Effects of mean weight of uniform litters on sows and piglets performance

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66th EAAP Annual Meeting - Warsaw, Poland 2015
INTRODUCTION

Source: IFIP-GTTT (2015)
INTRODUCTION

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PREWEANING MORTALITY OF PIGLETS

Concentrated in the first 2-3 days post-farrowing

Main causes

CRUSHING BY THE SOW

Accidental?
Poor mothering?
Hypothermia/Lethargy?

WEAKNESS

Low birth weight (runt)?
Low vitality?
No or insufficient colostrum intake?

STARVATION

No or insufficient colostrum/milk intake?

Importance of colostrum intake
Colostrum intake to “survive” (Quesnel et al., 2012)

“Minimum”
- 200g

“Adequate”
- 250g

Colostrum Yield by the sows
- 1.5 kg
- 3.5 kg
- 6 kg

35% Sows Insufficient Production
INTRODUCTION

INDIVIDUAL COLOSTRUM INTAKE

CV: 40%

0 – 700g
INTRODUCTION

INDIVIDUAL COLOSTRUM INTAKE

PRODUCTION BY THE SOW + EXTRATION CAPACITY BY THE PIGLETS

Problems/factors

Hiperprolificacy
Large Litters (>15)
1991 – 20%
2008 - > 50%

Heterogeneity
Mean CV – 20%
Can be > 50%

Light piglets
+ per litter
**INTRODUCTION** – previous study

Charneca *et al.* (2013).

<table>
<thead>
<tr>
<th></th>
<th>UNIFORM (n=26)</th>
<th>HETEROGENEOUS (n=26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 piglets, CV:</td>
<td>9.3%</td>
<td>27.8%</td>
</tr>
<tr>
<td>Mean weight:</td>
<td>1391 ± 28g</td>
<td>1393 ± 29g</td>
</tr>
</tbody>
</table>

- Tend to produce more colostrum
- ≈ individual colostrum intake
- Variation colostrum intake (CV: 22% vs 36%, P=0.01)
- Mortality rate 0 - 21d (6.4% vs 11.9%, P=0.02)
- More uniform litters at 21d (17.1% vs 25.8%, P=0.01)
INTRODUCTION

SELECTION FOR LITTER UNIFORMITY CAN HAVE IMPACTS ON

- Mean birth weight of piglets
- Pre-weaning survival
- Weight at weaning
- Weaning adaptation
- Feeding valorisation
- Litter size
Question: Can mean weight of uniform litters have an impact?

Objectives

Effects of uniform litters of different mean birth weights on:

Sows:
- Colostrum Yield

Piglets:
- Colostrum intake
- Survival until 21 days of age
- Growth during sucking phase
- Uniformity of litter at 21d
FARM – FACILITIES - ANIMALS

Private intensive pig farm at south Portugal
± 1000 Large-White - Landrace type sows (Topigs 20)
Piétrain semen (Top Pi)
Group gestation
20 farrowing rooms (10 – 16 places)
3 weeks batches system (130-150 sows per batch)
Weaning on average at 26 days of age
Normal feeding and piglets management
No farrowing induction
Experimental procedures

Simultaneous farrowing supervision

Primiparous or multiparous sows (total = 78 sows)

Piglets at birth:

Roughly dried

Weighed (±0.5g)

Identified (ear tag)

Placed inside a PVC box
MATERIALS AND METHODS

Experimental procedures

After the final of two simultaneous farrowings

Reweighing of the piglets

Uniform Light (UL)  Uniform Average (UA)  Uniform Heavy (UH)

12 Piglets

Free sucking (Time 0)

Supernumerary piglets - adopted by no experimental sows - removed from the study
MATERIALS AND METHODS

Experimental procedures

Time 0 → 24h → Weighing (colostrum intake period)

Colostrum intake (CI): Devillers et al. (2004) equation

Colostrum yield of sows: sum of individual CI

Deaths until 21 days of lactation (time, weight at death time)

Piglets were weighed at 21d of age

Statistics: Descriptive statistics for original litters; Litter types were compared by ANOVA with batch as random factor; Results: means ± SEM
## RESULTS/DISCUSSION

### Original litters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
<td>4</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Farrowing duration (min)</td>
<td>232</td>
<td>102</td>
<td>430</td>
</tr>
<tr>
<td>Total Born</td>
<td>14.2</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>Born Alive</td>
<td>13.2</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Stillborn</td>
<td>0.8</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Mummified</td>
<td>0.2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Mean birth weight (g)*</td>
<td>1414</td>
<td>940</td>
<td>2193</td>
</tr>
<tr>
<td>Intra-litter CV (%)*</td>
<td>19.0</td>
<td>3.4</td>
<td>36.4</td>
</tr>
</tbody>
</table>

* Only alive born piglets
## RESULTS/DISCUSSION

### Experimental litters - sows

<table>
<thead>
<tr>
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<th>Uniform Average (UA)</th>
<th>Uniform Heavy (UH)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra-litter CV (%)</td>
<td>9.8 ± 0.4</td>
<td>8.2 ± 0.5</td>
<td>8.6 ± 0.4</td>
<td>0.241</td>
</tr>
<tr>
<td>Mean weight (g)</td>
<td>1136 ± 23&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1415 ± 25&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1649 ± 20&lt;sup&gt;c&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Litter weight gain 0-24h (LWG, kg)</td>
<td>1.6±0.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.0±0.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.2±0.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.004</td>
</tr>
<tr>
<td>Colostrum Yield (CY, kg)</td>
<td>3.9±0.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.8±0.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.2±0.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
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- **n**: 27, 23, 28

**P-values**: Uniform Heavy (UH), Uniform Average (UA), Uniform light (UL)
RESULTS/DISCUSSION

\[ CY = 2031 + 1.4 \cdot LWG; \quad R^2 = 0.86; \quad P < 0.001 \] – independent of litter type

- Litter weight gain is a good marker for colostrum yield
RESULTS/DISCUSSION

CY = 1919 + 0.16*LWSP; R^2 = 0.30; P<0.001

Colostrum yield is positively influenced by litter weight
# RESULTS/DISCUSSION

## Experimental litters - piglets

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<th>Uniform Heavy (UH)</th>
<th>P-value</th>
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<tr>
<td>Colostrum intake (g)</td>
<td>335 ± 13&lt;sup&gt;a&lt;/sup&gt;</td>
<td>400 ± 14&lt;sup&gt;b&lt;/sup&gt;</td>
<td>436 ± 12&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Colostrum Intake/kg BW (g)</td>
<td>304 ± 9</td>
<td>299 ± 10</td>
<td>275 ± 8</td>
<td>0.165</td>
</tr>
<tr>
<td>CV of colostrum intake (%)</td>
<td>22.5</td>
<td>23.7</td>
<td>23.6</td>
<td>0.652</td>
</tr>
<tr>
<td>Mortality rate 0-21d (%)</td>
<td>9.6</td>
<td>7.6</td>
<td>8.3</td>
<td>ns</td>
</tr>
</tbody>
</table>

**Global Mortality rate = 8.5%**  
**Mean age of death = 4d**  
**64% of losses were register until d3**
### RESULTS/DISCUSSION

**Experimental litters - piglets**

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<td>Average daily gain 0-21d (g)</td>
<td>212 ± 3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>230 ± 4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>239 ± 3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean weight at 21d (kg)</td>
<td>5.6 ± 0.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.4 ± 0.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.7 ± 0.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CV of 21d weight</td>
<td>17.0</td>
<td>16.4</td>
<td>16.5</td>
<td>0.839</td>
</tr>
</tbody>
</table>
DISCUSSION

CROSS-FORESTING PRIOR COLOSTRUM INTAKE ≠ THAN FARM PROCEDURE

COLOSTRUM RICH IN CELLS
EX: LYMPHOCYTES

CROSS PIGLETS
INTESTINAL EPITHELIUM

FOUND IN GENERAL CIRCULATION

ONLY IF FROM NATURAL MOTHER

- MANY PIGLETS NOT NURSED BY THEIR NATURAL MOTHERS

- IMPACTS OF OUR PROCEDURE?
CONCLUSIONS/TAKE HOME MESSAGES

- Litter uniformity
- low pre-weaning mortality
  ≠ Mean Weights
- No influence on weaned piglets number
  ≠ Mean Weights
- Influences growth and weaning weight

Selection for uniformity is advisable
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