
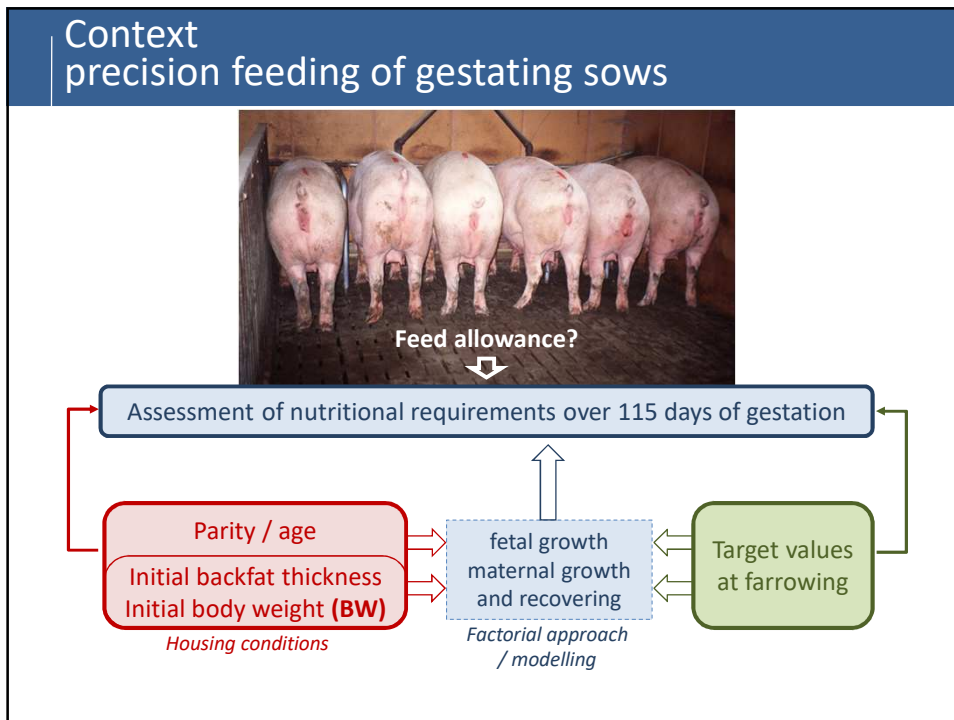
 **EAAP 2018** 69<sup>th</sup> Annual Meeting of the European Federation of Animal Science  
Session 32: Precision livestock farming in nutrition, genetics, and in physiology

 Relationship between age and body weight at farrowing over 6 parities in Large White x Landrace sow

 **ifip** institut du porc  
Nathalie QUINIOU  
nathalie.quiniou@ifip.asso.fr

**Feed-a-Gene**  
Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems  
The Feed-a-Gene Project has received funding from the European Union's H2020 Programme under grant agreement no 633531.



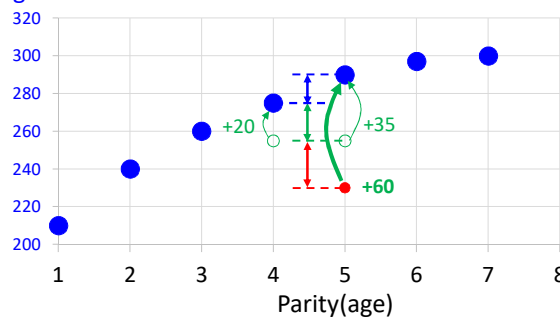
## Context precision feeding of gestating sows



1. The reproductive sow still grows during the first parities
2. Nutritional unbalance induces BW loss during lactation
3. BW loss during lactation has to be recovered

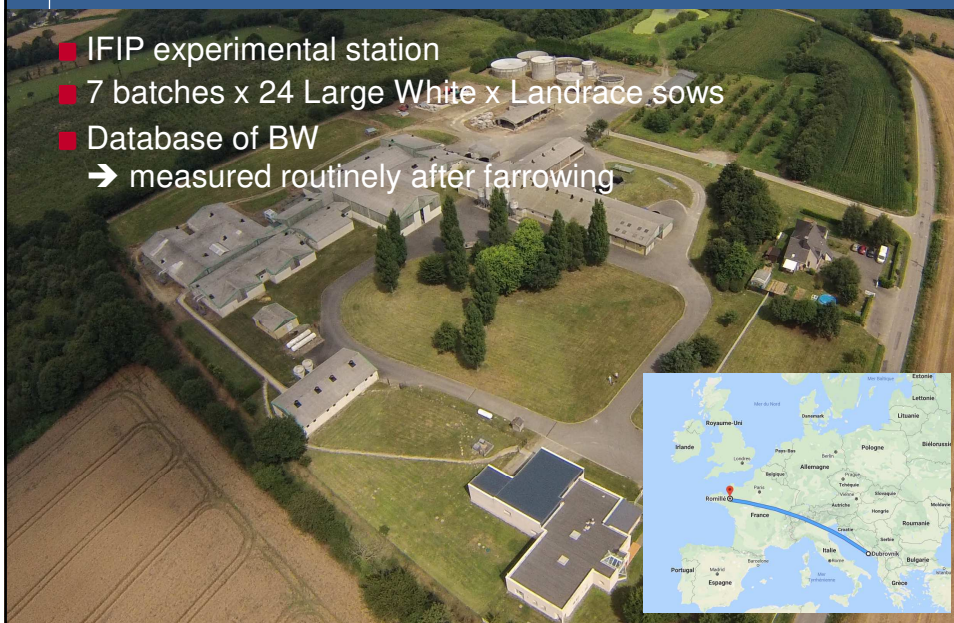
BW after farrowing, kg

BW at weaning  
=initial BW  
at the next parity  
Expected BW gain



## Material and methods

- IFIP experimental station
- 7 batches x 24 Large White x Landrace sows
- Database of BW  
→ measured routinely after farrowing



## Datasets and statistics

- Data removed from the database
  - early culled sows, i.e. longevity < 6<sup>th</sup> litter
  - special events (illness, appetite, upgrading buildings...)
  - number of available data < 6

### ■ Dataset 1 → modelling BW = f(Age)

- 90 sows born between 2012 and 2015

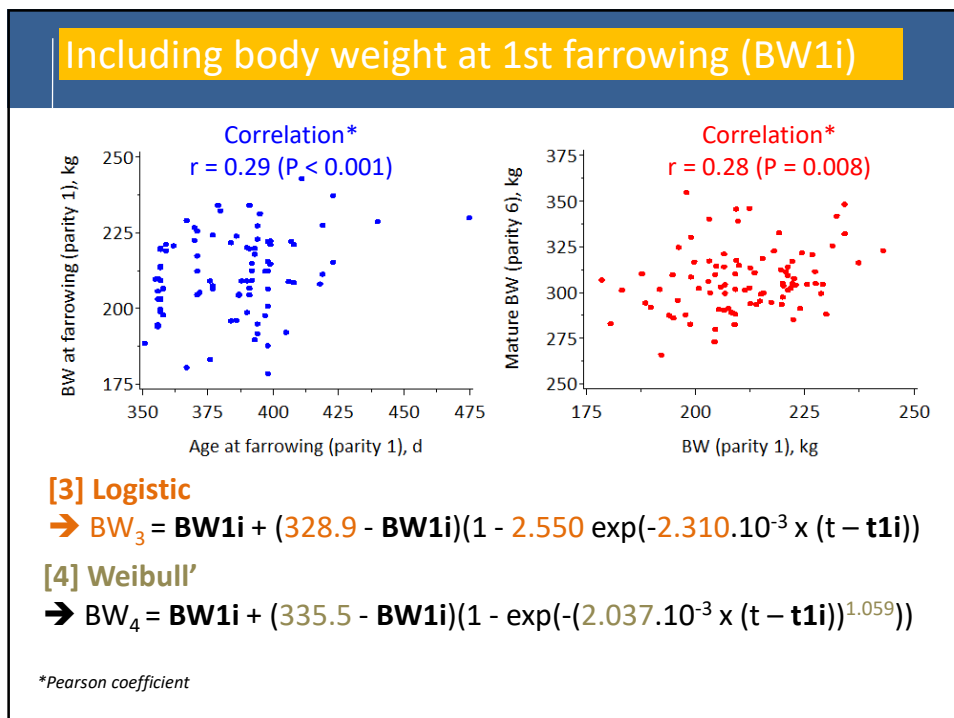
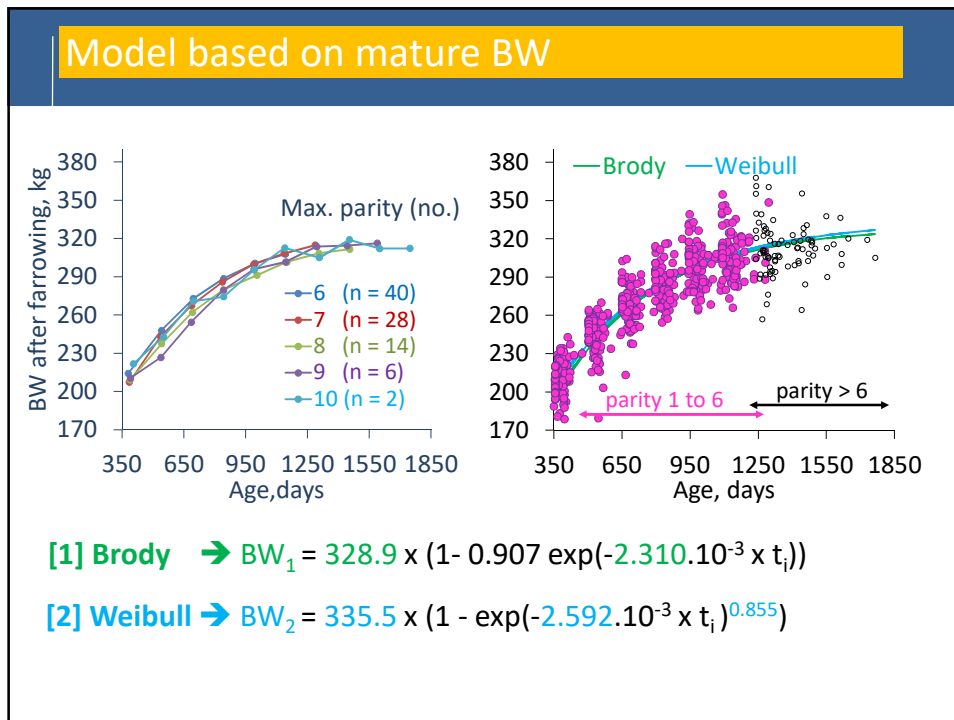
### ■ Datasets 2 to 4 → evaluation

- Sows born in 2000/03, 2004/07, 2008/11  
n = 116 n = 109 n = 112

- Stat. with SAS (v9.4): proc corr, reg, nlin

## Models and inputs

- Modeling individual BW with age (t)
  - Brody } based on average mature BW
  - Weibull } based on BW at first parity
  - Logistic } and BW gain to reach average mature BW
  - Weibull' }
- Inputs characterised at the 1st parity
  - Age at 1st farrowing = t1i
  - BW at 1st farrowing = BW1i
- Precision:
  - RMSEP



### Evaluation based on other datasets (collected within the same herd)

Dataset	modeling		evaluation	
	1	2	3	4
Age1	381 ± 23	381 ± 13	375 ± 13	379 ± 15
BW1	211 ± 13	210 ± 11	213 ± 9	218 ± 10
BW6	308 ± 17	303 ± 15	296 ± 13	301 ± 14

datasets 2 to 4 =  
more homogeneous sows at 1<sup>st</sup> farrowing

### Precision of prediction / RMSEP\*

Dataset		1	2	3	4
[1]	Brody	16.2	14.7	14.0	14.4
[2]	Weibull	16.3	15.0	14.4	14.7
[3]	Log.	16.4	13.3	13.0	12.9
[4]	Weibull'	14.9	13.2	13.5	13.1

similar average characteristics  
→ no ↗ RMSEP

more homogeneous  
sows → lower RMSEP

Compared  
to dataset 1

(\*without parity 1)

## Conclusion

- Choice of the equation
  - When BW<sub>1i</sub> and Age<sub>1i</sub> are known → Weibull'
  - When BW<sub>1i</sub> and Age<sub>1i</sub> are **un**known → Brody
- Evaluation from other data from the same herd
  - Precision remains rather stable over 15 years with stable average characteristics
  - Improved precision due to lower variability of sows' characteristics
- Equations are adapted to a LWxLD population in a herd
  - a calibration is required for **other** breeds in **other** herds
  - in commercial farm = development of sensors/tools (precision farming) for automatic measurement of BW → the future input for precision feeding

## Updated abstract

EAAP Annual Meeting 2018, Dubrovnik, Croatia

Abstract title: Relationship between age and body weight at farrowing over 6 parities in Large White x Landrace sow

Author: Quiniou, N.

Presentation: Theatre

Session 32: Precision Livestock Farming (PLF) in nutrition, genetics, and in physiology

Abstract text:

Parity and back fat thickness are frequently used by farmers to gather sows in groups and thereafter to choose a feeding plan at the pen- or individual-scale. At a given parity, ignoring differences in body weight with age contributes to the variability of body reserves at farrowing. Therefore, improvement of the adequacy in feed allowance relies on a better knowledge of the dynamic change of body weight over the productive lifetime. Data collected routinely in an experimental station on 90 crossbred Large White x Landrace sows were used to characterise the relationship between individual age (t) and body weight after farrowing (BW). Sows were born between 2012 and 2015, group-housed from the 25<sup>th</sup> to the 108<sup>th</sup> day of gestation, and studied over six parities at least. Among tested models, the Brody ( $BW = 328.9 \times (1 - 0.907 \exp(-2.310/1000 t))$ ) and the Weibull ( $BW = BW_{1i} + (335.5 - BW_{1i})(1 - \exp(-2.037/1000 \times (t - t_{1i}))^{1.059})$ ) were the most precise models (RMSEP = 16.2 and 14.9 kg, respectively on average between parity 2 and 6). Models were evaluated using other datasets obtained within the same herd from sows born over a period of 12 years whose BW characteristics remained rather comparable to one of dataset 1. The more homogeneous the herd was, the more precise was the prediction. Calibration of such models in commercial herd will be possible in a close future from automatic BW measured, using tools developed in context of precision farming. This study is part of the Feed-a-Gene project and received funding from the European Union's H2020 program under grant agreement no. 633531.