Improving low input pig production systems

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Defining Low Input Systems

- Low capital investment
- On-farm resources
- Outdoor
- Space
- Animal welfare
- Small herd size
Issues

Lack of dedicated breeding systems
Breed choice

High piglet mortality
Heat stress

Improve product quality
Lack of dedicated breeding systems

Conventional breeds

Small herd sizes limit own replacement breeding

Max 20% replacement gilts of conventional origin
Breed choice

Conventional
- Often used in commercial organic/low input pig production
- May be less suited for these systems

Traditional
- Favoured by organic production standards
- Prolificacy and carcass quality may be less suitable for commodity pork market
Piglet mortality

2x higher than in intensive systems

Large litters

Loose housing of sows

Lower feed quality
Heat stress

Increasing global temperatures

Pork production in warmer climates

Exposure in outdoor systems

Heat stress negatively affects sow production
Improve product quality

Heavy pigs (+160kg) for pork specialities

Limited fat quantity & quality of conventional breeds

Suitability of traditional breeds?
Project goals

Suitable breeds for low input systems

Design breeding systems low input systems

Breed for heat tolerant sows

Reduce piglet mortality by breeding & management

Improve product quality by breed choice & feeding regime
3 work packages
First work package

BREEDS & BREEDING SYSTEMS

Replacement breeding
Pig mortality
Heat stress resistance
Second work package

MANAGEMENT INNOVATIONS

Gilt rearing and lactation systems

Mothering ability
Piglet mortality
Piglet health
BREED CHOICE & FEEDING REGIME

Product quality (sausage)
Finishing performance
Meat quality
Fat quality
Fatty acid composition
Consumer evaluation
Results so far...
Breed choice

Traditional vs. Conventional breeds

Goal:
Evaluate performance of traditional vs. conventional breeds in low input & organic pig production systems

3 climatic regions within Europe

Literature + Surveys
Traditional vs. Conventional breeds
Litter size

Leenhouwers et al. 2013
Traditional vs. Conventional breeds
Feed conversion

Leenhouwers et al. 2013
## Breed choice

### Conclusions

**Conventional**
- Large litters
- High mortality
- Fast growth, efficient
- Lean
- Temperate climates
- Controlled environment
- Commodity pork

**Traditional**
- Smaller litters
- Low mortality
- Slow growth, less efficient
- Fatter

1. **Prolific breeds**  
   Good finishing performance  
   - Commodity pork

2. **Special meat breeds**  
   Less prolific and fat  
   - Added value products
**Goal:**
Design a system that provides NL organic sector with own replacement gilts

Improve important traits
Dutch organic pig industry

60 commercial organic pig farms (total ± 5,000 sows)

Conventional breeds (Landrace/Large White crosses)

Purchase of conventional replacement gilts
++ vitality, mothering ability, longevity

++ vitality, growth, FCR

TOPIGS EkoFok
17 NL organic farms

Leenhouwers et al. 2011
Breed for heat tolerant sows

Goal:
Increase knowledge on genetic aspects of heat stress tolerance
Heat tolerance
Differences between 2 lines

At 30°C: 7% difference in farrowing rate

Upper Critical Temperature

Bloemhof et al. 2012
Genetics of heat tolerance
93,969 records from 24,456 sows located in Spain/Portugal

Differences between families in heat tolerance exist
Sufficient genetic variation in heat tolerance within lines
21-14 days prior to insemination is most sensitive period

=> Breeding for improved heat tolerance is possible

Bloemhof et al. 2012
Goal:
Improve carcass, meat and fat quality in heavy pigs used for premium sausage production

Traditional vs. Conventional breeds
Feeding regime
## Production efficiency

<table>
<thead>
<tr>
<th></th>
<th>Saddleback</th>
<th>Pi*Sad</th>
<th>Modern hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Finishers</td>
<td>46</td>
<td>42</td>
<td>44</td>
</tr>
<tr>
<td>Avg daily gain, g/d</td>
<td>624&lt;sup&gt;a&lt;/sup&gt;</td>
<td>716&lt;sup&gt;b&lt;/sup&gt;</td>
<td>804&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Feed conversion ratio</td>
<td>4.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.6&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Carcass weight, kg</td>
<td>128.4</td>
<td>129.5</td>
<td>129.5</td>
</tr>
<tr>
<td>Lean meat, %</td>
<td>32.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>45.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>54.2&lt;sup&gt;c&lt;/sup&gt;</td>
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Weißmann *et al.* 2013

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*TOPIGS Progress in Pigs*
## Fat quality

### Consumer desirability

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<tr>
<td>Saturated Fatty Acids, %</td>
<td>37.8(^a)</td>
<td>36.7(^b)</td>
<td>35.8(^c)</td>
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<tr>
<td>Mono-Unsaturated Fatty Acids, %</td>
<td>50.2(^a)</td>
<td>49.9(^a)</td>
<td>48.6(^b)</td>
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<tr>
<td>Poly-Unsaturated Fatty Acids, %</td>
<td>11.9(^a)</td>
<td>13.3(^b)</td>
<td>15.4(^c)</td>
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<tr>
<td>Sensory evaluation (1-5)</td>
<td>4.5</td>
<td>3.9</td>
<td>3.6</td>
</tr>
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Weißmann et al. 2013
Improving sausage quality

Production efficiency

Fat quality
Consumer desirability

=> Piétrain*Saddleback: suitable alternative?

Weißmann et al. 2013
Thank you for your attention!