

Effects of Supplementation of Nano-Particle Zinc Oxide and Mannan-Oligosaccharide (MOS) on Growth, Feed Utilization, Fatty Acid Profile, Intestinal Morphology, and Hematology in Nile tilapia, *Oreochromis niloticus* (L.) fry

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Abstract : The purpose of this study was to examine the effects of supplementation of zinc oxide (ZnO) nanoparticles and Mannan-oligosaccharide (MOS) on growth performance, feed utilization, fatty acid profiles, hematology, and intestinal morphology of Chamo strain Nile tilapia *Oreochromis niloticus* (L.) fry reared at optimal temperature (28.62 ± 0.11 °C). Nile tilapia fry (initial weight 1.45 ± 0.01 g) were fed basal diet/control diet (Diet-T1), 6 g kg⁻¹ MOS supplemented diet (Diet-T2), 4 mg ZnO-NPs supplemented diet (Diet-T3), 4 mg ZnO-Bulk supplemented diet (Diet-T4), a combination of 6 g kg⁻¹ MOS and 4 mg ZnO-Bulk supplemented diet (Diet-T5) and combination of 6 g kg⁻¹ MOS and 4 mg ZnO-NPs supplemented diet (Diet-T6). Randomly, duplicate aquariums for each diet were assigned and hand-fed to apparent satiation three times daily (08:00, 12:00, and 16:00) for 12 weeks. Fish fed MOS, ZnO-NPs, and a combination of MOS and ZnO-Bulk supplemented diet had higher weight gain, Daily Growth Rate (DGR), and Specific Growth Rate (SGR) than fish fed the basal diet and other feeding groups, although the effect was not significant. According to the GC analysis, Nile tilapia was supplemented with 6 g kg⁻¹ MOS, 4 mg ZnO-NPs, or a combination of ZnO-NPs, and MOS showed the highest content of EPA, DHA, and higher ratios of PUFA/SFA than other feeding groups. Mean villi length in the proximal and middle portion of the Nile tilapia intestine was affected significantly ($p < 0.05$) by diet. Fish fed Diet-T2 and Diet-T3 had significantly higher villi lengths in the proximal and middle portions of the intestine compared to other feeding groups. The inclusion of additives significantly improved goblet numbers at the proximal, middle, and distal portions of the intestine. Supplementation of additives had also improved some hematological parameters compared with control groups. In conclusion, dietary supplementation of additives MOS and ZnO-NPs could confer benefits on growth performance, fatty acid profiles, hematology, and intestinal morphology of Chamo strain Nile tilapia.

Keywords : chamo strain nile tilapia, fatty acid profile, hematology, intestinal morphology, MOS, ZnO-Bulk, ZnO-NPs

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