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

www.fp7-prohealth.eu

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

- To develop an understanding of the multi-facto-rial 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)

<table>
<thead>
<tr>
<th>Country</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total born</td>
<td>14.6</td>
<td>13.3</td>
<td>15.0</td>
</tr>
<tr>
<td>Born dead (%)</td>
<td>8.2</td>
<td>14.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Liveborn mortality (%)</td>
<td>13.1</td>
<td>14.5</td>
<td>13.1</td>
</tr>
<tr>
<td>Total loss (%)</td>
<td>21.3</td>
<td>28.8</td>
<td>20.4</td>
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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

- Low birth weight/viability
- Sub-optimal temperature
  - Lowering of body temperature
  - Chilling
    - Lethargy
    - Starvation
      - Disease
      - Overlying
        - Physical trauma e.g. savaging
        - Poor maternal behaviour

DEATH

Edwards, 2002
The growing complexity with increased prolificacy

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

- Death during farrowing (23%)
- Non-viable underweight piglets (15%)
- Signs of early sepsis (8%)
- Mummification (11%)
- Crushing (21%)
- Starvation (17%)
- Others (5%)

PROHEALTH
Different categories of stillbirth

- Death during the farrowing
- Early sepsis
- Death before farrowing (Autolysis)
Prolificacy and intra-uterine competition

Distribution of mummified piglet size

Size of the mummies

- D45
- 90.4%
- D108 of gestation

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

Cluster 1:
- 15.3 piglets
- 1082 gr
- Non viable underweight piglet
- Mummified piglets
- Death during farrowing
- Death before or during farrowing with signs of sepsis
- Crushing
- Starvation

Cluster 2:
- 15.0 piglets
- 1185 gr

Cluster 3:
- 15.9 piglets
- 943 gr
- Average litter size
- Average weight of the dead piglets
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

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

Will this affect crushing risk?

Matheson, Thompson, Walling, Kyriazakis & Edwards
ISAE 2016

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
EAAP 2016 THIS SESSION
How do piglet characteristics affect mortality risk

- Piglets show great variation in IUGR indicators across birthweights

Matheson, Walling & Edwards  IPVS 2016
How do piglet characteristics affect mortality risk?

- Piglet maturity indicators
- Do these show genetic variation?

How do they affect crushing risk?

Matheson, Walling & Edwards
EAAP 2016 THIS SESSION
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
We wish to acknowledge and thank all members of the Prohealth consortium contributing to research on piglet survival.