Developing a 5 tonne sow: Biologically possible or commercially probable?

G.A. Walling & E.F. Knol
Defining the 5 tonne sow
5,000kg of pig carcasses per sow
Current Levels Of Output From Elite Sows
Current Elite Sows

- Assumptions
  - Always hold to first service
  - No failed pregnancies
  - Never have prolonged weaning-service intervals
  - Culled immediately at final weaning
  - All pigs sold at full weight
Elite Sow: Cycle Length

- Gestation: 114 days
- Lactation: 23 days
- Weaning-Service: 5 days
- Total: 142 days

- Litters/sow/year = 365/142 = 2.57
Elite Sow: Piglet Output

- Total Born per litter: 18.2
- Live born per litter: 16.1
- Weaned per litter: 13.5
  - Pre-weaning mortality: 16%
- Finished per litter: 12.8
  - Post-weaning mortality: 5.2%
- Kilos sold per litter: 1,216kg
  - Carcase weight: 95kg
Current Elite Sow Output
2.57 x 1216kg = 3,125kg
Towards the 5 tonne sow
Achieving the 5 tonne sow

1. Increase Litter Size
Genetic Trends: Numbers Born Alive

Number Born Alive

Historic
Future

Topigs Norsvin

JSR Genetics
Genomics Benefits Litter Size Traits

- Feed intake: BLUP 62, Genomics 9
- Gain: BLUP 65, Genomics 10
- Deboned ham weight: BLUP 50, Genomics 27
- Meat color: BLUP 41, Genomics 22
- Number born: BLUP 24, Genomics 29
- Survival: BLUP 21, Genomics 25
- Birth weight: BLUP 43, Genomics 37

Reliability %
Genetic Trends: Numbers Born Alive

Number Born Alive

- Historic
- Future
- Future + Genomics

Years: 2010 to 2020

Number Born Alive:
- 0 to 3

Topigs Norsvin
JSR Genetics
Impact of Genetic Progress for Litter Size

- Total Born per litter: 18.2
- Live born per litter: 16.1 + 2
- Weaned per litter: 13.5 + 1.7
  - Pre-weaning mortality: 16%
- Finished per litter: 12.8 + 1.6
  - Post-weaning mortality: 5.2%
- Kilos sold per litter: 1,216 + 152kg
  - Carcase weight: 95kg
Elite Sow Output

2.57 x 1368 kg = 3,516 kg (+12.5%)
Mortality Increases In Larger Litters

Larger Litters Produce Lighter Piglets

Lighter Piglets Have Increased Mortality…..

... and are less likely to make full value

Research by Justin S. Fix and M. Todd See, North Carolina State University, Raleigh; Graph taken from nationalhogfarmer.com
Difficult to maintain with higher litter size

- Total Born per litter 18.2
- Live born per litter 16.1 + 2
- Weaned per litter 13.5 + 1.7
  - Pre-weaning mortality 16%
- Finished per litter 12.8 + 1.6
  - Post-weaning mortality 5.2%
- Kilos sold per litter 1,216 + 152kg
  - Carcase weight 95kg
Solution: More balanced selection

62% of the total BG variation goes to Total Number Born "due to the fact that the National Committee wishes to promote litter size" the index weighting factor was doubled

68% of the total BG variation goes to Number Alive at 5 Days "survival is included in the BG [...] to counter a further increase in mortality"

Slide kindly shared by Pieter Knap, PIC
Breeding Companies Including Piglet Survival Traits in Indices

Number born alive per litter and number of teats (left axis)
Pre-weaning mortality % (right axis)
More traits in index can reduce genetic progress for other existing traits
Achieving the 5 tonne sow

1. Increase Litter Size
2. Reduce Cycle Length
Elite Sow: Cycle Length

- Gestation: 114 days
- Lactation: 23 days
- Weaning-Service: 5 days
- Total: 142 days

Litters/sow/year = 365/142 = 2.57

Variation between sows and litters
Typical Distribution of Gestation Length

Gestation Length (Days)

% of Litters

Numbers Born Alive

Gestation Length

Born Alive

Topigs Norsvin

JSR Genetics
Elite Sow: Cycle Length

- Gestation: 114 days
- Lactation: 23 days
- Weaning-Service: 5 days
- Total: 142 days

Litters/sow/year = \( \frac{365}{142} = 2.57 \)

Variation between sows and litters
Legal minimum is 21 days not 23
Possible to reduce by \(~1\) day
Elite Sow: Cycle Length

- Gestation: 114 days ±2 days
- Lactation: 23 days ±2 days
- Weaning-Service: 5 days ±1 day
- Total: 142 days ±5 days

Litters/sow/year = 365/137 = 2.66
Elite Sow Output

2.66 x 1368kg = 3,639kg (+3.5%)
Achieving the 5 tonne sow

1. Increase Litter Size
2. Reduce Cycle Length
3. Reduce Mortality
Possible to Genetically Reduce Mortality

Number born alive per litter and number of teats (left axis)
Pre-weaning mortality % (right axis)
Impact of Genetic Progress for Litter Size

- Total Born per litter 18.2
- Live born per litter 16.1 + 2
- Weaned per litter 13.5 + 1.7 + 0.3
  - Pre-weaning mortality 16% - 1.5%
- Finished per litter 12.8 + 1.6 + 0.4
  - Post-weaning mortality 5.2% - 0.5%
- Kilos sold per litter 1,216 + 152kg + 38kg
  - Carcase weight 95kg
Elite Sow Output
2.66 x 1406kg = 3,740kg (+2.8%)
Still nowhere near a 5 tonne sow
Shortcut To The 5 Tonne Sow

Becoming Italian and Increasing Weight
Average carcase weight of pigs in selected EU Member States, 2015

Source: Eurostat

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<tr>
<th>Country</th>
<th>Weight (kg)</th>
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</table>
Impact of Genetic Progress for Litter Size

- Total Born per litter 18.2
- Live born per litter 16.1 + 2
- Weaned per litter 13.5 + 1.7 + 0.3
  - Pre-weaning mortality 16% - 1.5%
- Finished per litter 12.8 + 1.6 + 0.4
  - Post-weaning mortality 5.2% - 0.5%
- Kilos sold per litter 1,216 + 152kg + 38kg + 539kg
  - Carcase weight 131.4kg
Elite Sow Output

2.66 x 1945kg = 5,174kg (+38.3%)
Issues With This Approach

- Consumer/Retail Demand
  - Pack & Portion size
Issues With This Approach

• Consumer/Retail Demand
  – Pack & Portion size

• Shape of the Growth Curve
Taken from PhD Thesis of Shull (2013), University of Illinois.
Issues With This Approach

- Consumer/Retail Demand
  - Pack & Portion size
- Shape of the Growth Curve
- Boar Taint
EU banning piglet castration by 2018

The European Union has taken another step into the abolishing of piglet castration. An agreement has been reached to stop castrating without anaesthesia by January 1, 2012 – and a total ban has been scheduled to be implemented by 2018 at the latest.

The announced deal is not so much part of European legislation as a voluntary agreement between market parties. The European Commission had initiated the talks, the European farmers’ organisation Copa-Cogeca, the European organisation for the meat sector UECPA, retailers, veterinarians, the European animal welfare organisation Eurogroup for Animals all joined in.

The deal was not officially confirmed as all relevant parties will have to submit the result to their members.

Netherlands: Product board happy
Frans van Dongen, negotiator on behalf of the Dutch Product Board for Livestock, Meat and Eggs (PVE), said he expects all parties involved will sign the deal around the abolishing of piglet castration – which will almost include all European pig production.

Some exceptions have been made as the heavy pig production in e.g. Italy for Parma production will be exempted from castration.
Duroc Sireline: 100% Taint

![Graph showing the relationship between Androstenone (ppb) and Skatole (ppm).](image)
Low Taint Sireline: 4.5% Taint
Poor correlation between boar taint risk and carcase weight

\[ R^2 = 0.0055 \]

\[ R^2 = 0.0043 \]

(D’Souza et al., 2011)
Issues With This Approach

- Consumer/Retail Demand
  - Pack & Portion size
- Shape of the Growth Curve
- Boar Taint
- Farm Capacity
Average farm would need 130 days accommodation post slaughter to 110kg liveweight

Average farm would need 206 days accommodation post slaughter to 170kg liveweight or grow 462g/day faster (both 58% increase)
462g/day = 39 years genetic progress!
5 Tonne Sow: Possible?
Elite Sow Output

2.66 x 1945kg = 5,174kg (+38.3%)
5 Tonne Sow: Probable?
You can never put too much pork in your mouth as far as I'm concerned

Lewis Black

PICTUREQUOTES.com