PROHEALTH, production diseases and preweaning piglet mortality

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Sustainable Intensive Pig and Poultry Production

EU Funded Research Project

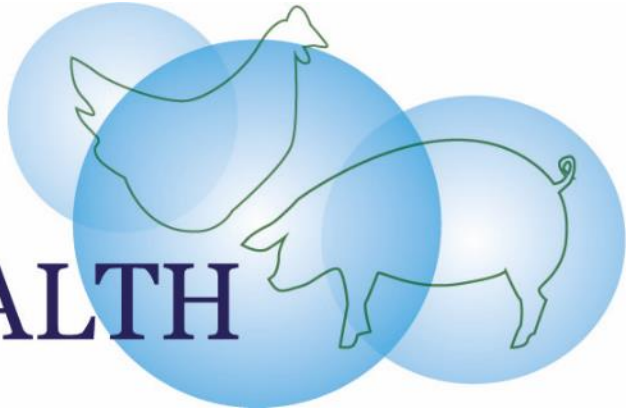
2013 - 2018

€12 M Budget

22 European Partners

10 Academic

12 Industry



PROHEALTH

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

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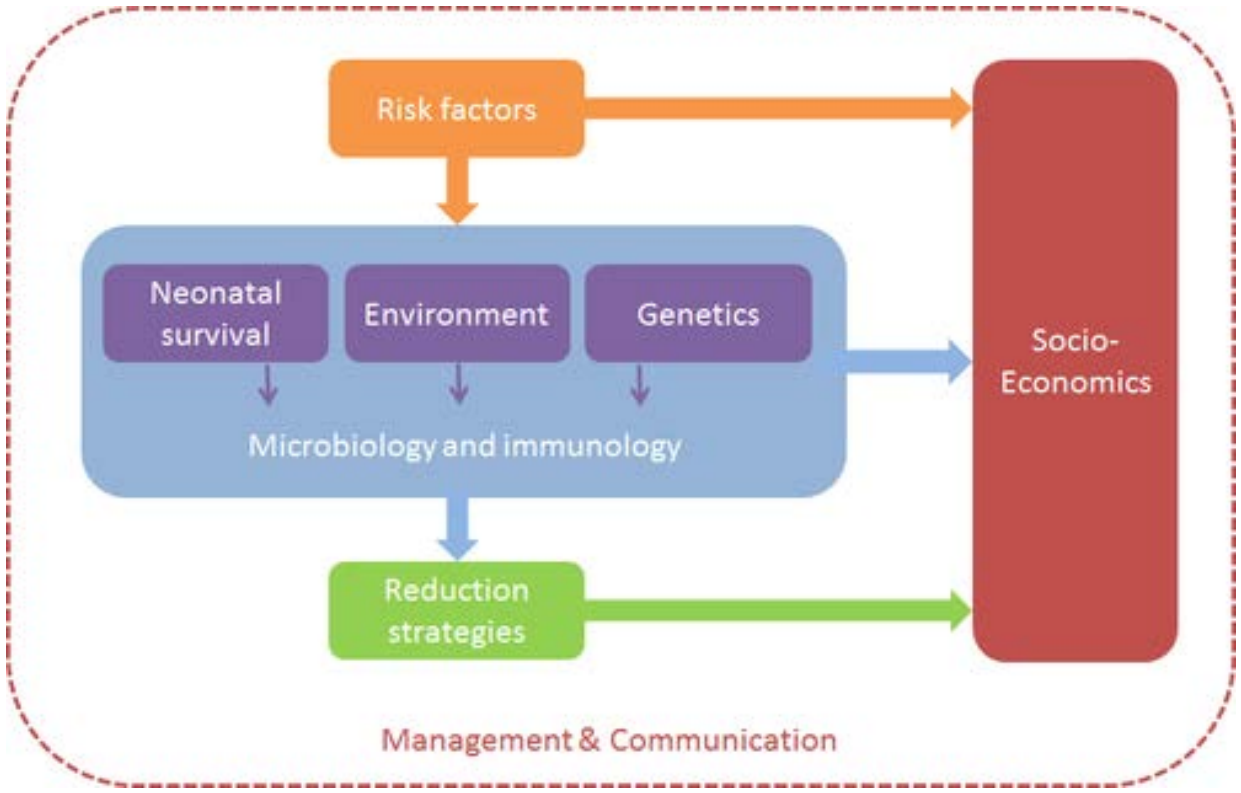
Project Objectives

- To develop an understanding of the multi-factorial dimension of animal pathologies linked to the intensification of production
- To develop, evaluate and disseminate effective management and control strategies for these ‘production diseases’.

What are ‘production diseases’?

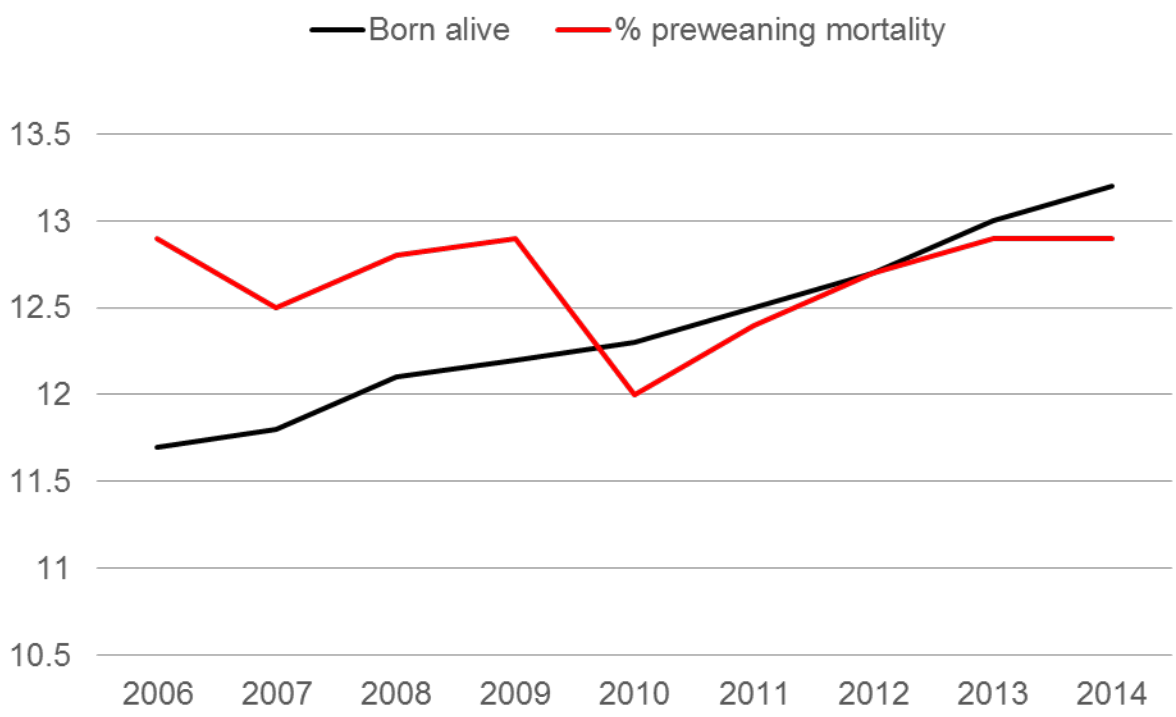
Diseases which persist in intensive systems and whose prevalence of severity tends to increase with production level

How is PROHEALTH addressing production diseases ?



Why is piglet mortality a ‘production disease’ ?

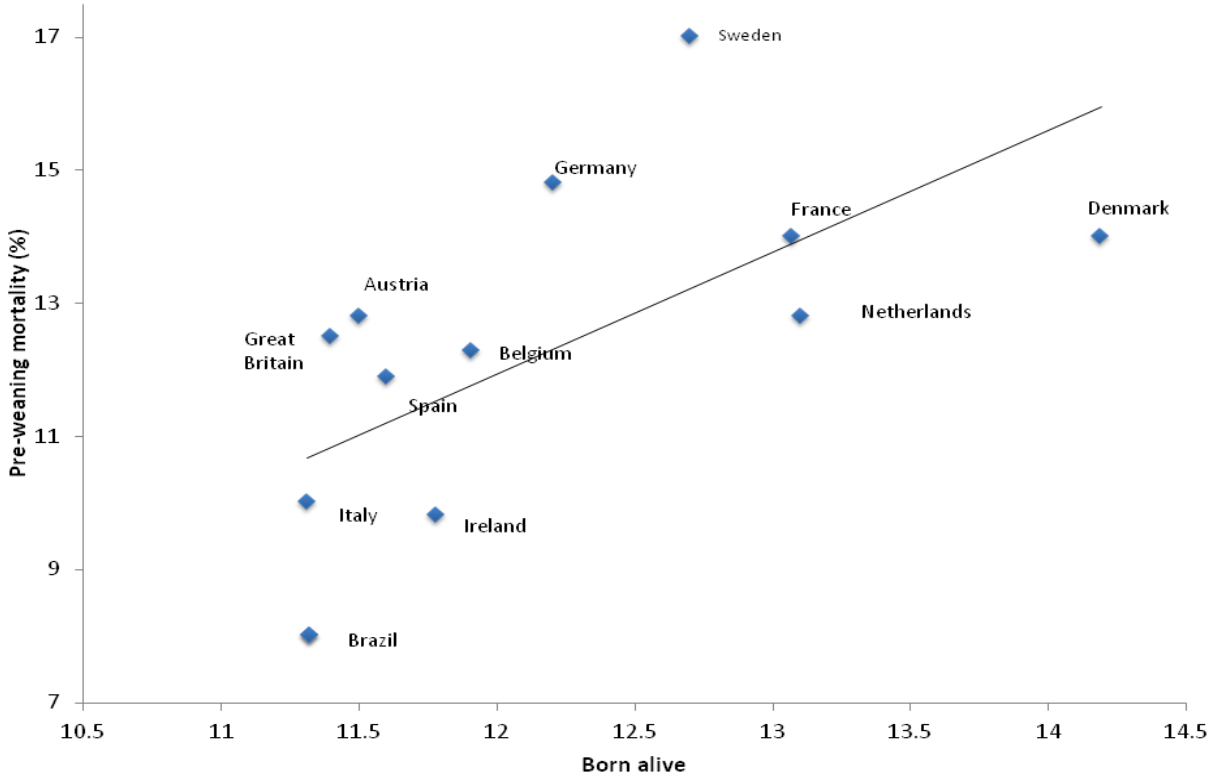
It is a persistent problem



based on Interpig data

Why is piglet mortality a ‘production disease’ ?

It increases with intensity of production



Baxter & Edwards (2016)
based on Interpig data

Levels of piglet mortality: the PROHEALTH survey

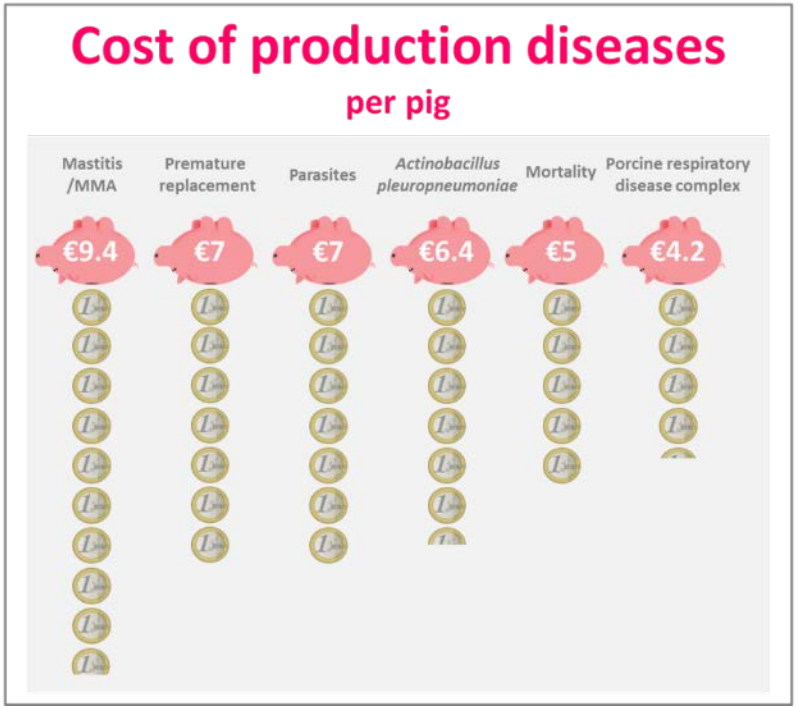
- 50 herds in each of 3 EU countries (2011-2013)

Country	A	B	C
Total born	14.6	13.3	15.0
Born dead (%)	8.2	14.3	7.3
Liveborn mortality (%)	13.1	14.5	13.1
Total loss (%)	21.3	28.8	20.4

Klinkenberg, Van Limbergen, Dewulf & Maes
IPVS 2016

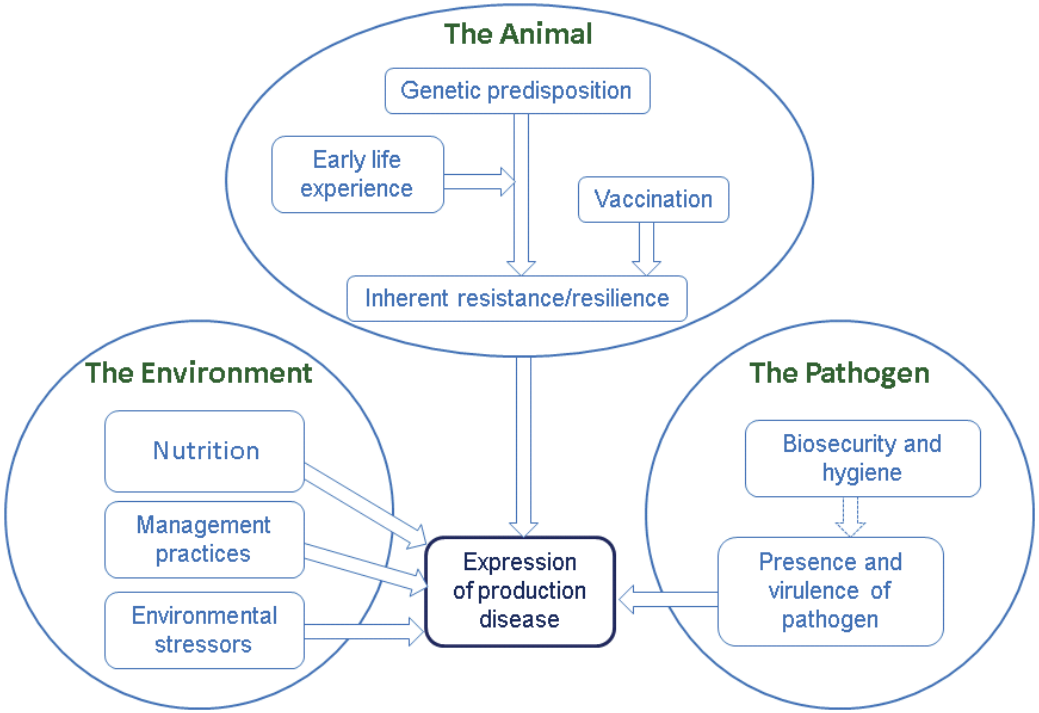
The cost of piglet mortality: PROHEALTH review

- Estimated costs of stillbirth ranged from €4-17 per produced piglet.
- Estimated costs of pre-weaning mortality were also highly variable, the average of all studies being ~ €5 per produced piglet

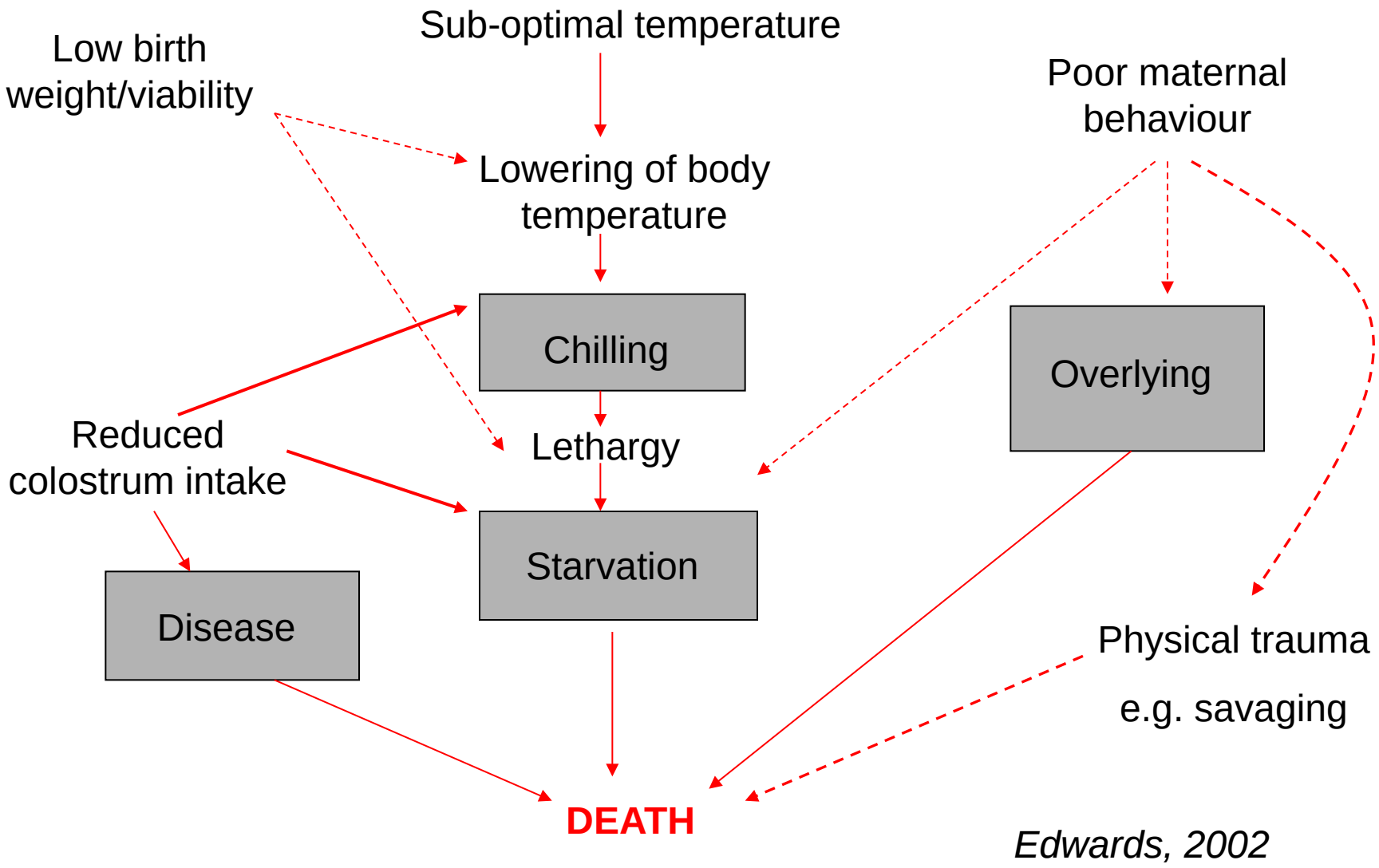


Niemi, Jones, Tranter, Heinola (2015) project deliverable

The complexity of production diseases

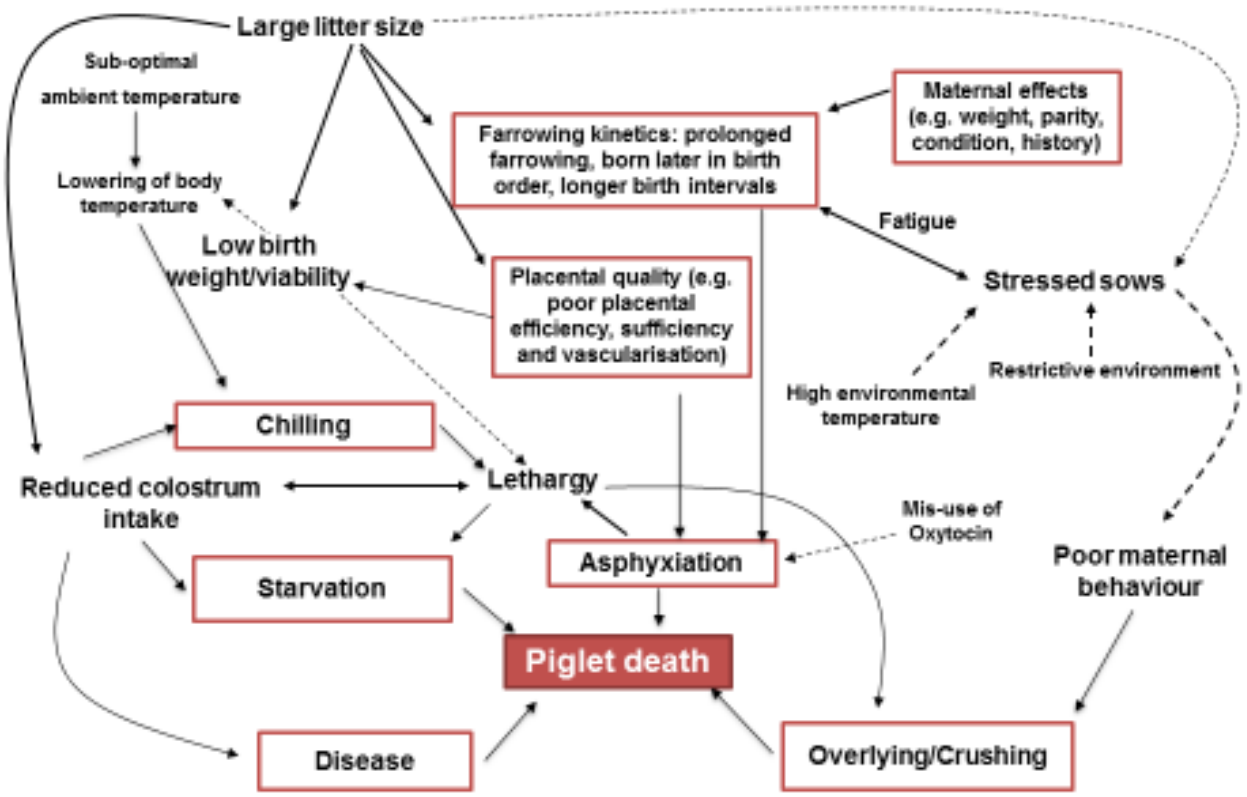


The complexity of piglet mortality



Edwards, 2002

The growing complexity with increased prolificacy

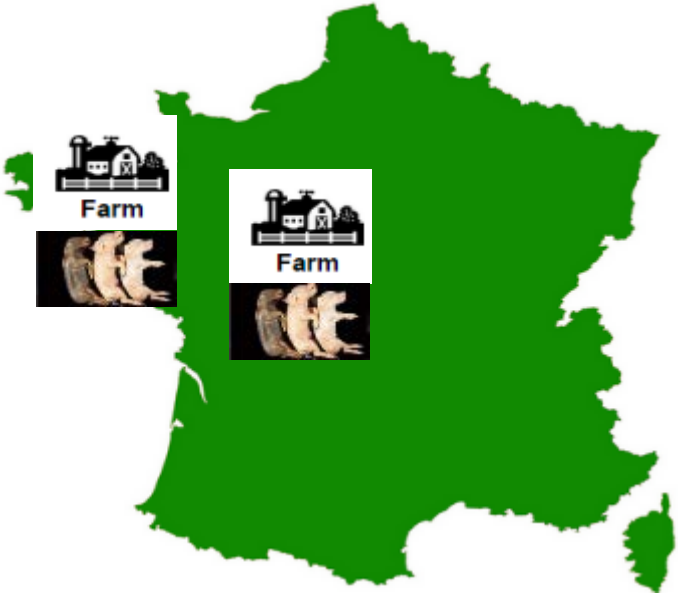


Baxter & Edwards (2015)

Figure 1. Predisposing factors of piglet mortality

Understanding the causes

- Farms requesting an audit for neonatal mortality problems
- ~ 20 sows randomly selected in each farms
- All dead piglets were classified in one of the 16 causes based on standardized necropsy and data collected from the farmer



Pandolfi, Edwards, Robert & Kyriazakis
IPVS 2016

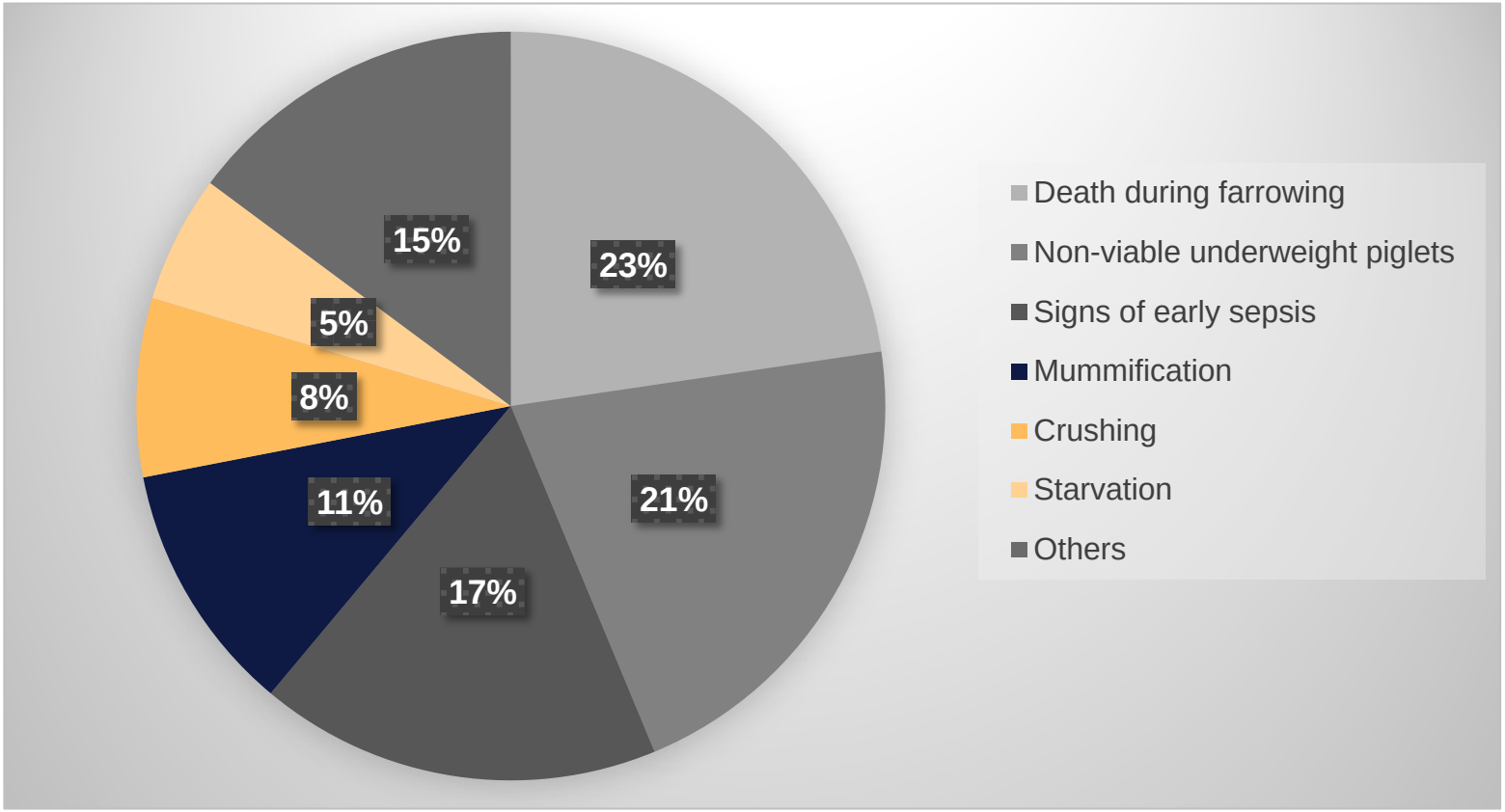
Animal effects and farm effects

- Identify risk factors for the different causes of piglet mortality
- Piglet level : 155 farms 7,761 dead piglets from 37,356 born

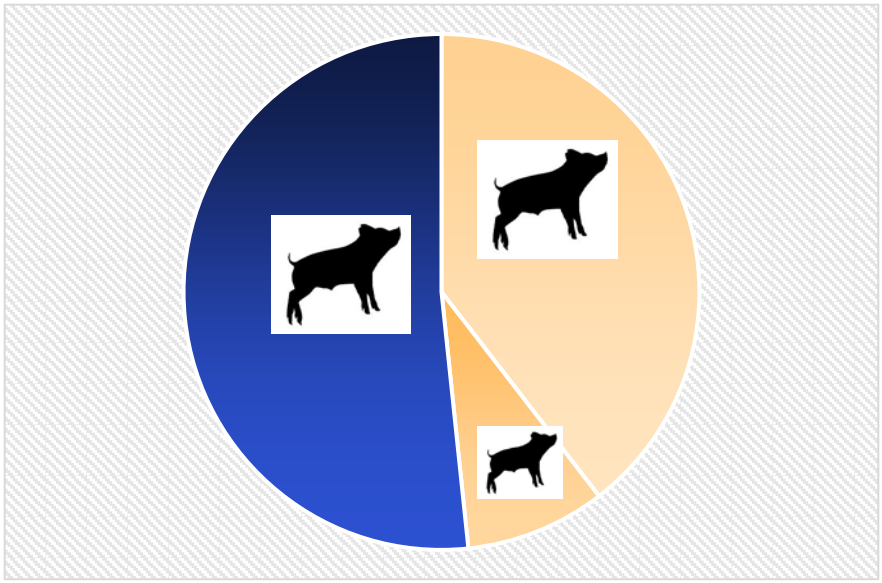
- Identify neonatal mortality pattern
- Farm level : 146 farms 7,928 dead piglets from 40,101 born

Causes of mortality

- 84.4% of the mortality due to 6 main causes



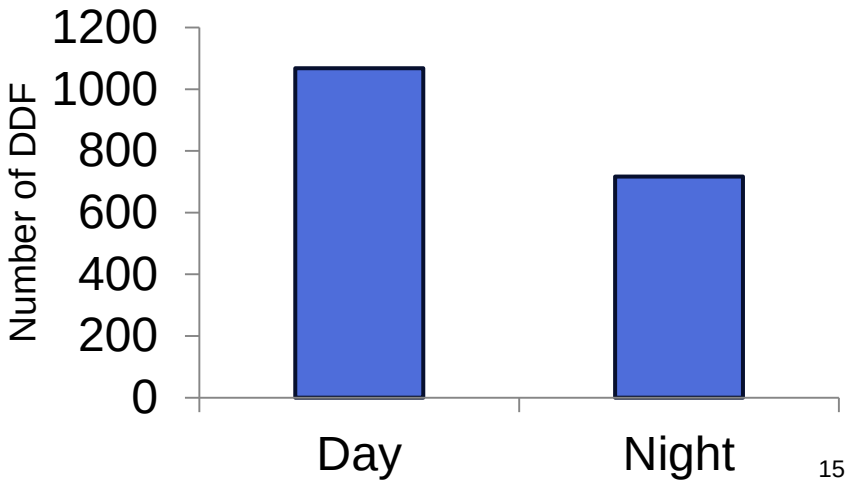
Different categories of stillbirth



Death during the farrowing

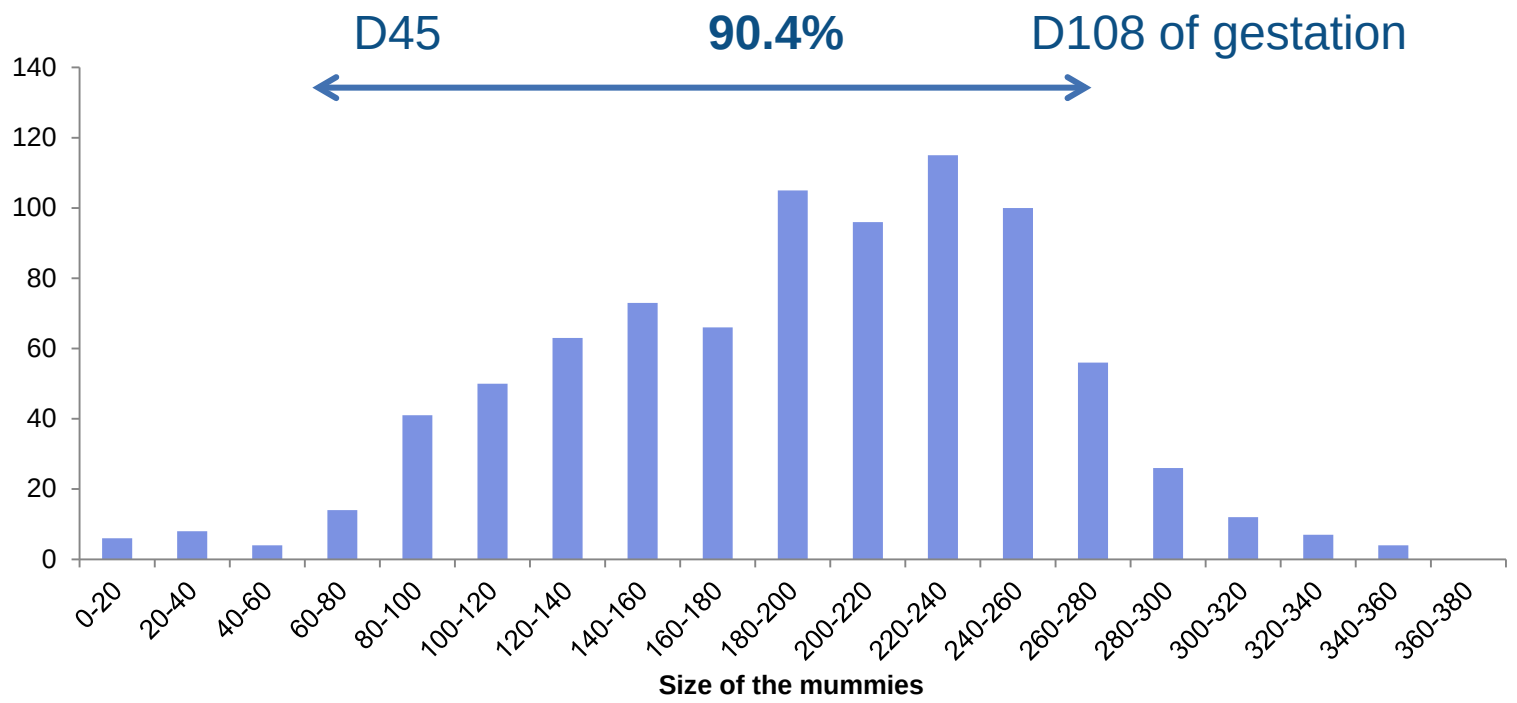
Early sepsis

Death before farrowing (Autolysis)



Prolificacy and intra-uterine competition

Distribution of mummified piglet size



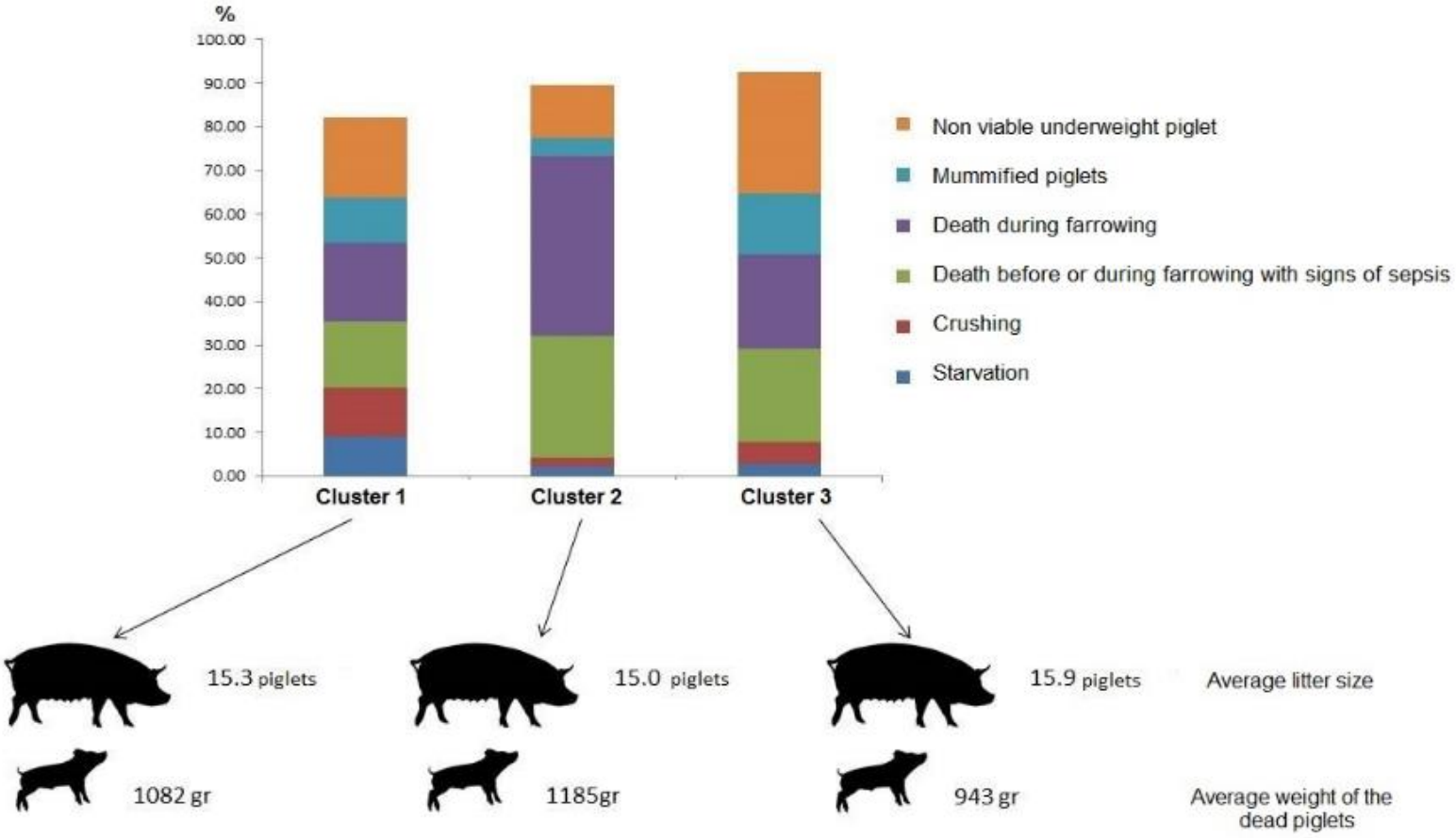
Starvation & crushing

- Same mechanism with different mortality endpoints?

- Correlation between prevalence of crushing & starvation
- Crushing and starvation both increase in older parity sows

Identifying farm patterns

3 farm clusters



Next phase for farm studies

- Different causes have different risk factors
- Different farm profiles for neonatal mortality patterns
    - Now investigating associated farm practices in more detail using retrospective questionnaire
    - Housing?
    - Genetics?
    - Management?

Understanding farm differences: gestation housing

Quesnel, Pastorelli, Merlot, Louveau, Lefaucheur, Robert, Pere & Gondret
EAAP 2016 THIS SESSION

Understanding farm differences: lactation housing

Matheson, Walling & Edwards
EAAP 2016 THIS SESSION

Understanding farm differences: management

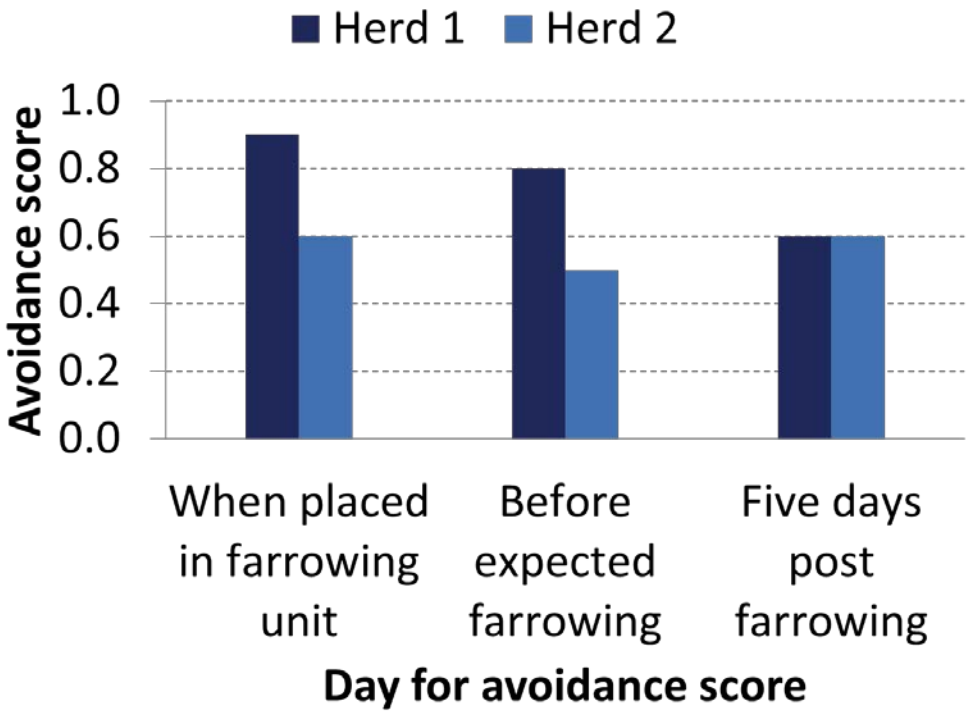
Moustsen, Johansson, Forkman, Nielsen & Andreasen
ISAE 2016

Can sow behaviour be modified to reduce crushing risk?

- Investigating impact of positive handling of loose housed sows in the 5 days prior to farrowing on subsequent sows responsiveness
  - Daily gentle scratching to accustom to humans
  - Classical music to reduce external startles

- Treatments replicated in 2 herds
- Free farrowing pens
- 446 hyperprolific sows (TB= 18.4)

Effects on sow response to humans (0-2 scale)



Will the treatments affect crushing risk ?

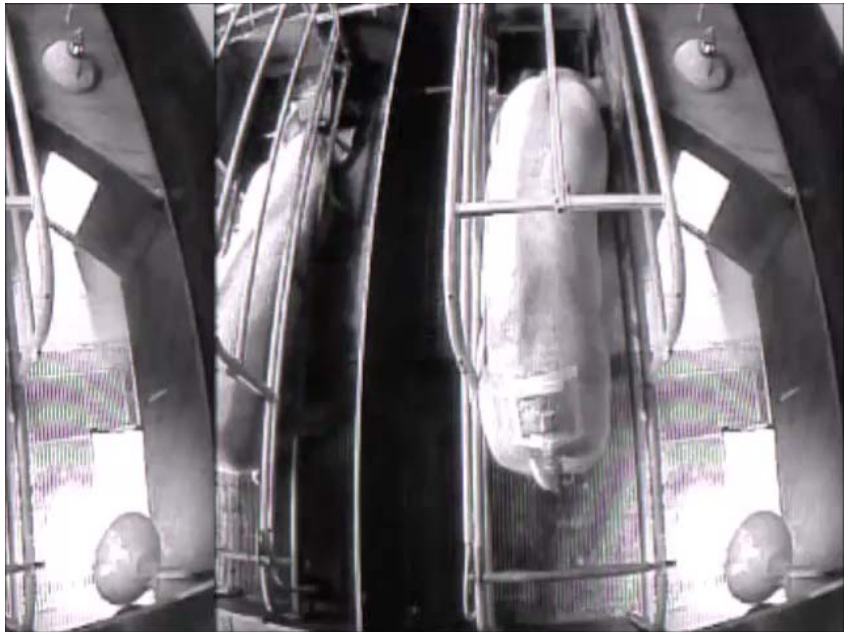
How do sow characteristics affect piglet mortality risk

- **The pattern of movements and how risky they are for piglets**
  - Lying control
- **The calmness of sows post farrowing**
  - Less restlessness post-farrowing

Is there genetic variation?

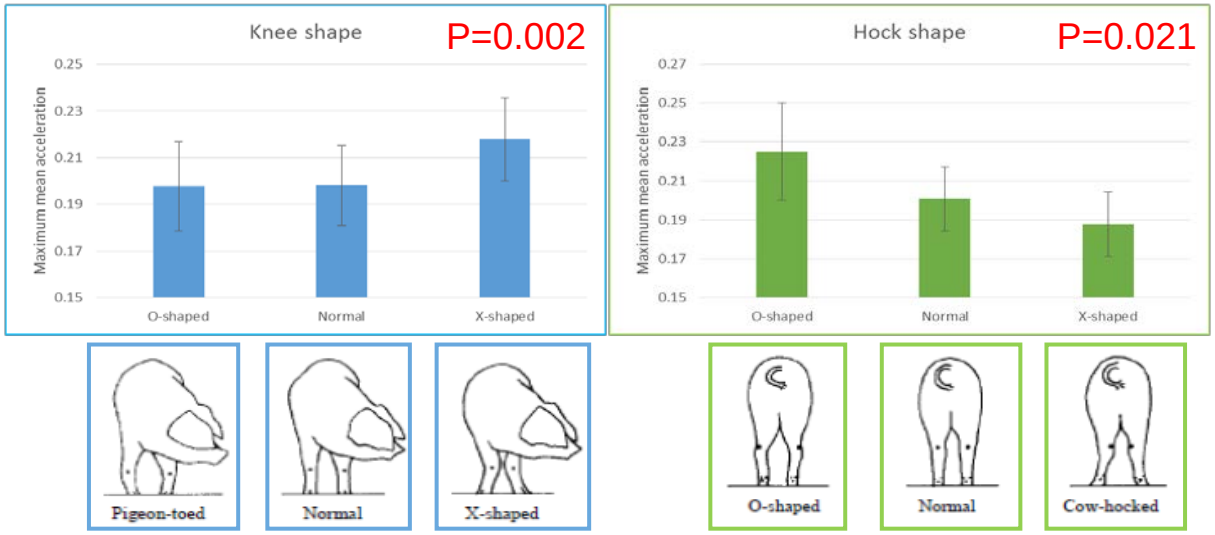
How do sow characteristics affect piglet mortality risk ?

- **Automating data capture for large scale assessments**



Thompson, Matheson, Plötz, Edwards & Kyriazakis
EAAP 2016 THIS SESSION

Sow conformation and lying characteristics



Matheson, Thompson, Walling, Kyriazakis & Edwards ISAE 2016

- Sow leg conformation influences accelerometer-derived measures
- Type of farrowing floor interacts with sow leg conformation

Will this affect crushing risk ?

Matheson, Walling & Edwards EAAP 2016 THIS SESSION

How do piglet characteristics affect mortality risk ?

- **Characterising piglet maturity at birth**

  - **Morphology**
  - **Energy reserves**
  - **Thermoregulatory ability**

How are these influenced by gestation conditions?

Quesnel, Pastorelli, Merlot, Louveau, Lefaucheur, Robert, Pere & Gondret
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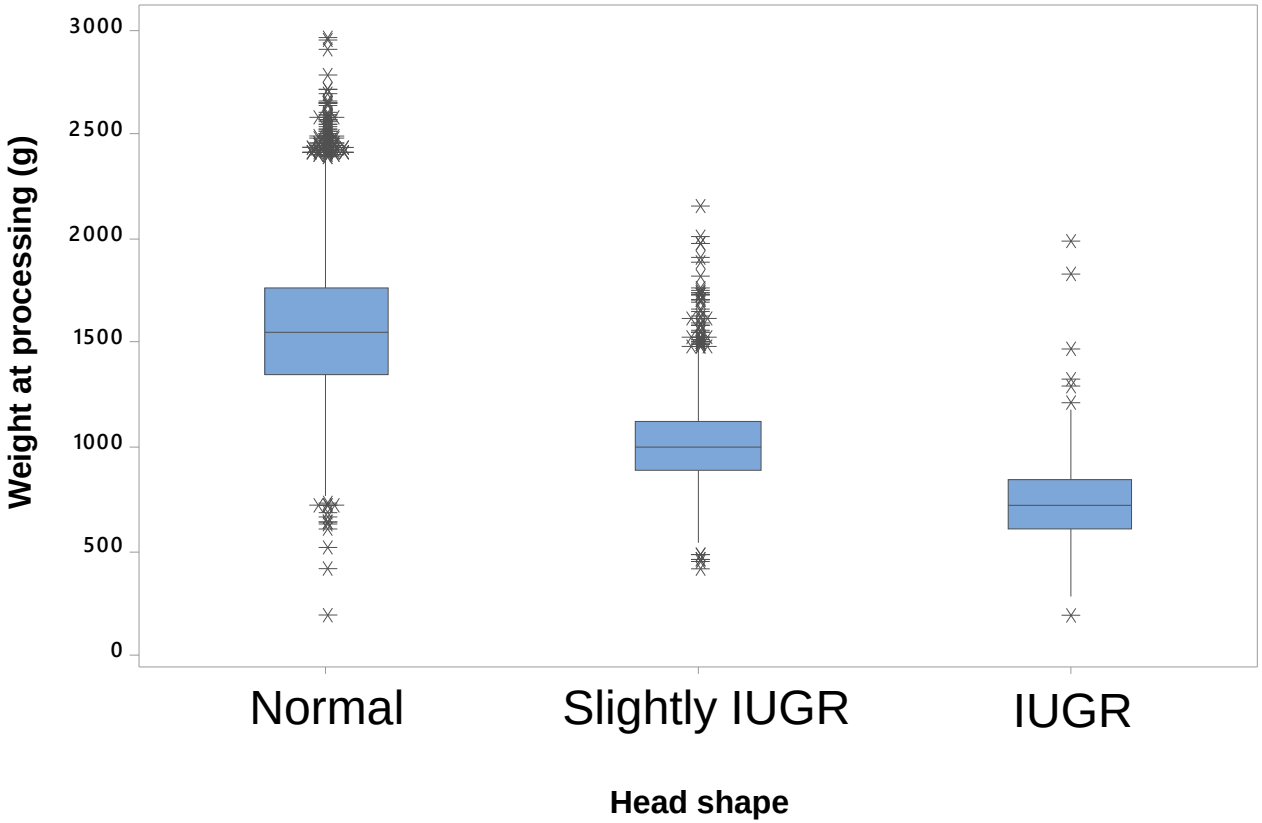
How do piglet characteristics affect mortality risk



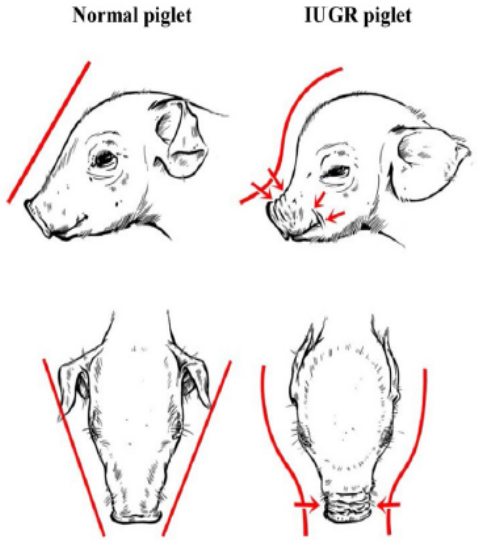


Figure 2. Illustrations of a normal (left) and a growth-restricted piglet (right). Criteria for growth restriction were 1) steep, dolphin-like forehead, 2) bulging eyes, and 3) wrinkles perpendicular to the mouth. IUGR = intrauterine growth restriction. See online version for figure in color.

Hales *et al* (2013) J Anim Sci 91:4991-5003

- Piglets show great variation in IUGR indicators across birthweights

How do piglet characteristics affect mortality risk ?

- **Piglet maturity indicators**
- **Do these show genetic variation?**

How do they affect crushing risk ?

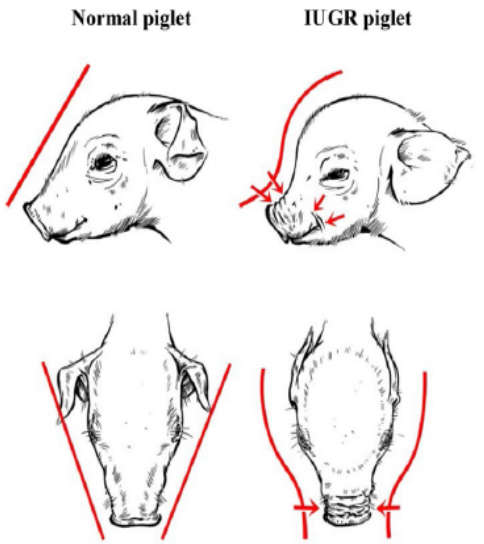


Figure 2. Illustrations of a normal (left) and a growth-restricted piglet (right). Criteria for growth restriction were 1) steep, dolphin-like forehead, 2) bulging eyes, and 3) wrinkles perpendicular to the mouth. IUGR = intrauterine growth restriction. See online version for figure in color.

Matheson, Walling & Edwards
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Conclusions

- Piglet mortality is a complex and intractable “production disease”
- Farm environment, sow and piglet characteristics all contribute

Genetic selection for prolificacy
Adoption of free farrowing systems
} increase the challenge

- PROHEALTH is investigating risk factors at all levels
  - to increase scientific understanding
  - to develop practical solutions

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