Precision feeding with a decision support tool dealing with daily and individual pigs' body weight

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Nutritionists, feed companies and equipment manufacturers look for solutions that help farmers to improve sustainability of pig production. Based on experimental results obtained in silico or *in vivo*, a better adequacy between amino acid supplies and requirements increases feed efficiency and farmer's income and reduces the environmental impact of growing pigs, highlighting the interest for precision feeding. Data are collected to characterize daily animal traits (e.g. body weight, BW) and their variation from one day to another (e.g. growth rate, ΔBW). They are used to determine the requirement for maintenance and growth on the next day, respectively. Therefore, adequacy between requirements and supplies depends on these predicted BW and ΔBW. The double exponential smoothing (Holt-Winters) method with a smoothing parameter α=0.6 ($HW_{0.6}$), presents a low sensitivity to the number of latest values used to forecast BW. It seems to allow for a secured prediction of BW soon after the beginning of the growing phase (at least after 4 days). A group of pigs was used in restricted feeding conditions to compare results obtained either with a 2-phase feeding strategy, considered as the control treatment, or a precision feeding strategy based on BW forecasting with the $HW_{0.6}$ method. Pigs allocated to both treatments were group-housed in the same pen, equipped with the decision support system built in the Feed-a-Gene project to manage the data, to determine in real-time the corresponding nutritional requirements, and to adapt the feed characteristics provided to each pig through the blend of two diets (9.75 MJ net energy/kg, 0.5 or 1.0 g of digestible lysine per MJ). Available results from 24 pigs per treatment indicate that overall average growth performance were not influenced by the feeding strategy (P>0.58 for both average daily gain and feed conversion ratio) but digestible lysine intake was reduced by 6% (1,774 vs 1,879 g, P<0.01) and N output by 7% (P<0.01) with precision feeding. Results will be completed by a second group using the same treatments. This study is part of the Feed-a-Gene project and received funding from the European Union's H2020 program under grant agreement no. 633531.