The microbiome, intestinal health and growth performance of weaned pigs fed similar diets with and without medicinal zinc

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Background & objectives: There is a growing need for alternative feeding strategies for newly weaned pigs in order to control post-weaning diarrhea and avoid poor growth performance without adding medicinal zinc to the diet. Intestinal microbiota have gained a growing interest as it may affect both nutrient absorption and gut health. A study revealed that adding medicinal levels of zinc to the diet of weaned pigs had a similar effect on the ileal microbiota as antibiotics (Yu et al., 2017). The aim of this experiment was to investigate the intestinal microbiota in pigs receiving diets with and with medicinal zinc.

Materials and methods: The experiment was conducted with a subpopulation of pigs from a larger study conducted by SEGES Pig Research Centre at Grønhøj experimental farm. Six batches of pigs were ear-tagged at the sow herd, and the ear-tags were removed if pigs received any antibiotic treatment after four days of age. Newly weaned piglets (Danbred, Dx(LxLY)) were delivered to the experimental farm with a bodyweight (BW) of 5.5-9.0 kg and a weaning age of 21-28 days. The pigs (with and without ear-tags) were randomly assigned to one of six dietary treatments based on BW, sex and ear-tag, and had access to feed and water ad libitum until they reached a BW of approximately 30 kg. For the remaining part of the abstract, only the two control treatments will be addressed. Treatment 1 (pos. control) and 2 (neg. control) were identical, except that treatment 1 was allocated 2500 ppm zinc in the stage one diet. All groups were allocated three diets; Stage 1: from weaning to 14 days, stage 2: 14 days to 15 kg BW and, stage 3: 15 to 30 kg BW. Ear-tagged pigs were individually weighed at day 1, 9 and 24 after entry to the weaner unit, and all individual antibiotic treatments were recorded. Prior to the two feeding changes (day 9 and 24) 8-10 pigs that had not received any antibiotic treatment were randomly selected from the two dietary treatments. Pigs were euthanized and the abdominal organs were extracted and weighted. Digesta samples were collected from the jejunum and colon, stored in cryotubes filled with RNA later and stored at -80°C for further analysis. Cellular DNA were extracted from the digesta samples for 16S gene sequencing, as described by Krych et al., (2018).

Results: Results regarding gut health, bacterial richness and diversity of gastrointestinal tract will be analyzed in early spring 2019 and presented at the conference. In the pigs selected for slaughter and dissection, no differences ($P > 0.05$) were detected in the relative stomach, intestinal and hindgut weights between pigs receiving diets with and without zinc 10 days post-weaning. Whereas, at day 24 post-weaning, the pigs allocated zinc had a relatively smaller empty stomach weight (0.86 vs. 1.05%; $P = 0.02$). This experiment was not statistically designed to detect any differences in growth performance and pigs fed diets with and without medicinal zinc had similar daily gain from 6-9 kg (200 vs. 201 g/d; $P = 0.99$) and from 9-15 kg (360 vs 361 g/d; $P = 0.99$).

Discussion and conclusion: Adding medicinal zinc to the diet did not have any effect on the gastrointestinal weights at day 10 and 24 after weaning, which may be due to the low number of pigs in each group. However, a reduced stomach weight was found in the zinc group at 24 days post-weaning, when taking BW into account. Nevertheless, whether the lack of difference can be explained by the microbial data remains to be seen. As expected, no differences were demonstrated in the growth performances between the two dietary treatments with and without zinc.

References:

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