THE COST OF BATCH VARIABILITY AS A COMPONENT OF ECONOMIC VALUES FOR ROBUSTNESS TRAITS

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Acknowledgements

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Background

- Selection for growth, feed efficiency and leanness key to pig genetic improvement
- May not be sustainable long term?
- Modern genotypes much more sensitive to the environment
  - Heat
  - Cold
  - Disease
  - Feed quality
Focus on the mean

- Genetic evaluation focus is on the mean of traits
- Reducing variability of performance implies robustness
- But what is in it for the commercial pig farmer?
- Clear economic drivers = change in breeding programs
- Reduced variability of performance
  - Short term profit
  - Long term sustainability
Batch variability

Consistent

Variable
Batch finishing system
Batch finishing system

- Need to refill the pen
- Not profitable to keep partly filled pen
- Underweight pigs are penalised
- More variable pen = more underweight pigs
Optimisation

- Tradeoff
- How long before the pen is cleared?
- Keep longer
  - Less penalties for underweight pigs
  - Higher opportunity cost of unused facilities
- Example calculations for Australia
Penalties for underweight carcases/pigs

<table>
<thead>
<tr>
<th>Dressed carcase weight band</th>
<th>Moderate threshold</th>
<th>Severe threshold</th>
<th>Moderate step</th>
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<tbody>
<tr>
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Other assumptions

<table>
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<tr>
<th>Parameter name</th>
<th>Values used</th>
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<tbody>
<tr>
<td>Feed price ($ fresh weight/tonne)</td>
<td>230</td>
</tr>
<tr>
<td>Daily dressed carcase weight gain (kg/day)</td>
<td>0.6</td>
</tr>
<tr>
<td>Target dressed carcase weight (kg)</td>
<td>70</td>
</tr>
<tr>
<td>Base carcase price ($/kg \textit{dw} )</td>
<td>2.85</td>
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<tr>
<td>Opportunity cost per pig per pen per day ($)</td>
<td>0.20, 0.50, and 0.80</td>
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Penalties for underweight carcasses/pigs

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Optimisation

Profit ($/pig) vs. Termination day

- Moderate threshold
- More variable

40 50 60 70 80 90

-20 -15 -10 -5 0 5 10 15

Termination day

Moderate thresh  More variable
Optimisation

Keep the more variable batch longer to minimise loss.
Optimisation

Financial cost per pig

Keep the more variable batch longer to minimise loss

Termination day

Profit ($/pig)

Moderate thresh

More variable
### Penalties for underweight carcases/pigs

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Optimisation

Later termination, similar profit drop

Graph showing profit ($) per pig against termination day for different thresholds:
- Moderate thresh
- More variable
- Severe threshold
- More variable
The optimisation is more important with a severe threshold.
Penalties for underweight carcasses/pigs

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Econ. Val. vs Pen Cost

-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2

Economic value of 1kg increase in sd ($/pig)

5 6 7 8 9 10 11 12 13 14 15 16 17 18

Standard deviation (sd) of batch dressed weight (kg)

- Stepwise penalty - moderate pen cost
- Stepwise penalty - high pen cost
Penalties for underweight carcasses/pigs

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Econ. Val. vs Pen Cost

- Economic value of 1 kg increase in standard deviation ($/pig)
- Standard deviation (sd) of batch dressed weight (kg)
- Lines represent different penalty scenarios:
  - Stepwise penalty - moderate pen cost
  - Stepwise penalty - high pen cost
  - Threshold penalty - moderate pen cost
  - Threshold penalty - high pen cost
Implications

- There is a clear rationale for economic cost of batch variability in finishing pigs
- Economic impact depends on (interacting)
  - Penalties for underweight pigs
  - Opportunity cost of growing facility (Pen Cost)
- High batch variability driven by
  - Very high lean growth potential
  - Variation in weaning weight within and across litters
- Need EBVs for variability in growth rate
Implications

- Economic penalty on other traits that increase batch variability
  - Increased weaning weight variability with increased litter size
  - Low sow survival equals more weaned pigs from gilts with lighter and more variable weaning weights
  - Disease susceptibility/tolerance traits