Poster preferred

Age at first service in gilts affects sow longevity and the probability of reaching third parity: a large-scale data analysis

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Introduction

Age and body weight at first service are strongly correlated in gilts (Bruun et al., 2020a). Previous studies have shown that excessive body weight at first service may impair sow longevity (Bruun et al., 2020b), but weight is rarely recorded under commercial conditions. Consequently, gilt age at first service may serve as a practical indicator of subsequent reproductive longevity as described in several publications (Saito et al., 2011; Koketsu et al., 1999). The objective of this study was to investigate the association between age at first service and both the probability of reaching third parity and overall productive lifetime using data collected from Danish herds.

Materials and methods

All analyses were performed in R and models were adjusted for herd size and calendar year. Effects of age at first service were evaluated both as categorical classes and as a continuous variable using splines. Longevity was evaluated using Cox proportional hazards models and Kaplan-Meier survival analyses on a dataset comprising 526,608 gilts first mated between 2021 and 2025 across 319 Danish sow herds. To investigate the probability of reaching third farrowing, a reduced dataset including 360,319 gilts first mated between 2021 and 2024 was created to ensure sufficient follow-up time.

Results and discussion

The probability of being removed before third farrowing was lowest for gilts first serviced at 211-230 d of age. Compared with this reference group, gilts mated at 231-250, 251-270, and 271-400 d had progressively greater odds of removal before third parity, with odds ratios of 1.09, 1.19, and 1.41, respectively ($P < 0.001$; Figure 1). Gilts serviced at 180-210 d also showed a slightly increased risk (odds ratio = 1.06; $P = 0.001$). Survival analyses on 526,608 gilts demonstrated a similar pattern. Gilts first serviced at more than 230 d had a significantly higher risk of leaving the herd, with hazard ratios of 1.05, 1.09, and 1.21 for ages 231-250, 251-270, and 271-400 d, respectively ($P < 0.001$). No significant difference in longevity was observed between gilts mated at 180-210 d and those mated at 211-230 d. Continuous analyses confirmed a non-linear relationship, showing optimal outcomes at approximately 210-230 d of age and progressively poorer performance above 230 d (Figure 2).



Figure 1. Probability of a sow failing to reach third farrowing dependent on age at first service. The light green shaded area ( ) represents 95% CI.

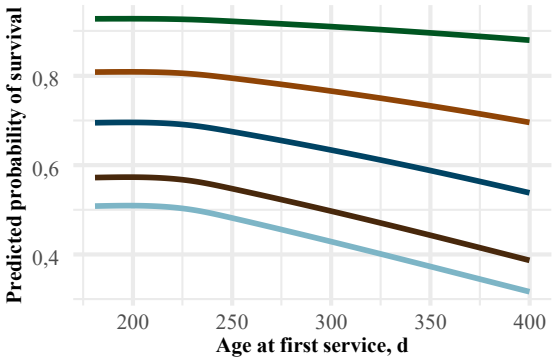


Figure 2. Predicted survival probability as a function of age at first service. In the figure, productive days since first mating are represented by the following colors: 150 days ( ), 300 days ( ), 450 days ( ), 600 days ( ), and 650 days ( ).

Conclusion and implications

This large-scale analysis demonstrated that gilts first mated at 211-230 d of age had the greatest likelihood of reaching third parity and the longest productive lifetime. Delaying first service beyond 230 d was consistently associated with reduced longevity and increased risk of early removal. The observed age effect mimics the negative effects of high weight at first service, and thus, the results support current recommendations that gilts should be bred at approximately 210-230 d of age to optimize sow retention and lifetime productivity.

Acknowledgements

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