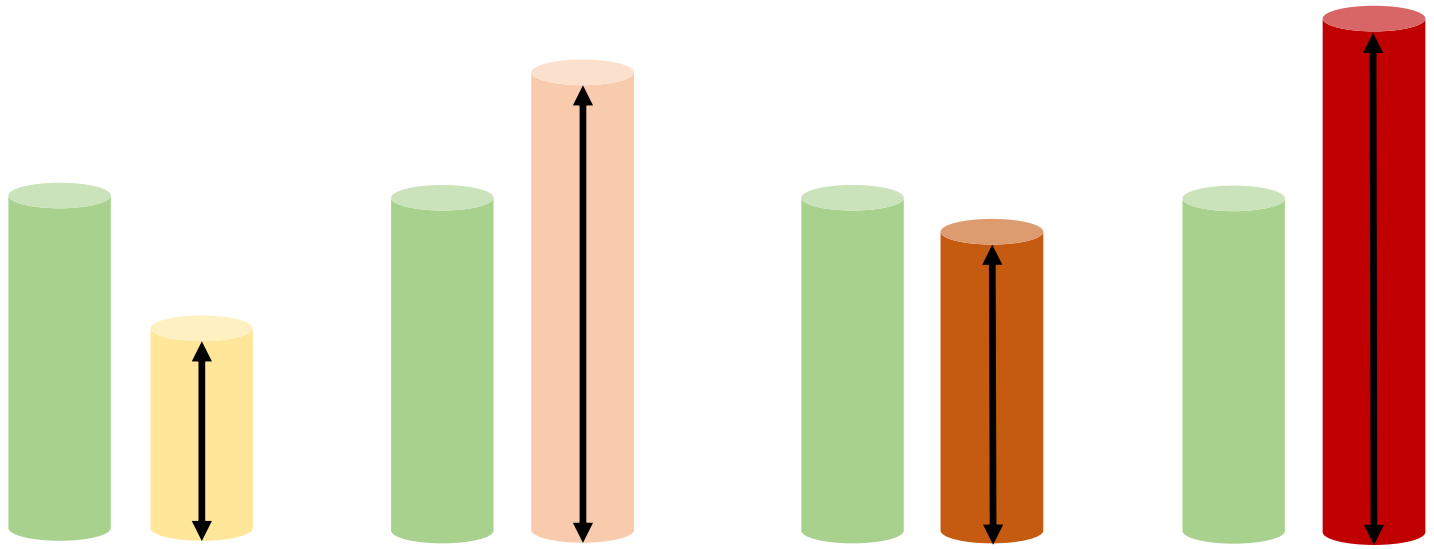
*Gestating sows*

Parity, BW at insemination: P1, 150 kg | P2, 210 kg | P1, 170 kg | P4, 250 kg

In practice :
- Restricted feed allowance
- 1 diet for all the sows during the gestation
- Fixed amount of energy and nutrients in diet



New technologies (feeders, sensors) characterize <u>in real-time</u> sows & environment
=> Use in real time the prediction model of nutrient requirements

***Perspective*** : to improve feed efficiency, reduce production costs and decrease environmental impacts

BW: Body Weight

- Precision Feeding : **daily** mixing of 2 diets with different lysine content

**Conventional feeding [CF]**

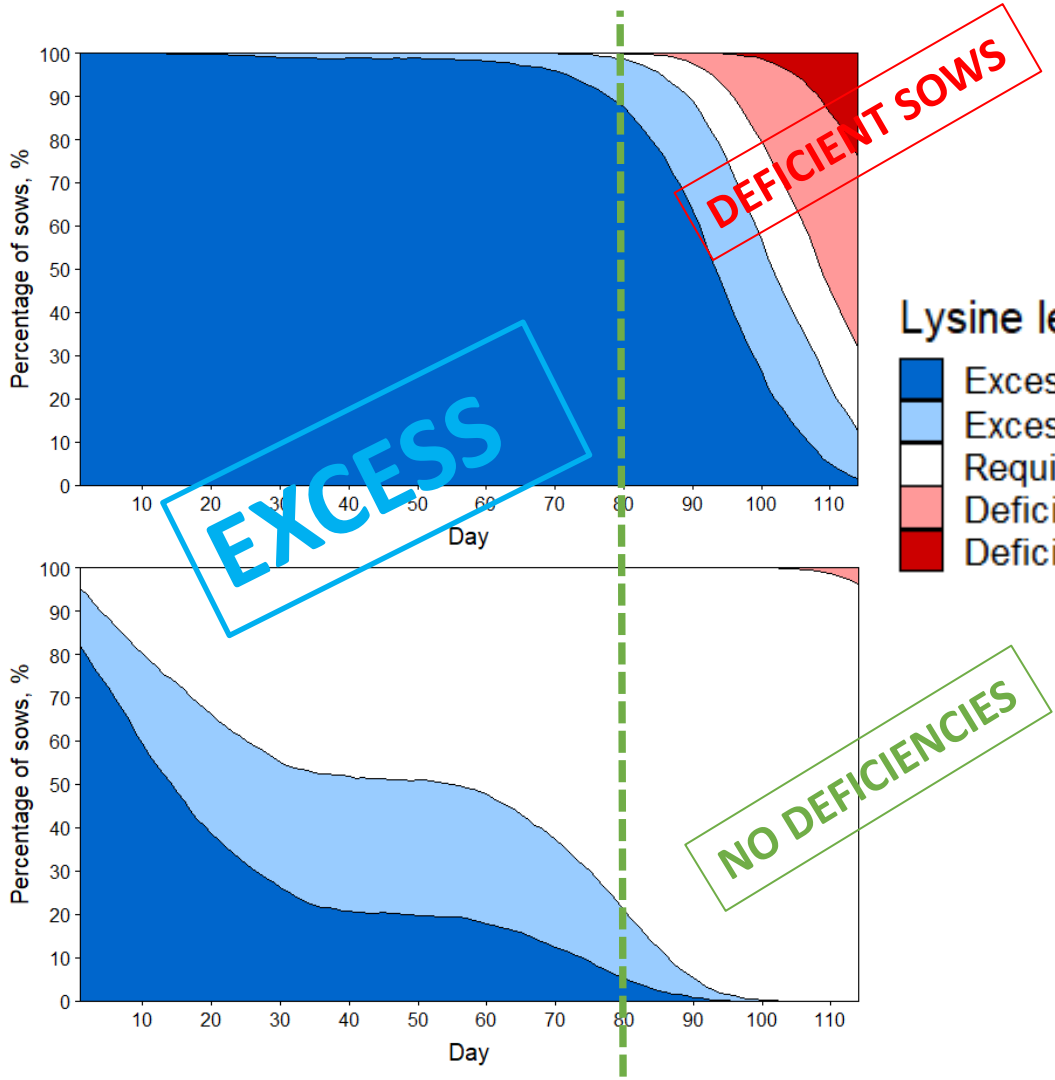
*1 diet 4.8 g Lys/kg*


**Precision feeding [PF]**

Daily Mix of 2 diets:

- *Diet A 3.0 g Lys/kg*
- *Diet B 6.5 g Lys/kg*


*[Group housed sows at 20°C]*




diet lysine content↘ of 27%

NB/ Higher benefit for primiparous sows : ↘ **excess** in early gestation

***OBJECTIVES***

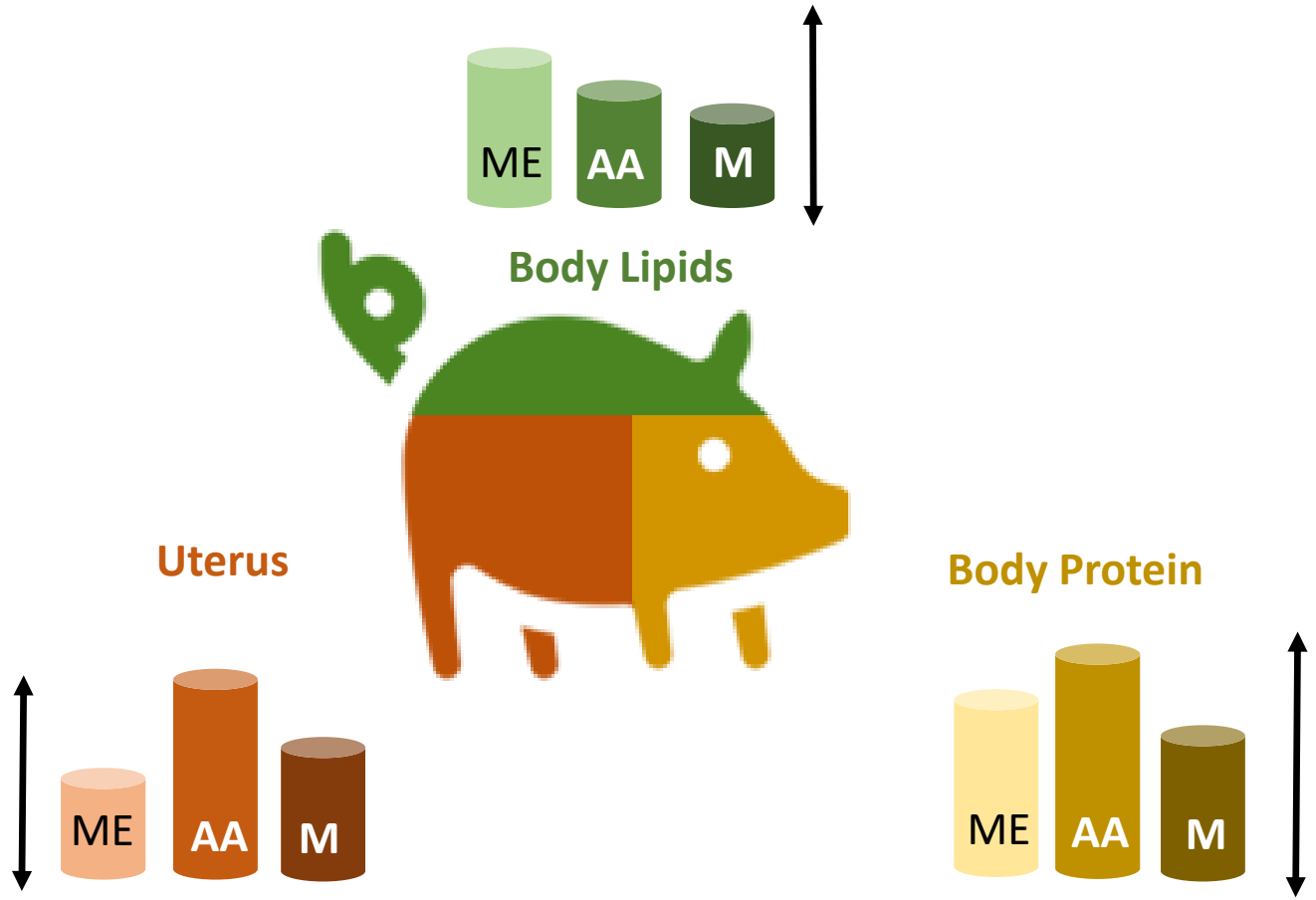
- to report the variations of mineral requirements (e.g. Standardized total tract digestible phosphorus **STTD-P**) among sows and during gestation

- to test if a precision feeding strategy based on lysine requirement could also be relevant for STTD-P

*Horizon 2020 EU Feed-a-Gene program (grant agreement n°633531)*

- Description of the gestating sow model (Adapted from InraPorc*)

ME: Metabolizable Energy
AA: Amino Acid
**M: Minerals**




Variation during gestation

** Dourmad et al. / Animal Feed Science and Technology 143 (2008) 372-386*

- Model inputs

**Sow**
- Parity
- Litter size
- Litter BW
- BW at AI and objective at farrowing
- BT at AI and objective at farrowing

**Feed**
- AA content
- Mineral content
- Energy content

**Environment**
- Housing
- Temperature

Calculate **total ME** requirement per sow, regarding BW and BT at AI

Calculate **feed supply** per sow, from total ME


For each sow, prediction of the **daily nutrient requirements** based on simulated BW from previous day

BW: Body Weight, BT: Backfat Thickness, AI: Artificial Insemination, ME: Metabolizable Energy

- Data set and analysis

2511 gestations

Python model

Statistical analysis : linear mixed model

Variables:
- requirements in SID Lys
- requirements in STTD-P

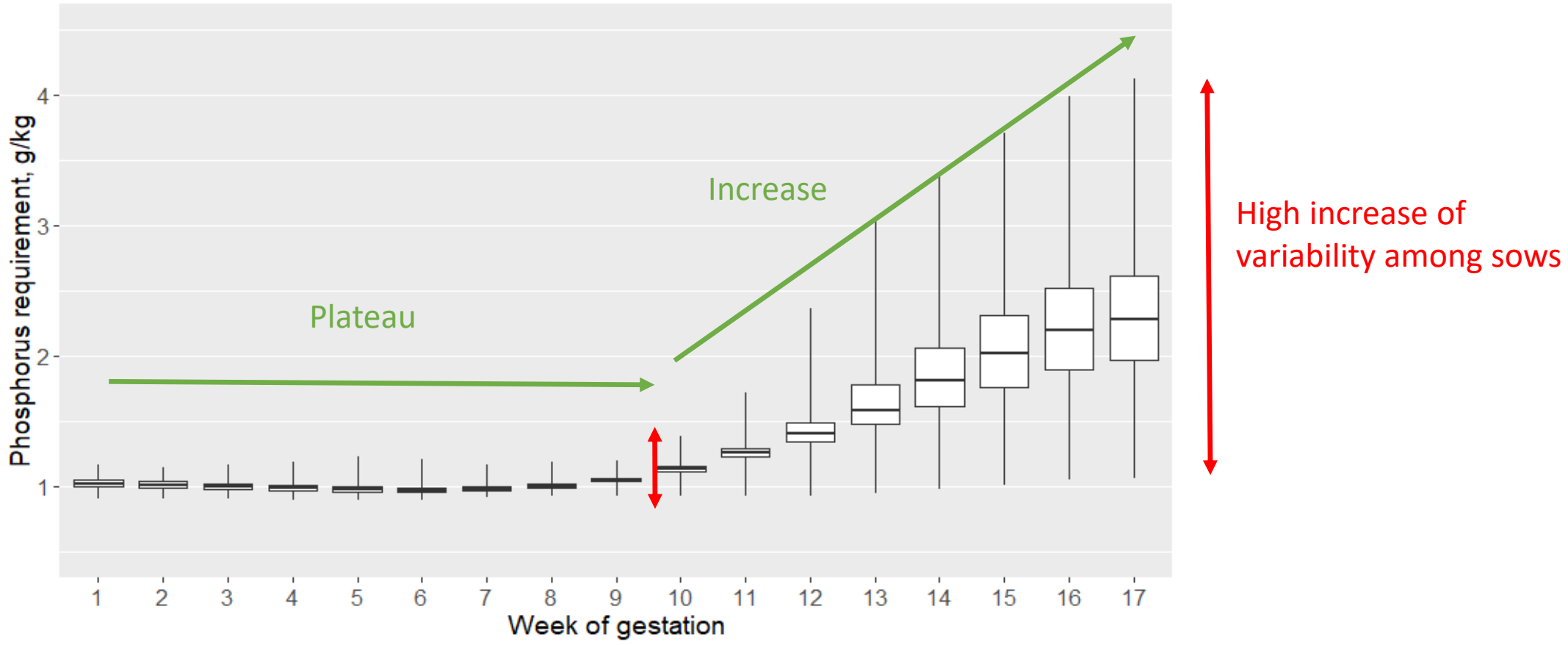
Fixed factors:
- week of gestation
- parity (1, 2, 3+)
- litter size (S, M, L)

Random factor : sow

**S**: < 12 piglets
**M**: ≥ 12 & < 16 piglets
**L**: ≥ 16 piglets

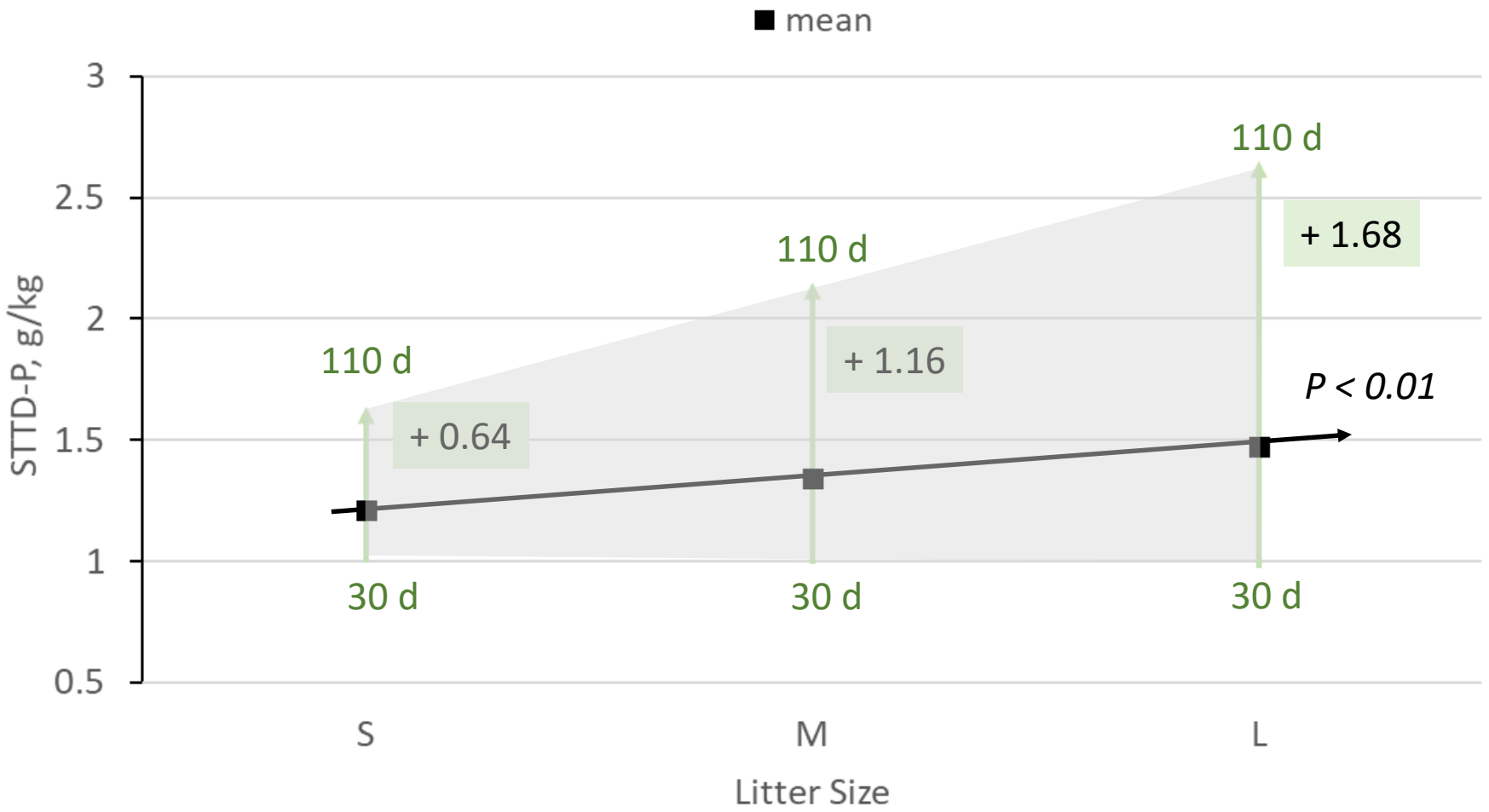
SID Lys: Standardized ileal digestible lysine, STTD-P: Standardized total tract digestible phosphorus

- Variability of STTD-P over gestation




STTD-P: Standardized total tract digestible phosphorus

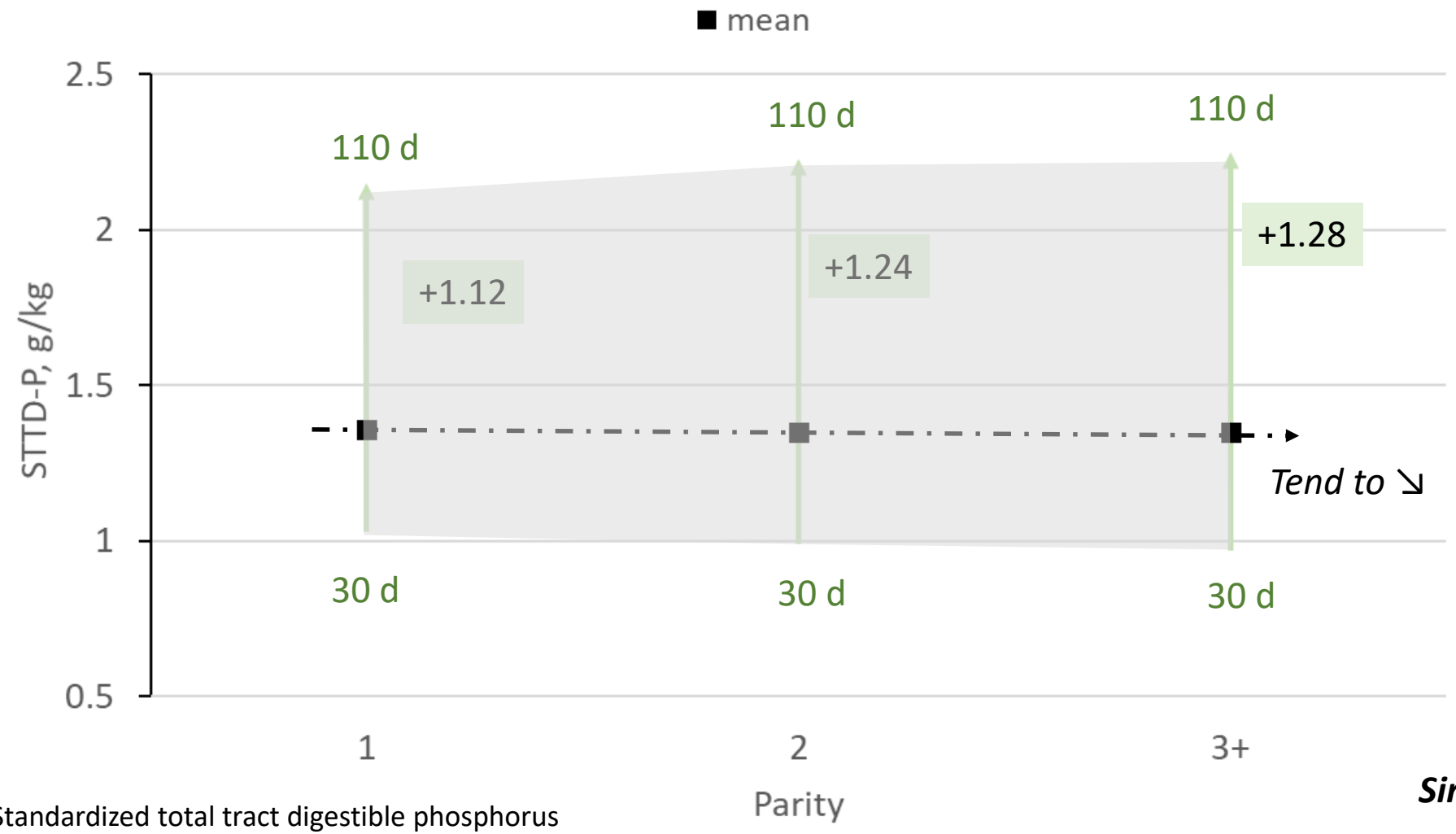
- Variability of STTD-P with litter size




Variation of STTD-P from 30 to 110 d, g/kg

STTD-P: Standardized total tract digestible phosphorus

- Variability of STTD-P with parity




Variation of STTD-P from 30 to 110 d, g/kg

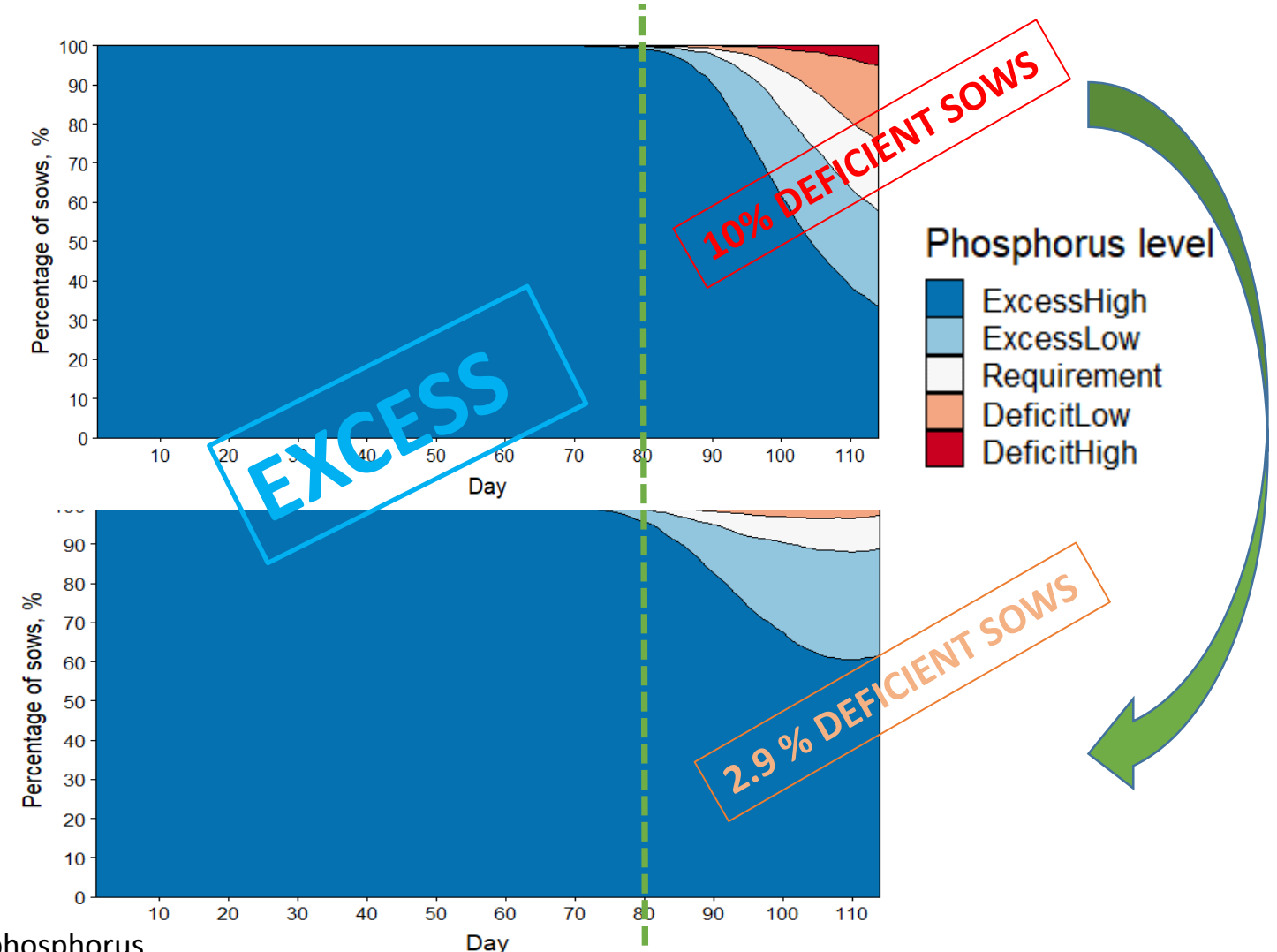
***Similar** results for STTD-Ca*

STTD-P: Standardized total tract digestible phosphorus

- **ALL SOWS** - Mineral precision feeding – based on lysine requirement

**Conventional feeding [CF]**
*1 diet* 2.5 g STTD-P/kg


**Precision feeding [PF]**
Daily Mix of 2 diets:
- *Diet A 2.0 g STTD-P/kg*
- *Diet B 3.3 g STTD-P/kg*


↘ % of P deficient sows, P intake & excretion

STTD-P: Standardized total tract digestible phosphorus

- **PRIMIPAROUS** - Mineral precision feeding – *based on lysine requirement*

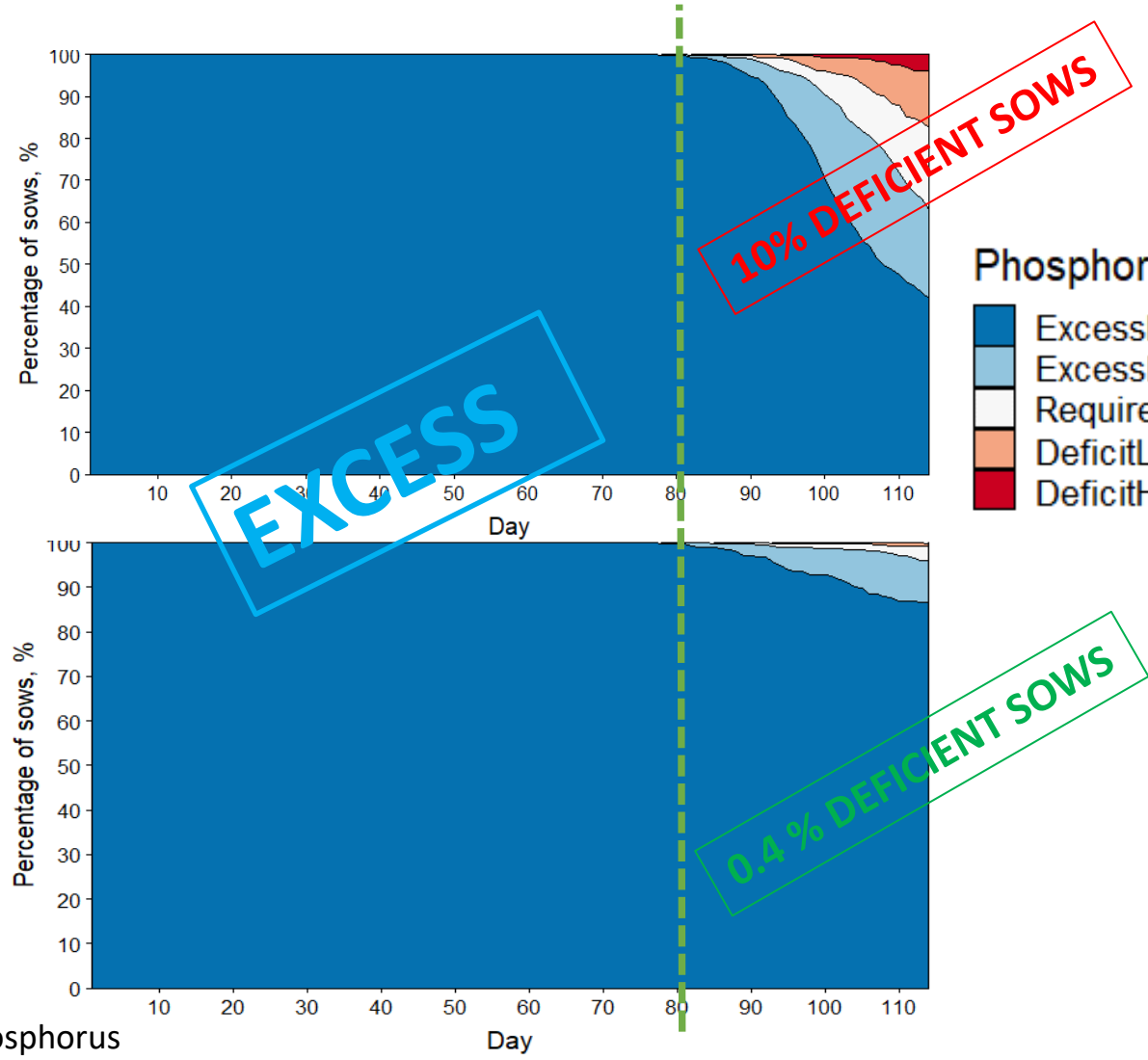
**Conventional feeding [CF]**

*1 diet* 2.5 g STTD-P/kg


**Precision feeding [PF]**

Daily Mix of 2 diets:

- *Diet A 2.0 g STTD-P/kg*
- *Diet B 3.3 g STTD-P/kg*

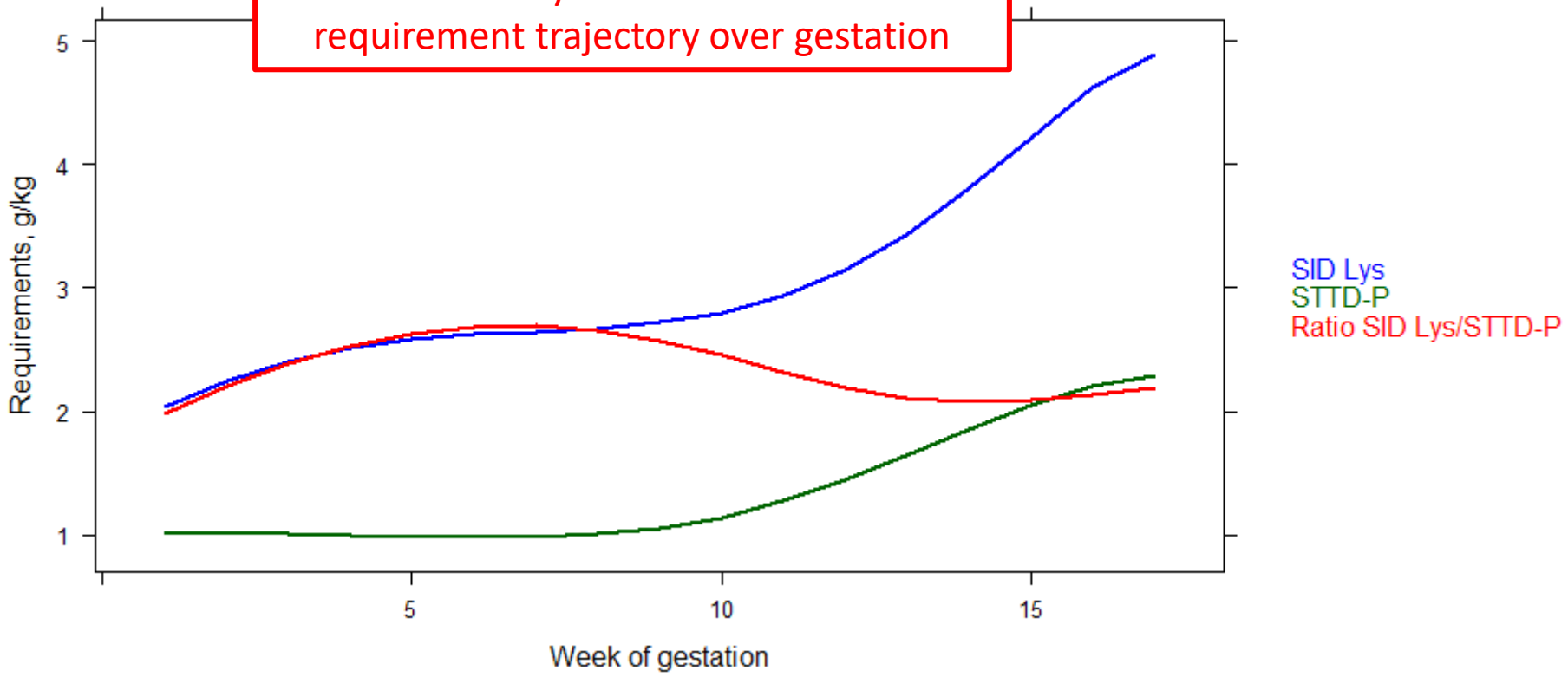

**NO P DEFICIENT**

primiparous sows

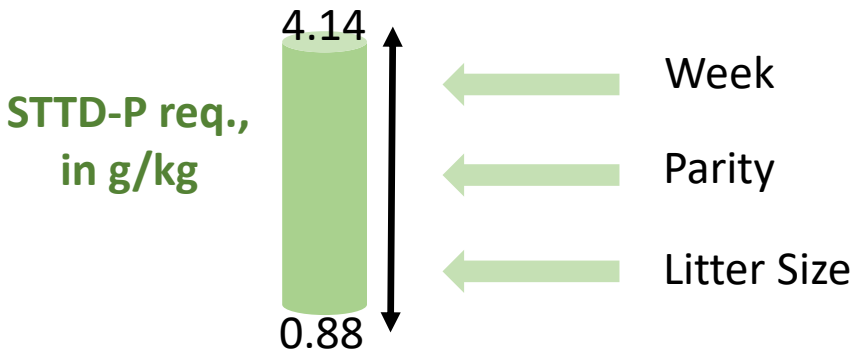
STTD-P: Standardized total tract digestible phosphorus

- Mineral precision feeding – *based on lysine requirement*

PF strategy less efficient to reduce excess in P than Lys due to a different requirement trajectory over gestation

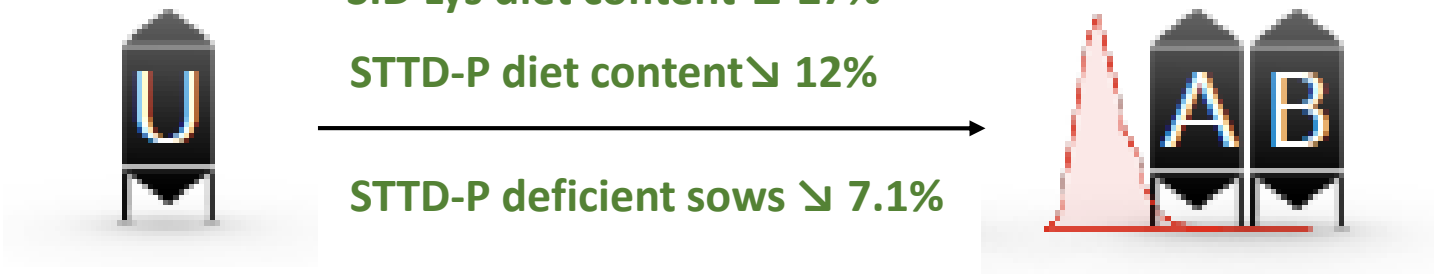


- To conclude …




**[CF]**
Conventional Feeding
(1 diet)

**[PF]**
Precision Feeding
(daily mix of 2 diets)




Mineral PF *based on lysine requirements* appear less efficient to reduce excessive supplies of STTD-P than for SID Lys due to different trajectories of requirements over gestation.

Nevertheless, the results clearly indicate that PF reduced phosphorus intake and excretion, as well as the risk of phosphorus deficient sows at the end of the gestation.

**Perspective** / Define a precision feeding strategy based on lysine & phosphorus simultaneously

# Thank you for your attention

# ANNEXES

- **SID Lys - <u>PRIMIPAROUS</u>** sows (group housed, 20°C)

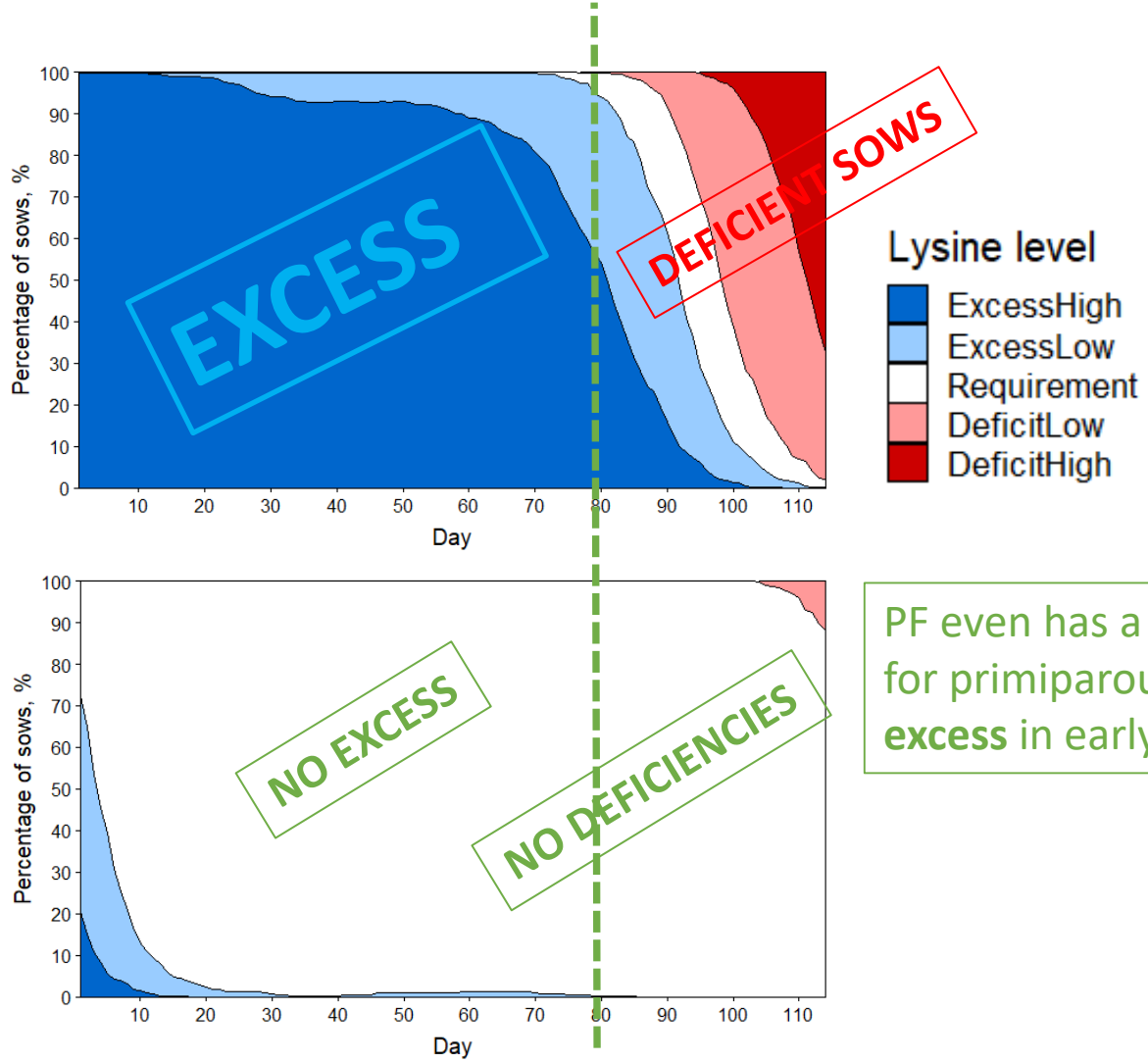
**Conventional feeding [CF]**

*1 diet 4.8 g Lys/kg*


**Precision feeding [PF]**

<u>Daily</u> Mix of 2 diets:

- *Diet A 3.0 g Lys/kg*
- *Diet B 6.5 g Lys/kg*


PF even has a higher benefit for primiparous sows : ↘ **excess** in early gestation