

## Implications of early-life indicators for survival rate, subsequent growth performance, and carcass characteristics of commercial pigs - Summary

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### Key Points:

- As litter size increases with the industry's drive to increase pig production, the number of pigs with low birthweights increase too
- Preweaning growth rate is a critical indicator of a low birthweight pig's likelihood to reach desired market weight on time
- High birthweight is associated with faster growth at all life stages, earlier marketing, and better carcass quality

### Introduction

As a result of genetic selection for increased litter size, modern sows often produce large litters with an increased percentage of light birthweight (BiW) piglets. Little is currently known about what proportion of these light BiW piglets can express compensatory growth to reach the desired finishing weight, or on how to identify them early in life. The objective of this study was to assess the effect of birth weight and early phase growth performance on preweaning mortality, subsequent growth performance, and carcass characteristics of pigs.

### Methods

Individual records collected on 7,654 commercial crossbred pigs were used for analyses. Data was obtained from Topigs Norsvin, collected at the Schothorst Feed Research B.V. under commercial conditions. After weaning pigs were gradually transitioned to a weaner diet until the start of the growing phase. A 3-phase feeding scheme was used from start of the growing phase to slaughter. Pigs were shipped to a commercial abattoir where carcass quality measurements were recorded. A segmented regression model was used to analyze the effect of birth weight on preweaning survival, and a series of mixed models were used to analyze the effect of birth weight group on weights recorded at weaning (WeW), nursery exit (NuW), finishing exit (FiW), and carcass characteristics such as hot carcass weight (HCW) and lean percentage. Preweaning mortality, growth weight, birth weight (BiW), and carcass traits were adjusted to a standard age, and average daily gain (ADG) and lean percentage were calculated.

### Results

The percentage of preweaning mortality increased linearly ( $p < 0.05$ ) as piglet BiW decreased. The segmented regression analysis show that pigs with a BiW below 0.99 kg were at higher risk of mortality, with a mortality rate 8.5 times greater than pigs with BiW above 0.99 kg. The mixed model analyses showed a positive linear effect ( $P < 0.05$ ) of BiW and quadratic effect ( $P < 0.05$ ) of sow parity on age-adjusted finishing weight (FiW), HCW, and lean percentage. The optimal parities were 4.8, 6.8, and 4.3 for WeW, NuW, and adjusted FiW, respectively.

The impact of preweaning growth, measured by WeW on lifetime performance depended upon BiW. Heavy BiW (>2 kg) pigs with fast preweaning growth rate weaned at higher body weight (BW) but did not significantly differ in FiW from heavy BiW pigs with slow preweaning growth. However, for light BiW (<.99 kg) pigs the slow growing suckling (average daily gain <225 g/d) pigs weighed 1.7kg less at weaning and 6.9 kg less at adjusted FiW weight at day 167 than the low BiW pigs with fast suckling growth rates.

Birth weight was 0.16 kg higher ( $p < 0.01$ ) for fast growing nursery pigs (ADG  $\geq 424$  g/d) compared with pigs expressing slow nursery growth (ADG <424 g/d) rate. Pigs with fast nursery growth rate had greater ( $P < 0.05$ ) age adjusted FiW and HCW compared with the slow growing nursery contemporaries. The positive influences of increasing BiW were greater ( $P < 0.05$ ) in age-adjusted FiW and HCW for pigs with slow suckling growth rate compared with those with fast suckling growth rate. The relationship between BiW and likelihood of producing a desired carcass for slow and fast growing suckling pigs was linear up to 1.89 and 1.48 kg respectively. After these points increased BiW did not increase likelihood of achieving desired carcass weight.

### Discussion

These results reinforce the importance of BiW on preweaning mortality and lifetime performance. Results show that light birth weight piglets were more likely to die prior to weaning than high birth weight pigs and that increased birth weight was associated with faster growth during the suckling, nursery, and grow-finish phases as well as increased weaning weight, decreased age at nursery exit, finish exit, and slaughter, and improved HCW, adjusted HCW, loin depth, lean percent, and lean growth rate.

Heavy piglets (BiW > 2 kg) with slow suckling growth rates were able to achieve similar lifetime performance compared with their counterparts. However, light birth weight pigs may lose compensatory growth capability if ADG during the suckling phase is below average. Therefore, light birth weight piglets (i.e., <1.0 kg of BW) require special attention during the suckling phase to reduce the likelihood of preweaning mortality and to improve later life performance. Results from this study also show that parity of the dam impacts piglet performance, and that progeny from mid-parity sows (3 to 6) had optimal lifetime growth performance.

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