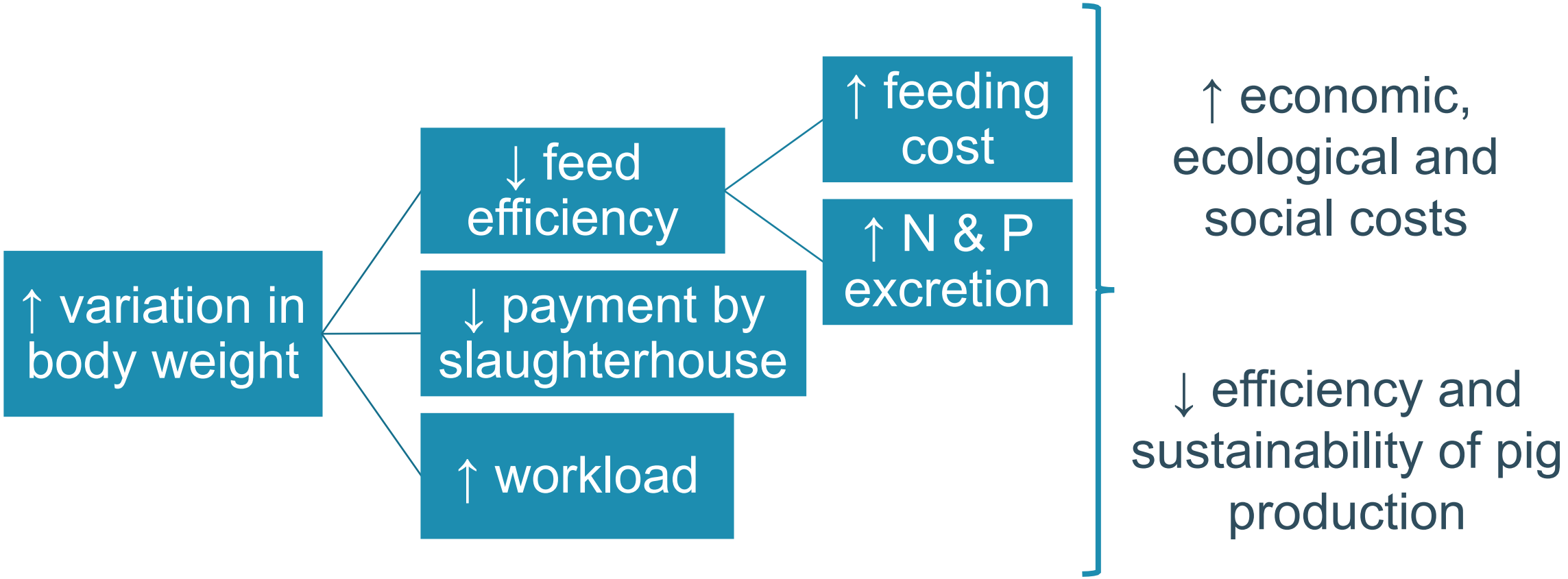
# Are pre-weaning piglet and sow parameters a proxy for uniformity and daily gain?

**K. Hooyberghs,** *S.* Goethals, W. Gorssen, L. Chapard, R. Meyermans, B. Chakkingal Bhaskaran, S. Millet, S. Janssens and N. Buys

Session 20: Innovative approaches to pig and poultry production

# Situation


↑ variation in body weight
↓ feed efficiency
↓ payment by slaughterhouse
↑ workload
↑ feeding cost
↑ N & P excretion
↑ economic, ecological and social costs
↓ efficiency and sustainability of pig production

# Observational study: objective

Find out which **sow-, litter- and piglet-specific parameters** contribute to **variation of weights and average daily gain**

Monitoring **sows**: farrowing house

Follow-up of **piglets**: from birth to slaughter

# Data collection of sows in farrowing house

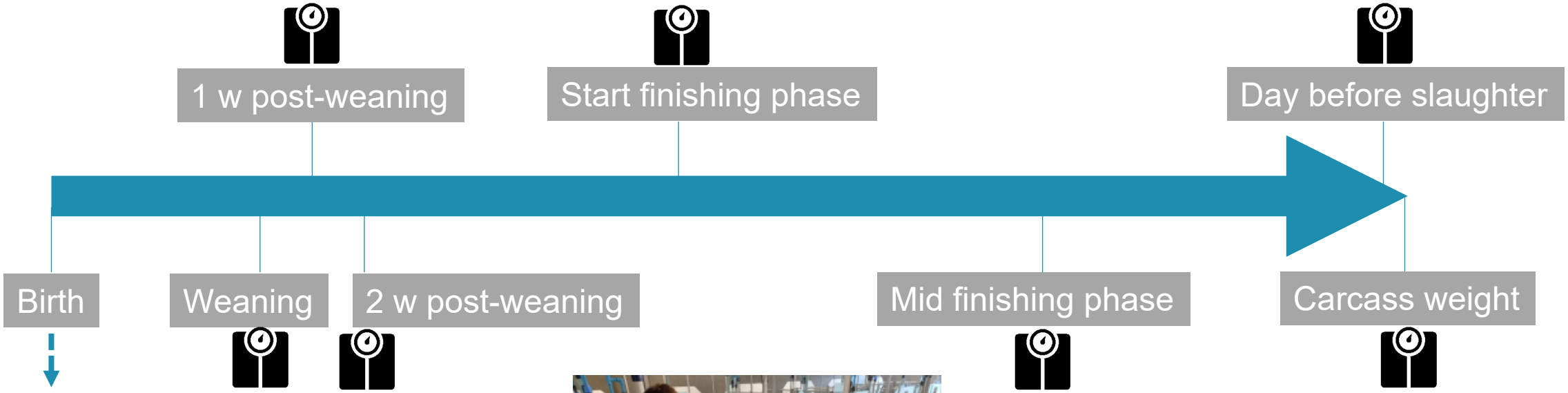
Before farrowing

At weaning

Weigh individually

Body circumference and back fat thickness

# Data collection of piglets: from birth till slaughter




Weigh individually

Electronic ear tag

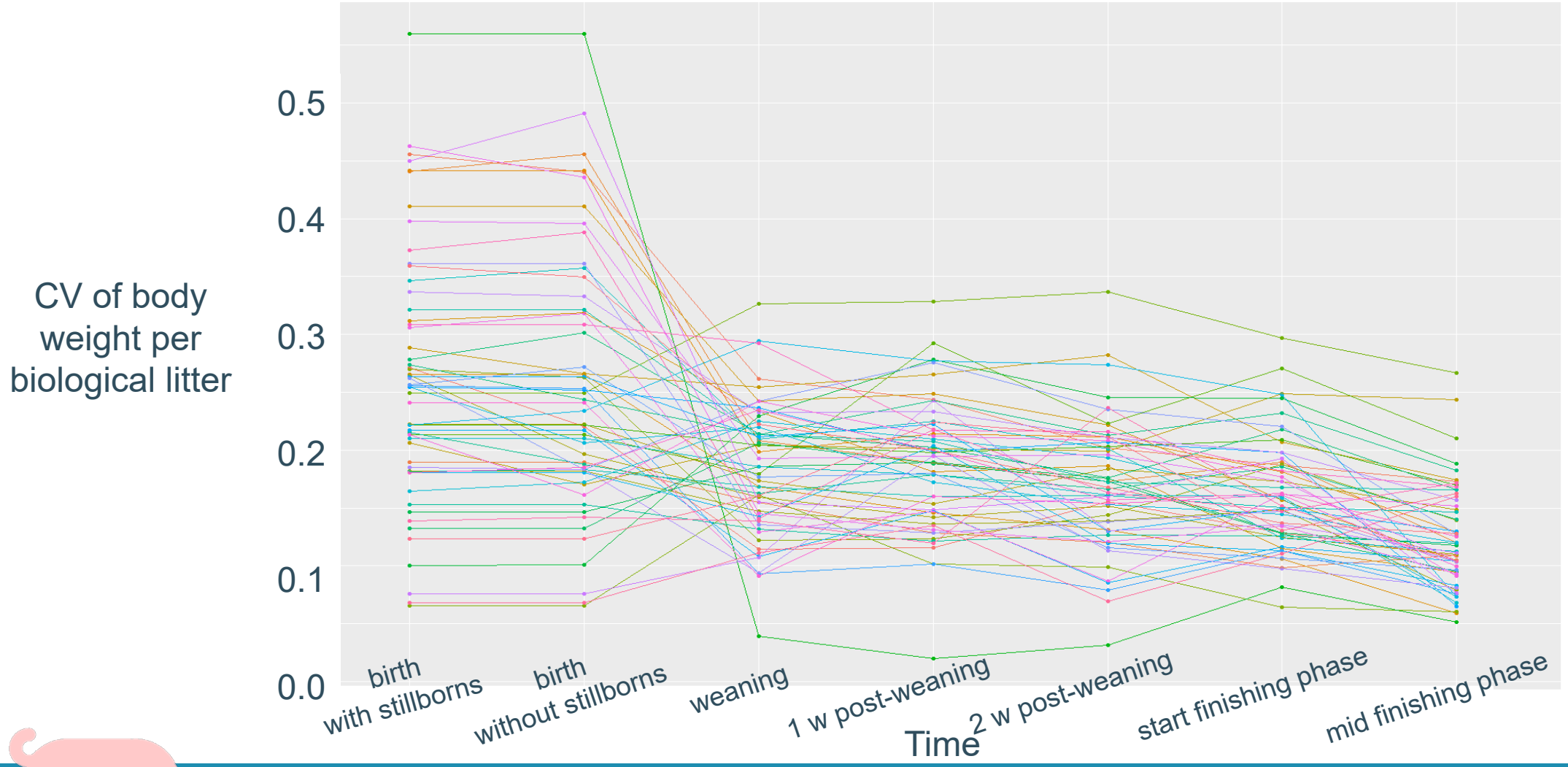
Time and order of birth

….

# Collected data

| Farm | Batch | Number of litters | Number of piglets *(born alive)* | Number of boars | Total litter size | Litter size born alive |
|---|---|---|---|---|---|---|
| 1 | 1 | 14 | 240 *(213)* | 5 | 8-22 *(17.1)* | 8-20 *(15.2)* |
| | 2 | 15 | 248 *(223)* | 8 | 4-27 *(16.5)* | 4-21 *(14.9)* |
| 2 | 3 | 31 | 542 *(466)* | unknown | 8-26 *(17.5)* | 8-22 *(15.0)* |

# Coefficient of variation (CV) of body weight per litter decreases over time



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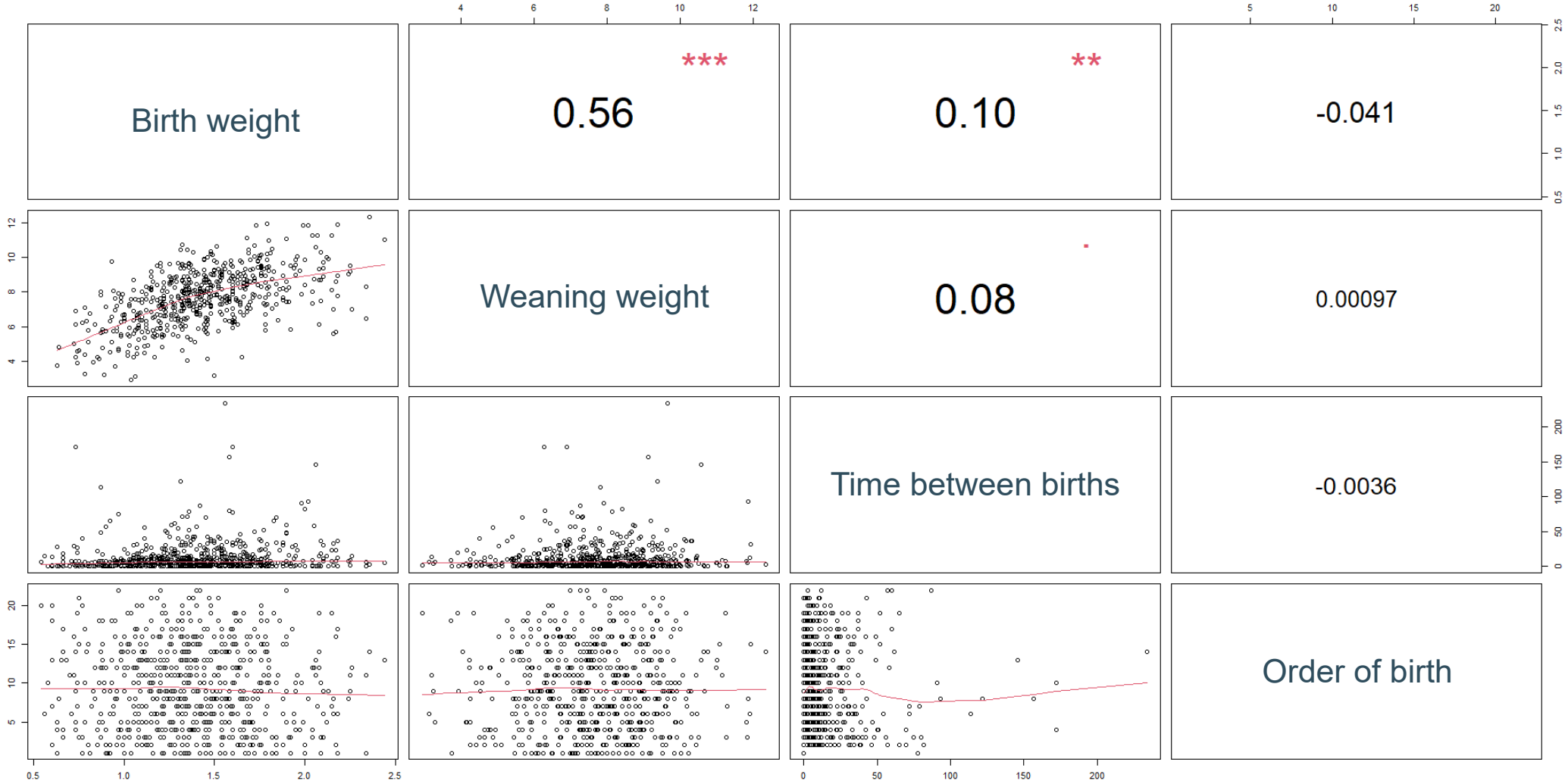
# Are piglet-specific parameters correlated?



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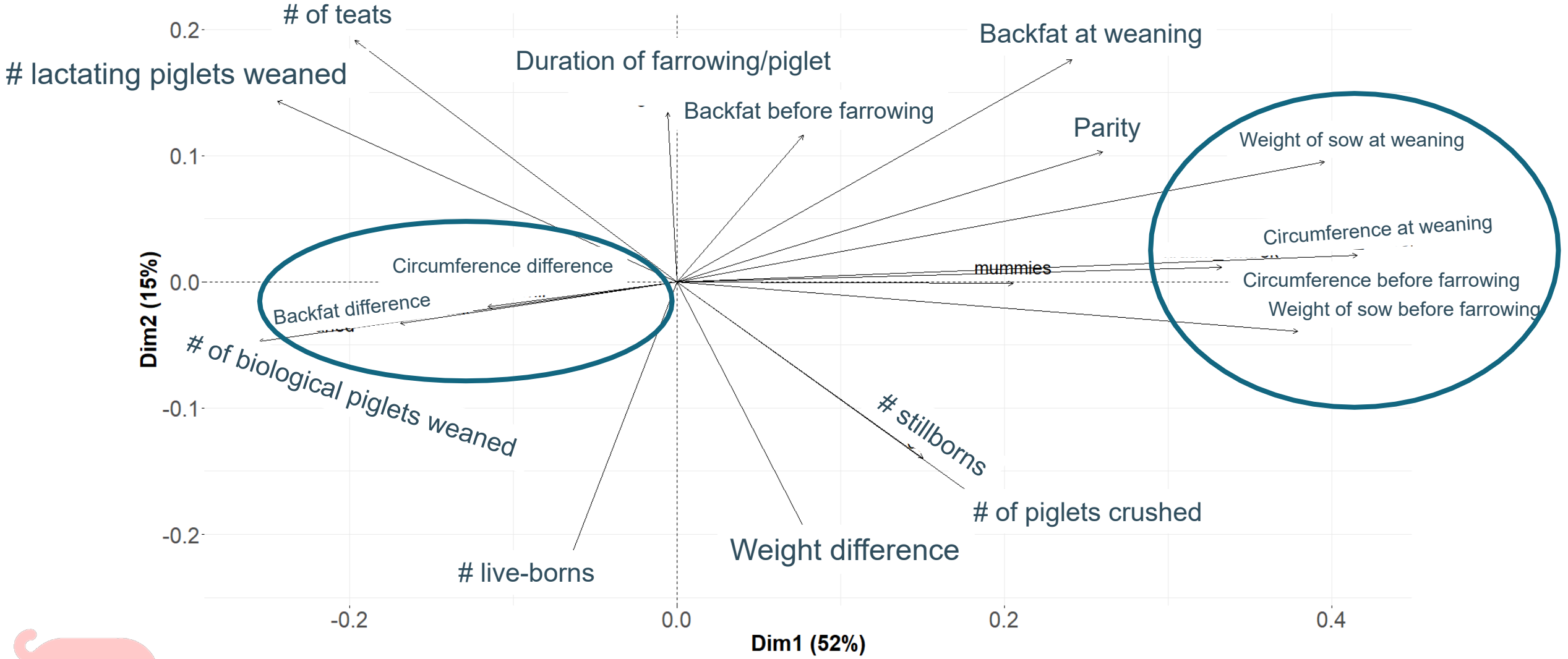
# Factor analysis of sow-/litter-specific parameters



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# Factors associated with birth weight

| Variable[1] | Coefficient | Standard error | P value |
|---|---|---|---|
| Intercept | 2.08 | 0.28 | <0.001 |
| Sex (f) | -0.06 | 0.02 | 0.006 |
| Number of piglets born alive | -0.03 | 0.009 | <0.001 |
| Parity | 0.02 | 0.02 | 0.03 |
| Weight of sow before farrowing (kg) | -0.0008 | 0.0009 | 0.006 |
| Time between birth (minutes) | 0.001 | 0.0005 | 0.10 |

[1]Round and sow nested within round were included as random variables

→ The fixed-effect model explained **11.3%** of the variation in birth weight

# Factors associated with weaning weight

| Variable[1] | Coefficient | Standard error | P value |
|---|---|---|---|
| Intercept | 3.23 | 0.62 | <0.001 |
| Parity | 0.11 | 0.06 | <0.001 |
| Back fat thickness of sow at farrowing (mm) | -0.04 | 0.03 | 0.005 |
| Birth weight (kg) | 3.11 | 0.18 | <0.001 |
| Difference in body circumference (cm) | -0.02 | 0.02 | 0.006 |

[1]Round and sow nested within round were included as random variables

→ The fixed-effect model explained **33.6%** of the variation in weaning weight

# Factors associated with ADG before weaning

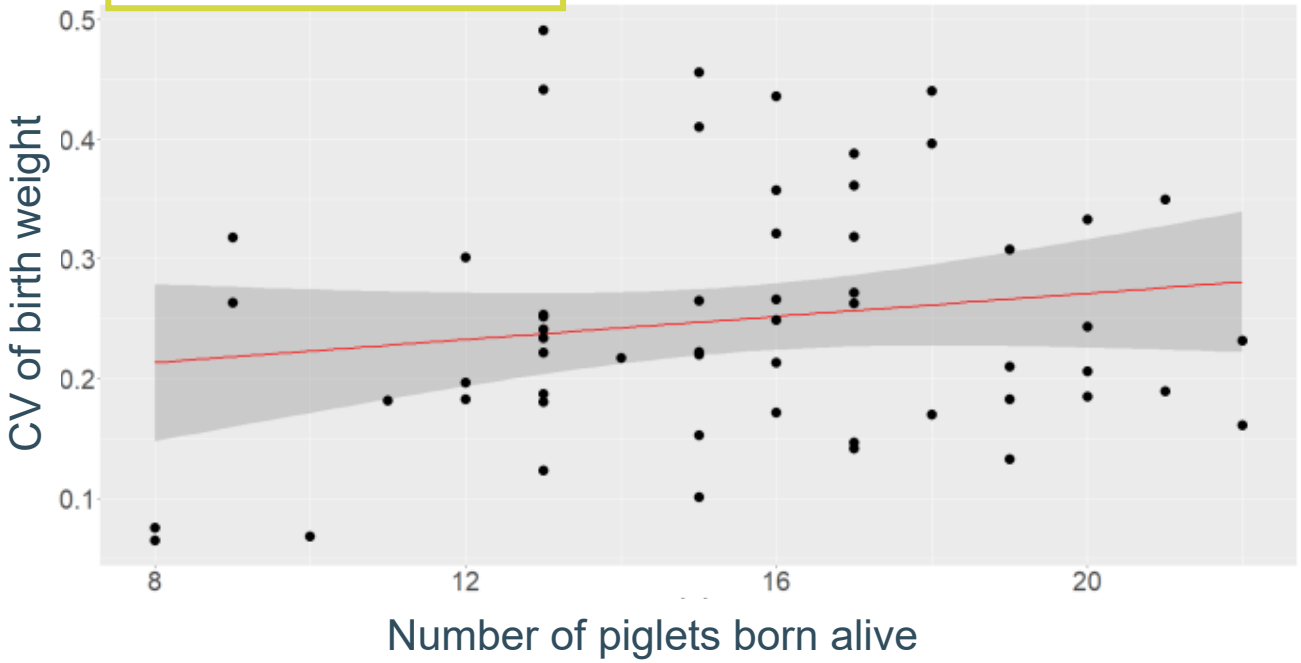
| Variable[1] | Coefficient | Standard error | P value |
|---|---|---|---|
| Intercept | 179.92 | 118.94 | <0.001 |
| Back fat thickness of sow before farrowing (mm) | -2.08 | 1.31 | <0.001 |
| Body weight of sow before farrowing (kg) | 0.20 | 0.11 | <0.001 |
| Number of teats | 4.37 | 3.32 | 0.007 |
| Birth weight (kg) | 80.02 | 6.81 | <0.001 |
| Weaning age (days) | -5.71 | 3.53 | <0.001 |
| Difference in body circumference (cm) | -0.64 | 0.62 | 0.01 |

[1]Round and sow nested within round were included as random variables

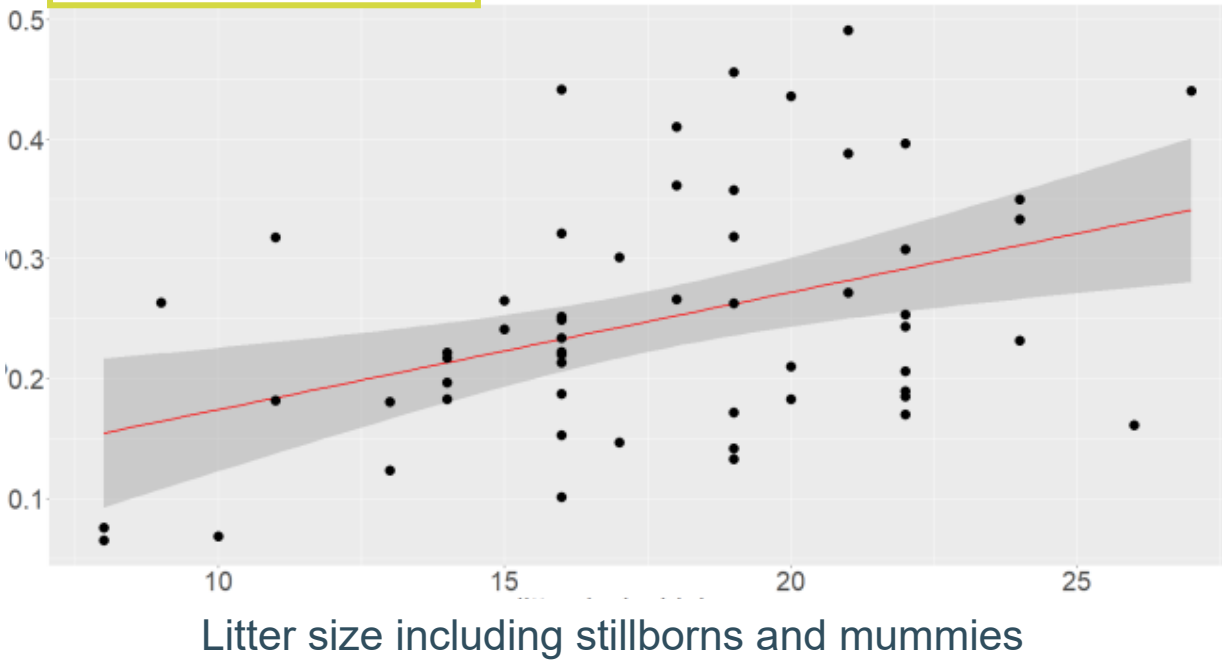
→ The fixed-effect model explained **19.6%** of the variation in ADG before weaning

# Uniformity of birth weight is more associated with litter size including stillborns and mummies

Adjusted $R^2$= 0.008



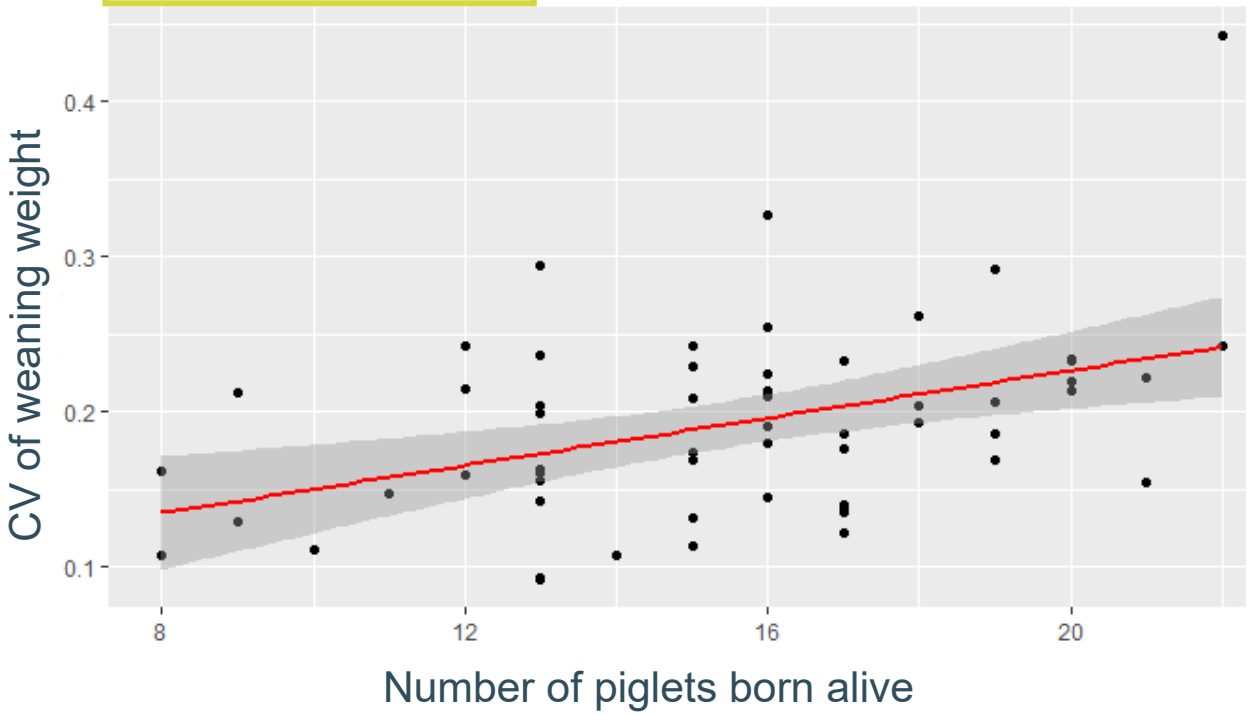

Adjusted $R^2$= 0.16




→ Lot of variation between sows with similar litter sizes

# Uniformity of weaning weight is similarly associated with litter size including stillborns and mummies and litter size of live-born piglets

Adjusted $R^2$= 0.17




Adjusted R= 0.14

# Conclusion

Current models explain:

**11.3%** of the variation in birth weight

**33.6%** of the variation in weaning weight

**19.6 %** of the variation in ADG before weaning

The **number of piglets born** is positively associated with the variation of body weights, BUT there is a **remaining variance** that we cannot yet attribute.

## Future steps

Analyse data until slaughter
DNA analysis to identify half-sibs

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Instituut voor Landbouw-, Visserij- en Voedingsonderzoek

# Thank you for your attention

Katrijn.hooyberghs@kuleuven.be