Factors influencing faecal myeloperoxidase in piglets from trials without in-feed therapeuticals

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Background and objectives

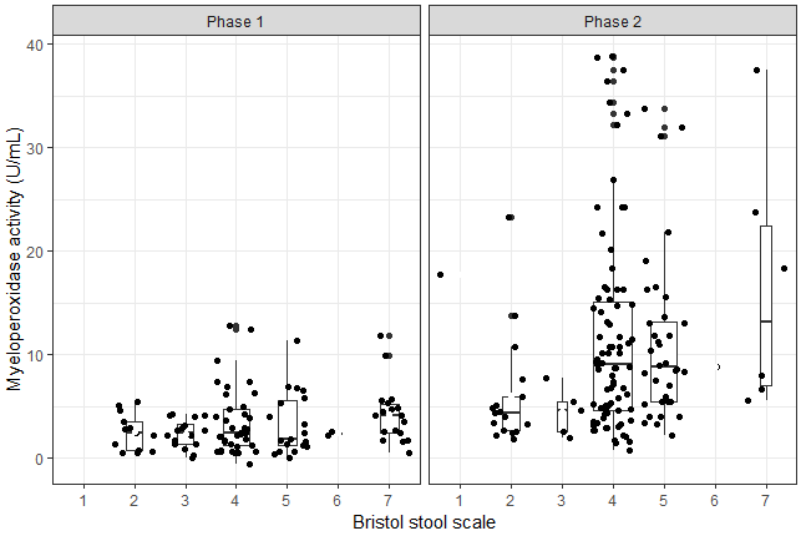
Without clear and accurate definition of gut health status, the design of feeding trials to study alternatives to in-feed therapeuticals (antibiotics and zinc oxide) is a challenge. Growth performance and clinical signs of scours remain the key measurements for feed evaluation, but they may not allow to discriminate solutions in a repeatable manner. Niewold (2015) proposed faecal myeloperoxidase (MPO) as a biomarker of inflammatory response in the gut of Mammals (Niewold, 2015), and validated in post-weaning piglets (Lemoine *et al*., 2018). After using these criteria in trials for 1 year, a retrospective analysis was undertaken in order to emphasize on the main criteria to control aside feed composition when designing trials including MPO determination.

Material and methods

292 faecal samples were collected from piglets in 8 feeding trials at Mixscience Research Center (St Symphorien, Sarthe, France) performed between March 2017 and March 2018. Individual faecal samples were taken directly at the time of natural excretion and scored according to Bristol Stool Scale (1: dry small balls to 7: watery). The conical tubes with faeces were immediately frozen in dry ice container (-78.5°C) and shipped to the lab where they were stored in freezer (-20°C) prior analysis. Before analysis, faeces were weighed and triturated in buffer solution (HTAB, Sigma) and centrifuged at 4°C (1000 G, 15 min). The supernatant was assayed in triplicates for MPO according to the method of Bradley *et al*. (1982), based on oxidation of o-dianisidine by hydrogen peroxide, with or without addition of faecal extract. Colour change was assessed with a spectrophotometer microwell-plate reader at 460 nm. Comparison to human MPO standard sample (Sigma) allowed expression in units of MPO activity. The relationship between MPO, faecal score and trial characteristics was studied with linear model of R-project packages. Data were retrieved from individual trials to further describe the faecal samples: piglet sex, age and weight at weaning and sampling time (8, 28, 35 or 46 days post-weaning), weaning room, mild cold challenge in the protocol.

Results

MPO activity varied between 0 (1 sample) and 38,9 U/mL. Values depended mainly of trial (P<0.001) and faecal consistency (P<0.05). No effect of piglet sex, weaning weight, room or challenge in protocol was evidenced. Higher MPO values were observed in pooled results of starter vs. pre-starter period (P<0.001). However, the profile of response according to faecal score was not affected (see Figure). According to these results, inflammation was likely higher with the less refined diets, and same level of neutrophils degranulation may not be associated to scours in the starter period.



Conclusion

In complement to growth measurements and clinical sign of illness, faecal MPO allows to address specifically the level of intestinal inflammation at chosen time points. Key features from the protocol influencing the results were: feeding period post-weaning and faecal score of sample. Additional research is under way to study MPO analysis in variable field conditions.

References

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