Bacillus subtilis C-3102 supplemented feed improves sows' and piglets' health

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Background and objectives: Piglets' gut health is crucial to limit weaning associated diarrhoea and can already be improved in the pre-weaning phase. Supplementation of piglets and/or sows feed with probiotics have been shown to support piglets' health and development. In the present study, supplementation of sows and piglets feed with viable spores of *Bacillus subtilis* C-3102 significantly improved suckling piglets' growth and improved faecal score until weaning.

Material and methods. Efficacy was evaluated in breeding sows and their litters through two full sequential reproductive cycles. *B. subtilis* C-3102 was administered at a concentration of $3×10^8$ CFU/kg feed. Control and supplemented groups each included ca. 25 sows. Cross-fostering at 24 hours after birth ensured equal litter size of 14 piglets. Body weight, body condition score and back fat of sows were measured after insemination, before each farrowing, and at the end of both 25 days long lactation periods. Individual feed intake of sows was measured daily. Piglets were weighed per litter at birth, after cross-fostering, and at weaning. Daily creep feed intake per litter was measured from 7 days of age until weaning. General health status was examined daily along with ranking of faecal scores of sows and litters. Finally, qPCR assays were carried out to specifically detect differences in faecal microbiota.

Results: Sow health was improved by *B. subtilis* C-3102 as we observed less body weight loss and back fat loss during lactation in both cycles. Consequently, at weaning, body condition score was significantly higher. Moreover, overall incident rates of mastitis-metritis-agalactia syndrome was lower in sows supplemented with *B. subtilis* C-3102. Besides, positive effects of *B. subtilis* C-3102 were observed in piglets. Trends of increased weight gain of piglets were observed in the 1st cycle (p=0.055). This became significantly higher in the 2nd cycle, the litters fed *B. subtilis* gained +7% weight as compared to the control diet (74.3 kg vs 69.5 kg). Increased weight gain was not due to an increase of creep feed intake. The faecal scoring in both cycles was significantly better in supplemented piglets ($p<0.001$). The beneficial effects of *B. subtilis* C-3102 was observed at the level of faecal microbiota composition as well. Sows supplemented with *B. subtilis* C-3102 had significantly lower number of *Escherichia* at the end of the 1st cycle and at the start of the 2nd cycle, while lactobacilli were significantly higher during the 2nd lactation period compared to the control sows. Besides, microbiota of supplemented piglets had higher number of lactobacilli at weaning during the 1st cycle, and lower numbers of *Clostridium* cluster I and *Bacteroides-Prevotella-Porphyromonas* cluster at weaning during the 2nd cycle compared to the control piglets.

Conclusion and discussion: Dietary supplementation of sows and piglets with *B. subtilis* C-3102 improved sows' faecal microbiota, health, and body condition through two reproductive cycles, and positively affected piglets' faecal microbiota, growth and faecal scores. Earlier studies reported similar effects of *Bacillus* probiotics increasing lactobacilli levels and reducing *E. coli* in piglets intestines (Guo, X. et al., 2006; Kritas, E. et al., 2010). This was further confirmed in an extensive piglet study where piglets challenged with enterotoxigenic *E. coli* and receiving *B. subtilis* C-3102 were protected against the disease as effectively as with antibiotic treatments. Moreover *B. subtilis* C-3102 unlike the tested antibiotics maintained high levels of lactobacilli in piglets' intestinal microbiota (Koopmans, S.J. et al., 2015). Supplementation with *B. subtilis* C-3102 might be instrumental in preventing diarrhoea from piglets fed without zinc oxide.

References

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