

## **1-Monoglycerides of short and medium chain fatty acids reduced pathogenic intestinal bacteria, post-weaning diarrhoea, mortality and myostatin level in piglets**

Afro Quarantelli, Department of Veterinary Medical Sciences, Parma University (Italy); Clotilde Silvia Cabassi, Department of Veterinary Science, University of Parma (Italy); Manuela Parini, SILO International (Italy); Alessio Paoli, SILO International (Italy)

### **Background and objectives**

The reduction of antibiotics and zinc oxide in the swine farming practice is an emerging topic at global level. Among promising alternatives, fatty acids and their derivatives proved to be effective against several pathogenic bacteria causing enteric diseases and mortality in livestock (Churchward et al. 2018). The aim of this study was to measure the effects of a specific composition of 1-Monoglycerides of fatty acids from C3 to C12 (1-MGL) on the intestinal bacterial population, diarrhea scores, mortality and performance of early weaned piglets, in comparison with antibiotic treatments.

### **Material and methods**

One hundred and eighty early weaned piglets (21-days of age) were allotted to two treatments: one group received a basal commercial diet supplemented with 300g of Doxycycline/ton of feed during the first 40 days of the trial, and with 8 kg of a medicated premix containing 12.5% of Sulfadiazine and 2.5% of Trimethoprim/ton of feed during the subsequent 30 days of the trial. The 1-MGL group received the basal feed supplemented with 4kg of 1-MGL/ton of feed during the first week of the trial, and with 3kg of 1-MGL/ton of feed until the end of the trial. The starting average weight of the piglets was 5.5 kg. The trial lasted for 70 days. The piglets were placed in cages with plastic gridded bottom, 10 piglets each cage, for the first 40 days of the trial, and then they were kept in 6 collective boxes (3 boxes for each group). Piglets were weighed at the beginning and at the end of the trial. To determine the effects of the supplements on the intestinal bacterial population, 20 samples of feces were collected from each group during the second post-weaning period and analyzed for bacterial identification and quantification with biochemical tests (API system, BioMerieux). The CFU counts were statistically estimated (t-student test). Fecal scores were evaluated according to 4 levels: 0, normal to 3, liquid (Liu et al., 2010). Six piglets from each group were analysed through blood sampling for myostatin levels determination (ELISA).

### **Results**

The daily weight gain in the 1-MGL group was 6% higher than in the antibiotics group. The mortality in the antibiotic group resulted to be equal to 7%, and to 1.1% in 1-MGL group. Mortality causes resulted to be mainly related to colibacillosis. The diarrhea score was 0 (normal) in the 1-MGL group and 2-3 (semi-liquid; liquid) in the antibiotics group. The hemolytic *E. coli* was not detected in the 1-MGL group fecal samples, while the CFU count of hemolytic *E. coli* resulted to be 6.62% of the total amount of the aerobic bacteria in the antibiotics group. The *Aerococcus viridans*, a potentially pathogenic bacterium, was isolated only in the antibiotics group, being 27.56% of the total aerobic bacteria amount. In the 1-MGL group, the total bacterial CFU count resulted to be significantly higher compared to the antibiotics group. Nevertheless, the total amount of pathogenic bacteria was significantly higher in the antibiotics group: it resulted to be 34.68% versus 0.48% in the 1-MGL group ( $p < 0.00001$ ). Myostatin level in the blood resulted to be  $8.84 \pm 1.80$  ng/ml in the 1-MGL group versus  $17.95 \pm 0.83$  ng/ml ( $p < 0.001$ ) in the antibiotics group.

### **Conclusion and Discussion**

The myostatin, a factor limiting the muscle mass development, was significantly reduced in the 1-MGL group. This factor may contribute to a more efficient muscle development, body structure, growth performance and economic return. The 1-MGL composition significantly reduced the intestinal pathogenic bacteria, with positive impact on the survival rate, growth and fecal scores of the piglets. It can be considered as a promising alternative to the Zinc Oxide in weaned piglets.

### **References**

Colin P. Churchward. 2018. Alternative antimicrobials: the properties of fatty acids and monoglycerides. Crit Rev Microbiol <https://doi.org/10.1080/1040841X.2018.1467875> Liu P, Piao. 2010. Chito-oligosaccharide reduces diarrhea incidence and attenuates the immune response of weaned pigs challenged with *Escherichia coli* K88. J Anim Sci;88(12):3871