Quantifying the relation between reproduction and finishing traits

Roos Vogelzang, Egbert Knol, Luc Janss

Topigs Norsvin

PROGRESS IN PIGS

Towards 5 ton of pork per sow per year

- We need:
  - Reduction in cost price of a piglet: increase in litter size
  - Reduction in fixed cost per kg of pork: increase in market weight

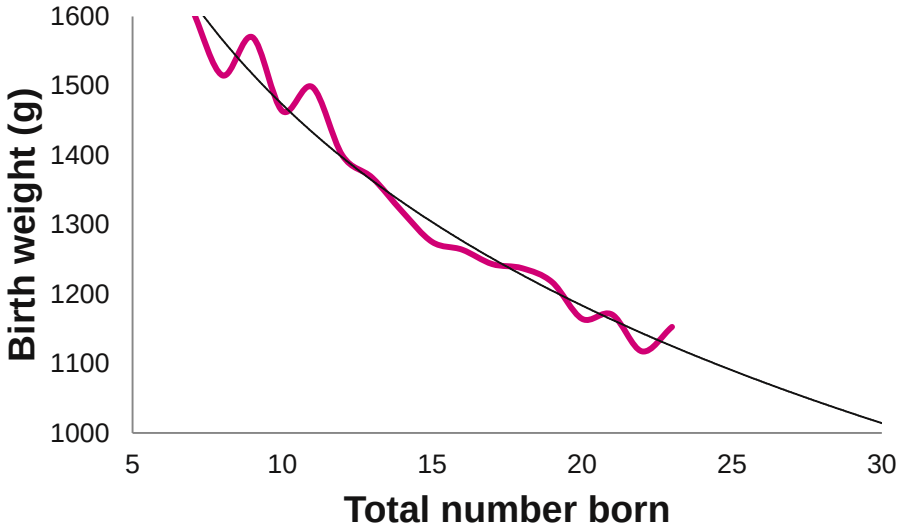
- Consequence larger litters
  - Decrease in birth weight, hence
    - Higher mortality risk
    - Lower gain later in life

Litter size and birth weight

Phenotypic trend

Tempo * Topigs 20
> 28,500 piglets

Average birth weight 1285 gram



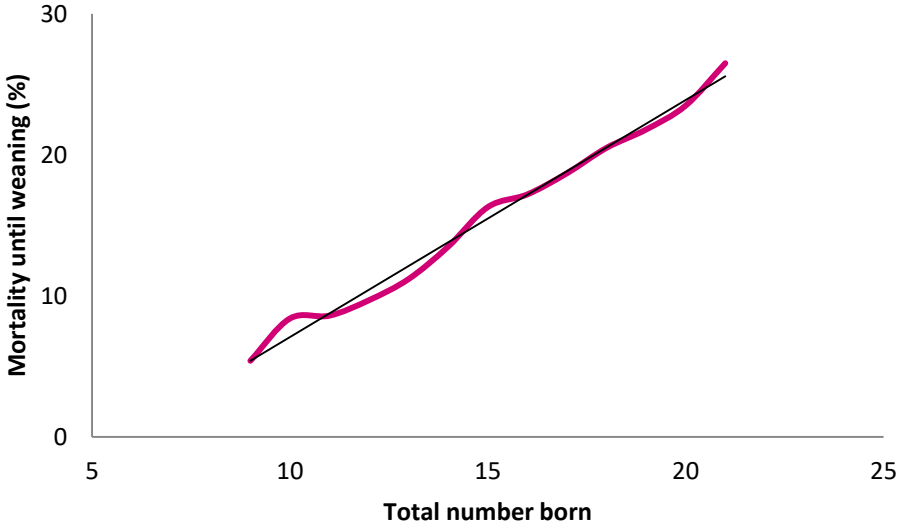
An extra piglet born per litter decreased the average birthweight with 30 gram

Litter size and mortality

Phenotypic trend

Tempo * Topigs 20
> 28,500 piglets

Stillborn + preweaning mortality



An extra piglet born per litter increased mortality until weaning with 1.68%

Birth weight and daily gain

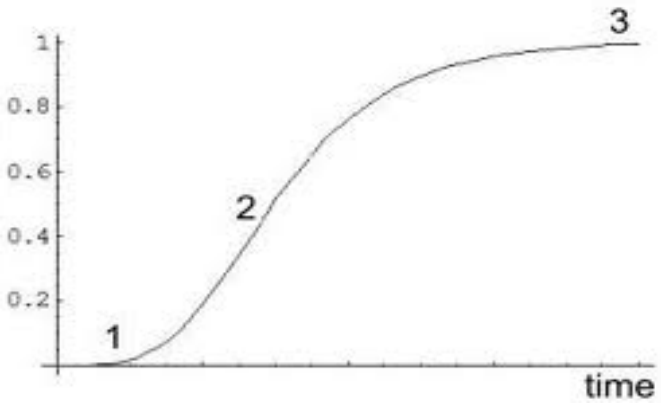
- Individual weight curves of 2174 finishing pigs
- Using the Gompertz curve function in a joint Bayesian analysis
- Average birth weight was 1391 gram and average litter size was 15.2
- The weights during start, middle and end of the finishing period were used (23.2, 70.2, and 123.8 kg, respectively)

Birth weight and daily gain

Gompertz curve (Fitzhugh Jr. 1976)

$$Y = A\exp(-be^{-ct})$$

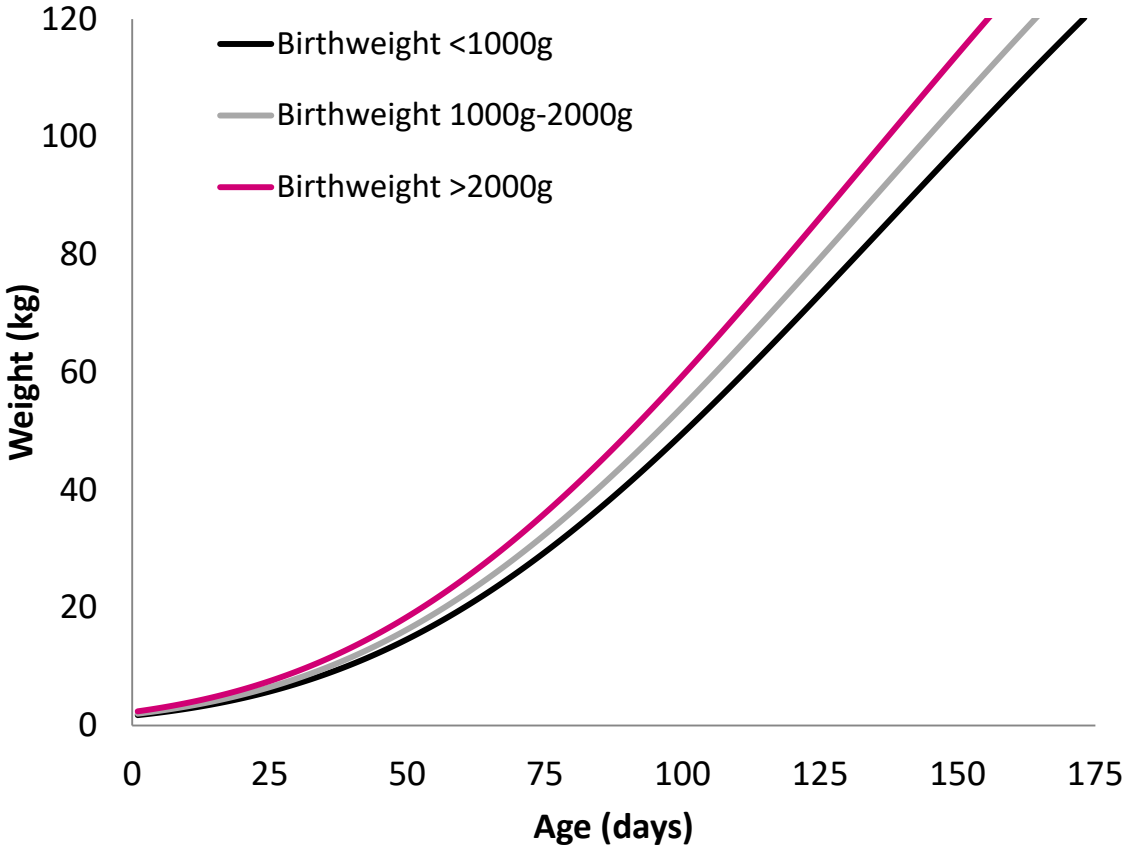
Y → Body weight on time = t
A → Mature weight
b → scaling parameter (established by initial Y_0)
c → growth rate parameter
t → time in days after birth



- Growth curve is the first derivate of weight curve

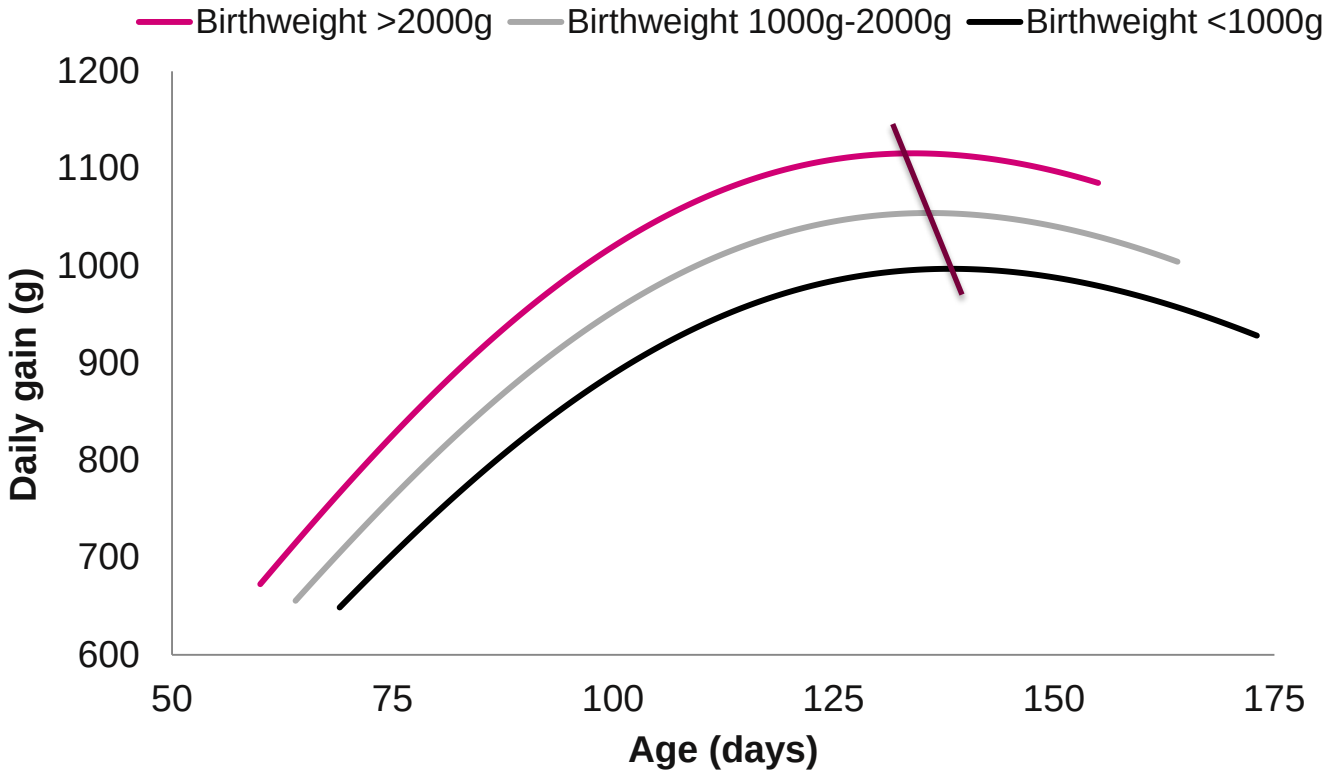
Birth weight and daily gain

Birth weight	<1000g	1000g-2000g	>2000g
Gompertz parameter A	233.6	245.4	260.3
Gompertz parameter B	-4.944	-4.859	-4.737
Gompertz parameter C	-0.0116	-0.0117	-0.0117
Average age 120 kg	173	165	156
Average weight 170 days	118	126	136



Birth weight and daily gain

Growth curve 25-120 kg



Birth weight and daily gain

Combining results

Sow output per litter

- Increasing litter size
- Increasing mortality
- Decreasing birth weight
- Decreasing daily gain

Slaughter age 170 days

Total number born	Birth weight	Number weaned	Weight 170 days	Kg per litter
10	1545	9.3	129	1176
15	1343	12.7	126	1570
20	1200	15.3	124	1867
25	1089	17.2	123	2072
30	998	18.3	122	2186
35	922	18.7	121	2213
40	855	18.3	120	2154

25 total born = 17.2 weaned = 2072kg / litter * 2.43 litters = > 5000 kg / sow / year

Combining results

Biological limit

± 18 piglets weaned per litter

Vision Topigs Norsvin

Every extra piglet born should be weaned

If farrowing + lactation survival = 85%

→ 15 piglets born = 1579 kg /litter

→ 20 piglets born = 2073 kg /litter

Total number born	Birth weight	Number weaned	Weight 170 days	Kg per litter
10	1545	9.3	129	1176
15	1343	12.7	126	1570
20	1200	15.3	124	1867
25	1089	17.2	123	2072
30	998	18.3	122	2186
35	922	18.7	121	2213
40	855	18.3	120	2154

Combining results

Finite finishing space

15 → 25 piglets
+ 4.5 weaned per litter

Total number born	Birth weight	Number weaned	Weight 170 days	Kg per litter
10	1545	9.3	129	1176
15	1343	12.7	126	1570
20	1200	15.3	124	1867
25	1089	17.2	123	2072
30	998	18.3	122	2186
35	922	18.7	121	2213
40	855	18.3	120	2154

We will need to

Create space

or

Reduce sow population

or

Decrease slaughter age to 125 days

→ ±1250 kg/litter

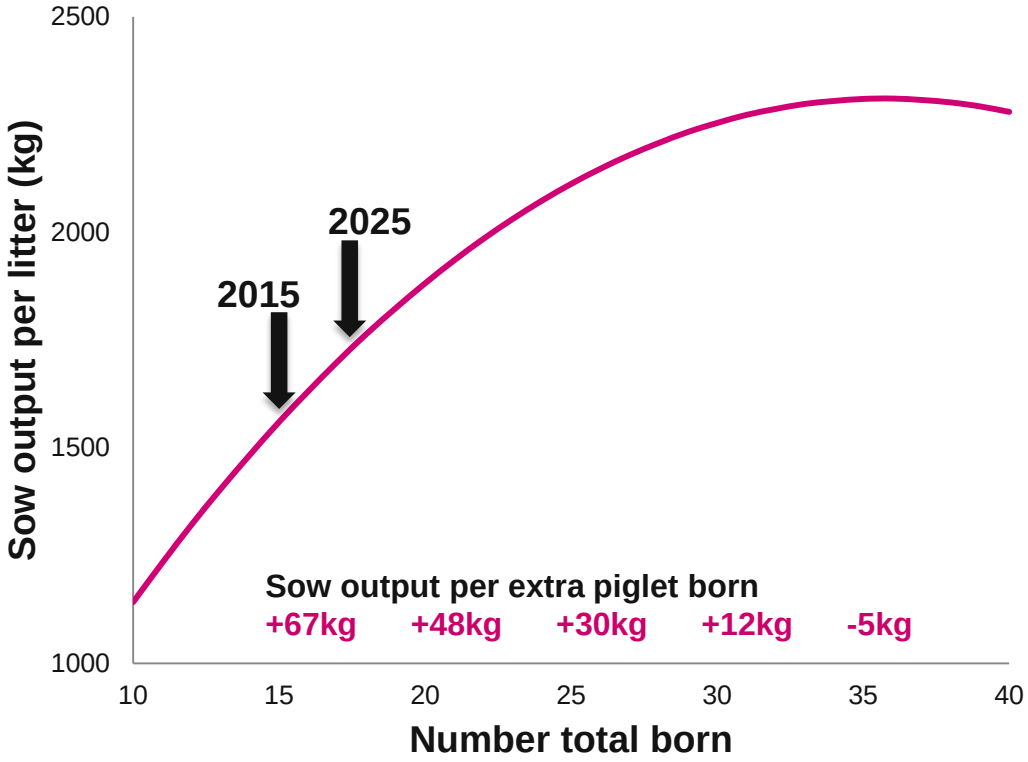
Combining results

Sow output per litter

2015
15.6 piglets / litter
1600 kg / litter

Phenotypic trend
+0.25 piglets/litter

Prediction 2025
18.1 piglets / litter?
1760 kg / litter



Take home message

- The effect of birth weight proves that not only the genes of the finisher pig, but also the reproduction potential of the sow is very important for the total weight output per sow at slaughter

- Increasing birth weight is highly relevant

- The total carcass weight output per sow continues to increase with increase in litter size and there is no evidence that breeding for a further increase in litter size will restrict sow output at slaughter in the near future

Thank you for your attention!

roos.vogelzang@topigsnorsvin.com

Topigs Norsvin

PROGRESS IN PIGS