Welfare, environmental impact and production – conflicting pig breeding goals

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Funded by Formas and SLU
We want a high production level and a good animal welfare

Need for broad, balanced breeding goals
Genetic correlations between goal traits

- Birth weight
- Piglet survival
- Litter size
- Growth rate
- Fertility
- Disease resistance
- Feed conversion
- Leg health
- Meat %
- Shoulder ulcers
- Meat quality
- Sow longevity
- Litter size
- Feed conversion
- Meat quality
- Sow longevity
- Meat %
Create balance between goal traits with ‘economic weights’

Genetic evaluation

Heritabilities
Genetic correlations
‘Economic weights’

One total merit breeding value
Aims

Investigate farmers’ views on
- which traits should be in the breeding goal
- how much weight should these traits have
- which traits effect animal welfare

Estimate
- difference in genetic change between alternative ‘Welfare’ and ‘Current’ breeding scheme
Questionnaire with selection index

110 Swedish pig farmers
15 % organic production
85 % conventional
28 % piglet production
24 % slaughter pig
48 % both
Farmers were asked to rank 15 traits

Piglet growth rate
Growth rate, 30-100kg
Roughage consumption
Feed conversion
Meat percentage
Meat quality

Fertility
Litter size
Piglet survival
Piglet birth weight

Disease resistance
Parasite resistance
Shoulder ulcers
Leg health
Sow longevity
Per cent of producers ranking a trait among the top 5 with highest priority
Which weights should the traits have to get the genetic gain you want in your herd?

<table>
<thead>
<tr>
<th>Trait</th>
<th>Weight</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 highest ranked traits</td>
<td></td>
<td></td>
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<tr>
<td>Relative weights, add up to 100</td>
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<tr>
<td>Resulting genetic change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeat until satisfied</td>
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</tbody>
</table>

5 highest ranked traits
Relative weights, add up to 100
Resulting genetic change
Repeat until satisfied
Genetic changes (from selection index), based on economic weights given by producers

Meat percentage: -0.2 %
Growth rate, 30-100 kg: +8 g/d
Litter size: -0.1 born alive
Piglet survival: +1 % of liveborn
What effect do you consider each trait to have on profitability and animal welfare?

<table>
<thead>
<tr>
<th>Trait</th>
<th>Lönsamhet</th>
<th>Djurvelfärd</th>
<th>Klimatemiljö</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tillväxt slaktgris</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
</tr>
<tr>
<td>Smågrisöverlevnad</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
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<tr>
<td>Köttkvalitet</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
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<tr>
<td>Produktiv livsändag sugga</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
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<tr>
<td>Foderomvandlingsförmåga</td>
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<td>Benhalsa</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
</tr>
<tr>
<td>Bogsår sugga</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
</tr>
<tr>
<td>Födelsevikt smågris</td>
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<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
</tr>
<tr>
<td>Grovfoderkonsomtion</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
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<tr>
<td>Fertilitet</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
<td>Ingen mellan stor</td>
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<tr>
<td>Parasitresistens</td>
<td>Ingen mellan stor</td>
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<tr>
<td>Kullstorlek</td>
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<td>Tillväxt smågris</td>
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</tbody>
</table>

No, Medium or HIGH effect
Organic and conventional producers associated the same traits with animal welfare
Most farmers (90 %) considered all traits except roughage consumption to have medium or high impact on farm profitability
Traits with a HIGH effect on pig welfare, according to farmers

- Leg health
- Shoulder ulcers
- Disease
- Sow longevity
- Parasite
- Piglet survival
- Piglet birth weight
- Roughage
- Feed conversion
- Growth piglet
- Fertility
- Growth 30-100kg
- Litter size
- Meat quality
- Meat percentage
Simulated the new breeding program ‘Welfare’

Leg health
Shoulder ulcers
Disease resistance
Sow longevity
Parasite resistance
Piglet survival

50% of total economic weight in breeding goal

Proportionally reduced weight on all other traits (litter size, growth, meat percentage etc)
## Estimated genetic trends, change per generation

<table>
<thead>
<tr>
<th></th>
<th>‘Welfare’</th>
<th>‘Current’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg health</td>
<td></td>
<td>-0.0</td>
</tr>
<tr>
<td>Shoulder ulcers</td>
<td></td>
<td>-0.1 % free</td>
</tr>
<tr>
<td>Disease resistance</td>
<td></td>
<td>+0.2 % healthy</td>
</tr>
<tr>
<td>Sow longevity</td>
<td></td>
<td>+1.7 days</td>
</tr>
<tr>
<td>Parasite resistance</td>
<td></td>
<td>+0.2 % health</td>
</tr>
<tr>
<td>Piglet survival</td>
<td></td>
<td>-0.2 % of liveborn</td>
</tr>
<tr>
<td>Parameter</td>
<td>‘Welfare’</td>
<td>‘Current’</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Litter size</td>
<td>-0.00</td>
<td>+0.02 piglets</td>
</tr>
<tr>
<td>Growth, 30-100 kg</td>
<td>+6</td>
<td>+19 g/d</td>
</tr>
<tr>
<td>Feed conversion</td>
<td>+0.5</td>
<td>+0.8 g/MJ Me</td>
</tr>
<tr>
<td>Meat percentage</td>
<td>+0.2</td>
<td>+0.3 %</td>
</tr>
</tbody>
</table>
The progress in ‘welfare traits’ is accompanied by reduced progress in production traits

Who should pay for increased welfare?
 • The farmer
 • The industry
 • The society – political governance
 • The consumer
To conclude

• Farmers’ opinions about breeding goals can be studied with a web questionnaire
• Farmers are interested in ‘welfare traits’ and may accept less progress in production traits
• Societal demands must be related to willingness to pay for animal friendly products

To discuss

• Who pays for improved welfare?