An innovative treatment method of zinc oxide to help reducing postweaning diarrhoea in piglets

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Background and objectives

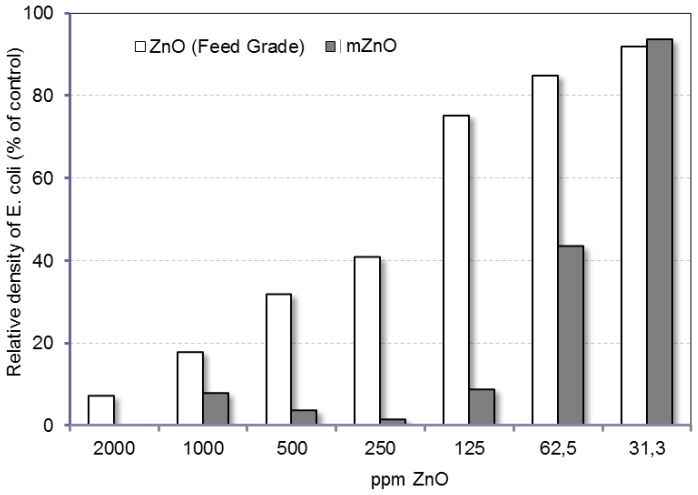
One of the main health issues after weaning of piglets is diarrhoea, often caused by E. coli. Next to antibiotics, the use of very high dosages of zinc oxide (ZnO) with 2500 ppm and more is a very effective method to control postweaning diarrhoea. In terms of the big effort made to reduce antibiotics in animal husbandry and the upcoming ban of ZnO in pharmacological effective dosages the pig producing sector needs new concepts to stabilise gastrointestinal health and therefore combat postweaning diarrhoea. The hypothesis of the study was that using a micronised zinc oxide product postweaning diarrhoea can be effectively controlled within the legal regulations on maximum concentrations of zinc in diets for weaned piglets.

Material and methods

Conventional zinc oxide was treated in an eccentric vibrating reactor for micronisation and activation of the zinc molecules resulting in an increase of product enthalpy of 18 kJ/kg as well as a 10times larger surface. The ability to influence the growth of E. coli by different concentrations (2000/1000/500/250/125/62.5 ppm) of either conventional zinc oxide or micronized ZnO (mZnO) was tested in vitro. In a second step the efficacy in reducing postweaning diarrhoea was tested in an in vivo assessment. Therefore 200 weaned piglets (body weight at start: control=7.58±0.15 kg; mZnO=7.37±0.20 kg) in 4 replicates each were fed a conventional diet with 160 ppm zinc oxide added either as conventional ZnO or mZnO for 14 d. Feed intake and body weight gain was measured on pen basis (25 piglets/pen). A faeces score (1=normal, 2=pasty, 3=watery, 4=watery with divergent colour) was determined daily for every single pig.

Results

As shown in Figure 1, growth of E. coli showed a linear increase with decreasing concentration of conventional ZnO. In contrast to that all concentrations of mZnO from 2000 to 120 ppm showed a relative densitiy of E. coli below 10 % compared to the control and therefore an effective growth inhibition. In the in vivo trial, number of events of diarrhoea differed significantly between the groups. In the control group, supplemented with conventional ZnO, 80 pig-days with diarrhoea were count whereas only 13 pig-days with diarrhoea were determined in the group fed the diet supplemented with mZnO. Also effects in production parameters were measured: Daily weight gain was higher and feed conversion ratio lower in the mZnO than in the conventional ZnO group (242 vs. 303 g and 1.39 vs. 1.15, respectively).



Conclusion and discussion

This study showed positive effects on *in vitro* growth control of E. coli as well as on the incidence of diarrhoea in piglets within the first two weeks after weaning. It is assumed that activation and enlargement of the surface due to the special treatment makes mZnO more effective against E. coli already in low concentrations. Further investigations on the mode of action are necessary to verify the potential effect of activation in combination with the enlargement of the surface. In regard of the European ban of high ZnO dosages in pig production the new formulation of micronized ZnO can be an effective method to support gastrointestinal health in weaned piglets.