Managing Piglets from Birth to Weaning (Minimizing Pre-Weaning Mortality)

Mike Ellis
Katherine Vande Pol
Naomi Cooper
Caleb Shull

ILLINOIS
College of Agricultural, Consumer & Environmental Sciences

THE MASCHOFFS
Progressive Farming. Family Style.
Pre-Weaning Mortality Has Increased Recently

Total Average Losses (Stillborn+PWM) ~23%

PigChamp; AHDB; SEGES
Increasing Litter Sizes

Potential Genetic Trend
~+0.2 piglets/litter/year
(Knol and Mathur, 2009)

Total Number Piglets Born/Litter
(Alive + Stillborn)

Denmark: +0.29 piglets/year
Canada: +0.22 piglets/year
USA: +0.19 piglets/year

Number of Piglets/Litter

Year


PigChamp; AHDB; SEGES
Increasing Litter Size
Average Birth Weight Decreases

Relationship Between Litter Size and Average Piglet Birth Weight within Litter

\[ y = -0.039x + 2.01 \]
\[ R^2 = 0.31 \]

Decrease in Birth Weight with Increasing Litter Size is Greater in Low than High Birth Weight Piglets

Within-Litter Variation in Birth Weight Increases

Increase in Number of Low Birth Weight Piglets
Relationship Between Birth Weight & Pre-weaning Mortality

<table>
<thead>
<tr>
<th>Birth weight, kg</th>
<th>Total number born alive</th>
<th>Percentage of population</th>
<th>Pre-weaning mortality, %</th>
<th>Total number dead piglets</th>
<th>Percentage of total mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.00</td>
<td>1,294</td>
<td>12.5</td>
<td>44.7</td>
<td>578</td>
<td>35</td>
</tr>
<tr>
<td>1.00 - 1.49</td>
<td>4,191</td>
<td>40.7</td>
<td>16.1</td>
<td>675</td>
<td>41</td>
</tr>
<tr>
<td>&gt;1.50</td>
<td>4,819</td>
<td>46.8</td>
<td>8.3</td>
<td>400</td>
<td>24</td>
</tr>
</tbody>
</table>

Average Piglet Birth Weight, kg

1.1 lb
2.2 lb
4.4 lb
6.6 lb
Causes and Timing of Pre-weaning Mortality

Laid On & Starvation
~90% of total losses
~50% of losses in first 2 days
~80% of losses in first week

Piglets with Empty Stomachs
Low viability 76%
Laid On 43%
Starved 81%
Reducing Pre-Weaning Mortality

- Complex, Multi-faceted Problem
- No easy solutions
- Requires a Systems Approach
  - Genetics
  - Health
  - Nutrition
  - Facilities
  - Environment
  - Management
Stillbirths

• Increase with:
  – Farrowing Duration
    ▪ Litter Size
    ▪ Parity
  – Low sow blood glucose levels

• Solutions:
  – Farrowing supervision
  – Increase feeding frequency
  – “High” fiber levels in late gestation

![Graph showing the relationship between total number of piglets born and number of stillbirths per litter.](image)
Reducing Pre-Weaning Mortality

• Early Care is Critical
  – Ensure Early & Adequate Colostrum Intake
  – Minimize Post-Natal Body Temperature Decline
Minimizing Post-Natal Temperature Decline

- Newborn piglets:
  - WET
  - COLD
    - Experience a substantially lower temperature than in utero
    - Have limited body surface insulation
  - LOW ENERGY RESERVES
    - Limited capacity to produce heat to increase/maintain body temperature
  - SMALL
  - VERY SUSCEPTIBLE TO HYPOTHERMIA
Minimizing Post-Natal Temperature Decline

Rate, Extent, and Duration of Temperature Decline Are Greater in Smaller Piglets

### Effect of Birth Weight on Piglet Temperature

<table>
<thead>
<tr>
<th>kg</th>
<th>ΔTemp °C</th>
<th>lb</th>
<th>ΔTemp °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1.5</td>
<td>-3.3</td>
<td>&gt;3.3</td>
<td>-5.9</td>
</tr>
<tr>
<td>1.0 - 1.5</td>
<td>-3.7</td>
<td>2.2 - 3.3</td>
<td>-6.7</td>
</tr>
<tr>
<td>&lt;1.0</td>
<td>-5.7</td>
<td>&lt;2.2</td>
<td>-10.3</td>
</tr>
</tbody>
</table>

![Graph showing rectal temperature decline over time](image)
Drying + Warming of Piglets at Birth

Drying + Warming reduced extent of temperature decline

Effect relatively greater in light birth weight piglets

Rectal Temperature, °C

Time after Birth, min

Birth Weight, kg

0 20 40 60 80 100 120

30 32 34 36 38 40

104.0°F 100.4°F 96.8°F 93.2°F 89.6°F 86.0°F

Control
Drying
Warming
Drying + Warming
Drying + Warming - Pre-Weaning Mortality

Pre-weaning mortality, %

Control
400 litters
5,140 piglets

Drying + Warming
400 litters
5,164 piglets

16.4%
15.7%
12%
13%
14%
15%
16%
17%
18%
19%
20%

Room temperature and piglet drying treatment

Control

Drying+Warming

<25°C
<77°F
≥25°C
≥77°F

16.9%a
14.3%b
16.5%a
16.5%a

“Cool Conditions”
2.6 % units reduction in PWM

“Warm Condition”
No effect on PWM

Strategic use
Reducing Pre-weaning Mortality
“Alternative” Rearing Strategies

• Number of piglets born exceeding sow rearing capacity

• Increasing need for other rearing strategies
  – Cross-fostering
  – Nurse sows
  – “Complimentary” rearing
Cross-fostering

• Widely used practice

• Limited research suggests:
  – Cross-fostering without reducing litter size doesn’t reduce PWM
  – Creating litters of uniform weight piglets (e.g., low birth weight) will not reduce overall PWM in all piglets
    ▪ Creating a better environment for part of litter = Poorer environment for remainder of piglets?
Pre-weaning Mortality
People Are Critical

- People - the major source of variation between facilities with low and high mortality levels?
- What can we do to improve the “people” component?
  - Selection/Aptitude
  - Training
  - Support Resources/Technologies
Minimizing Pre-Weaning Mortality

Concluding Observations

- Not a new issue but of increasing importance
- Moving into a new era of sow productivity
- Will require a systems-based approach
- Dearth of appropriate controlled research
- Need to evaluate impact of interventions on all piglets and from birth to harvest
- People component is critical but poorly understood
Acknowledgements

• The Maschhoffs, LLC

• National Pork Board