Exploring variation in saleable meat yield

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Description of carcase quality

• Lean meat percentage
  - Weight of lean meat expressed as % of carcase weight
  - Prediction often based on fat depth, (muscle depth) and carcase weight

• Saleable meat yield
  - Yield of bone-in or boneless cuts
  - More difficult to specify since it depends on market specifications
  - Farm-gate versus Wholesale versus Retail cuts
Market value of a pig carcase

• Overall lean meat content is still important
  • Consumers prefer lean cuts

• Higher weight in more valuable cuts is desired
  • For a given carcase weight and P2 fat depth (independent of lean meat content)

• (Extra) economic return depends on market specifications
Yield & value of saleable meat differs between markets

Distribution of meat from Danish abattoir in Horsens,

(Pig Progress No 2, 2008)
Exploring saleable meat yield

- Data from French National Pig Breeding Program
- Recorded at 3 central test stations from 1999 until 2007
- Four breeds:
  - French Landrace – dam line (LF)
  - Large White – dam line (LWF)
  - Large White – sire line (LWM)
  - Pietrain – sire line (PP)

Results were presented at AGBU pig genetics workshop (Mérour and Hermesch, 2008) and are available at:
Data description

- Carcasses divided into
  - 4 primal cuts: loin, back leg (ham), shoulder, belly
  - + weight of the subcutaneous fat above the loin (backfat)

<table>
<thead>
<tr>
<th></th>
<th>LF</th>
<th>LWF</th>
<th>LWM</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>7,386</td>
<td>11,803</td>
<td>2,714</td>
<td>2,400</td>
</tr>
<tr>
<td>Sex</td>
<td>Castrate</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Female Castrate
- N = 2,400
- Sex = Female
Carcase dissection

- Pubis symphisis
- Backfat = fat and rind weight above loin
- Last lumbar vertebra
- 5th - 6th rib
- 2 cm below the last cervical vertebra
- Shoulder
- Foot
- Back leg
- Belly

[Diagram of pig carcass with labeled parts]
Between-breed variability

All differences between breeds were significant (p<0.001)
# Between-breed variability

<table>
<thead>
<tr>
<th>Breed</th>
<th>Length (cm)</th>
<th>Lean meat percentage</th>
<th>Back leg (kg/pig)</th>
<th>Loin (kg/pig)</th>
<th>Belly (kg/pig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landrace</td>
<td>102.3</td>
<td>52.4</td>
<td>18.8</td>
<td>20.3</td>
<td>10.1</td>
</tr>
<tr>
<td>Pietrain</td>
<td>94.2</td>
<td>64.6</td>
<td>21.9</td>
<td>23.0</td>
<td>8.5</td>
</tr>
</tbody>
</table>
Carcase weight is major influence on primal cuts

- How much variation in primal cuts is explained by carcase weight and fat depth?

- What is the change in weights of primal cuts with increasing carcase weight?

- Does the relationship between weight and primal cut weights differ between breeds?
The effect of carcase weight on back leg

- Carcase weight accounted for 60 to 66% of variation
- Further 2 to 5% of variation was explained by fat depth
- Minimal extra variation was explained by fitting muscle depth or carcase length
  - On the phenotypic level
The effect of carcase weight on loin weight

- Carcase weight accounted for 54 to 66 % of variation
  - Breed differences

- Further 3 to 10 % of variation was explained by fat depth
  - Breed differences

- Muscle depth and carcase length explained some additional variation
  - On the phenotypic level

\[
\text{Loin} = \text{CW} + e
\]

\[
\text{Loin} = \text{CW} + P^2 + e
\]
The effect of carcase weight on belly

- Carcase weight accounted for up to 50% of variation
- Fat depth explained further 1 to 2% of variation
- No extra variation was explained by fitting muscle depth or carcase length
  - On the phenotypic level

\[
\begin{align*}
\text{Belly} &= \text{CW} + e \\
\text{Belly} &= \text{CW} + P^2 + e
\end{align*}
\]
Influence of carcase weight on primal cuts

- Increase in back leg per kg carcase weight
  - LF, LWF, LWM: 0.21
  - PP: 0.23

- Increase in loin per kg carcase weight
  - LF, LWF: 0.25
  - LWM: 0.26
  - PP: 0.27
Breed differences for the increase in primal cuts with higher carcase weight

![Bar chart showing breed differences in primal cuts across different carcase weights](chart.png)

Legend:
- LF
- LWF
- LWM
- PP
Breed differences reflect selection emphasis

- Largest differences for fat weight
  - Selection for lean meat percentage mainly based on fat depth measurement

- Increase in loin weight with heavier carcases was larger in sire lines (LWM and PP)
  - Muscle depth has been recorded on farm since 1999 in France

- There were minimal differences in primal cut gain with higher carcase weight for back leg, belly and shoulder
  - Pietrain have larger back leg but other breeds did not differ
Additional economic return from saleable meat yield?

- Australian payment system based on carcase weight and P2 fat depth

- For carcases with the same carcase weight and fat depth:
  - Variation in primal cuts?
  - Variation in return?
    - Based on farm-gate prices versus wholesale/retail prices
Variability for constant weight and fatness

- Only LWF animals (189 pigs) with limited variation in
  - weight [81 - 82 kg]
  - fat depth [14.5 - 16.5 mm]

Loin weight (kg/pig) ~ 5 kg

Back leg weight (kg/pig) ~ 4 kg
## Variation in extra return from saleable meat yield

### Farm gate prices ($/kg)

<table>
<thead>
<tr>
<th></th>
<th>Loin</th>
<th>Back leg</th>
<th>Belly</th>
<th>Shoulder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder</td>
<td>2.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belly</td>
<td>4.20</td>
<td>1.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Green, 2008)

### Graph: Extra return from SMY ($ per carcase)

- Top 10% = + 6.7 $ per carcase in comparison to an average carcase
Variation in extra return from saleable meat yield

**Wholesale/Retail prices ($/kg)**

<table>
<thead>
<tr>
<th></th>
<th>Loin</th>
<th>Ham</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder</td>
<td>13.99</td>
<td>7.99</td>
</tr>
<tr>
<td>Belly</td>
<td>8.99</td>
<td>7.99</td>
</tr>
</tbody>
</table>

(Green, 2008)

Top 10% = + 20.4 $ per carcase in comparison to an average carcase
Take home messages

• Lean meat percentage and saleable meat yield determine market value of a carcase

• Breed differences reflected selection emphasis
  • Biggest differences for fat weight and increase in fat weight with higher carcase weight

• Variation in saleable meat yield can be used to capture extra returns per carcase
  • Example: extra 6.7 $ and 20.4 $ for top 10% versus average pigs using farm-gate and wholesale/retail prices
Acknowledgements

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