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Gompertz model improves breeding value prediction for feed conversion ratio for incomplete weights

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With the development of automatic self-feeders, repeated measurements of feed intake are becoming available in more species. However, corresponding weights are not always recorded which complicate the longitudinal analysis of feed efficiency due to missing values. In our study, male pigs were weekly weighted while females and castrated males were monthly weighted. Our aim is thus to evaluate whether the use of Gompertz model in predicting the missing weights could improve the estimation of breeding values of Feed Conversion Ratio (FCR). For this study, we used 18,387 weekly records of weight and feed intake which were recorded over 18 consecutive weeks for 1,286 male growing pigs. A simulation study was carried out on this dataset to mimic weight missing values according to the pattern of weekly-proportions of incomplete weights observed in females and castrated males. Next, Gompertz model was applied to the data with mimic missing weights and the estimates were used to predict missing records. Then FCR was computed for each week using observed data (FCRo), data with missing weight (FCRm) and data with predicted weight using the Gompertz model (FCRg). Finally, breeding values for FCRo, FCRg and FCRm (EBVo, EBVg and EBVm, respectively) were estimated using Random regression models. We compared the EBV using Pearson correlation coefficient (R2). Over 100 simulations, the mean of R2 between EBVo and EBVg was 0.87 ± 0.01 and 0.84 ± 0.02 between EBVo and EBVm. Thus predicting missing weight records using a Gompertz model improved the genetic evaluation of FCR.