Modelling the feed intake response of growing pigs to diets contaminated with mycotoxins

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Application The procedure quantifies resistance and resilience traits in pigs, with the potential to be used in breeding programs.

Introduction Quantifying robustness of farm animals is essential for breeding and management strategies. Elements of the response of animals to perturbations, an important element of robustness (Friggens et al., 2017), can nowadays be measured by technologies such as automatic feeding stations. A novel data analysis and modelling procedure was developed to quantify feed intake response of growing pigs to perturbations (Nguyen-Ba et al, submitted). The procedure estimates the target trajectory of cumulative feed intake (**target CFI**) as a benchmark from which the impact of a perturbation on the animal (i.e. resistance) and its subsequent response through compensatory feed intake (i.e. resilience) can be quantified. The objective of this study was to use this procedure to quantify resistance and resilience of pigs from an experiment where they received diets with or without mycotoxin-contaminated cereals.

Material and methods The procedure was applied to data from a published study about the effects of mycotoxin (deoxynivalenol) on the feed intake of growing pigs (Serviento et al., 2018). Experimented pigs (n=155) were divided among a control group (CC) and three challenged groups. Pigs in each of the challenged groups received a diet contaminated with mycotoxins from day 113 to day 119 of age (DC group), from day 134 to day 140 of age (CD group), or twice during both periods (DD group).

Results and discussion No significant difference between parameters of the target CFI was found among the four groups. Moreover, the estimated average daily feed intake of group CC was very close to the observation (2.86 vs. 2.87 kg/ d). This means that the target CFI of each pig could be estimated independently of the challenge. Applying to pigs in three challenged groups, the procedure estimated precisely the start and end times of the perturbations (Table 1).

Table 1. Estimated start and end times mycotoxin perturbations had on the pigs

Challenged period	Times	Median	Mean ± SD
Beginning (DC and 1st time DD)	Start	112	112 ± 2.0
	End	123	123 ± 3.7
End (CD and 2nd time DD)	Start	133	131 ± 5.8
	End	142	142 ± 1.9

Correlation between resistance and resilience were low (-0.07, -0.13, -0.00, -0.33 for groups DC, CD, and for the 1st and 2nd challenge in the DD group, respectively), indicating that the two traits represent different phenomena. Results from the quantification of the response of pigs in different groups indicated that pigs at different ages or body weights responded differently to the mycotoxin challenge. Those receiving the mycotoxin-contaminated diet later on in life had a more important immediate reduction in feed intake compared with those receiving the challenge early on. However, the older or heavier pigs recovered faster from the challenge.

Conclusion The data analysis procedure using feed intake as a response trait proved its capacity to detect and quantify the response of animals to a mycotoxin-contaminate diet.

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