

Effect of organic mineral cocktail and xanthophyll on growth performance and immunity of hybrid catfish (*Clarias gariepinus × Clarias macrocephalus*)

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Abstract

An experiment on a dietary supplemental organic mineral cocktail and xanthophyll of hybrid catfish (Clarias gariepinus x Clarias macrocephalus) was conducted to determine the effects of chromium-L-methionine, zinc amino acid complex, selenomethionine, and xanthophyll on growth performance and immunity. The study was assigned in the completely randomized factorial designed (Factorial 2x2 in CRD). Two factors of a mineral supplementation; with or without mineral cocktail added on top and two factors of xanthophyll supplementation; 40 or 80 mg/kg, along with 45 mg/kg zinc amino acid complex, 0.4 mg/kg selenomethionine, and 0.5 mg/kg chromium-L-methionine were applied to 4 treatments and 5 replicates. The basal diets containing 27% soybean meal and 16% poultry meat meal were supplemented with the testing materials; T1: no mineral cocktail diet with 40 mg/kg xanthophyll, T2: no mineral cocktail diet with 80 mg/kg xanthophyll, T3: diet with an added mineral cocktail on top and 40 mg/kg xanthophyll, and T4: diet with an added mineral cocktail on top and 80 mg/kg xanthophyll. A 4-week trial was conducted in a net cage installed in an earthen pond. The catfish with an average of 52 g/individual were stocked at 34 fish per cage (17 individual/m²). The results show that the organic mineral significantly improved (p<0.05) the growth performance, by which T4 had the highest results of 4665.58^a g/cage, 3.50^a %/day, and 98.82^a % in terms of fish yield, SGR, and survival rate respectively, followed by T3 and T2, while T1 exhibited the lowest (3909.64^b g/cage, 2.93^b %/day, and 95.29^b %). The weight gain and ADG of T4 and T3 also showed the highest results, where the weight gain and ADG of T4 were highest at 86.81^a g/individual and 3.10^a g/day respectively, which is significantly different from T1 and T2, by which the weight gain and ADG of T1 were the lowest at T1=67.61^b g/individual and 2.41^b g/day. However, in terms of FCR, T1 exhibited the highest result of 1.51^b, and T4 exhibited the lowest of 1.14^{a} . Furthermore, xanthophyll also significantly enhanced (p<0.05) the growth performance in terms of fish yield, SGR, FCR, and survival rate (P<0.05). Focusing on the catfish's health and immunity, the organic mineral cocktail showed a significant (p<0.05) enhancement in fish health and immunity, in particular hematocrit of T4, T3, and T2. The highest result of hematocrit was obtained from T4 at 50.6^a %, significantly different from T1, which was the lowest at 41.60^b %. The immunoglobulin M of T4 and T3 showed the highest results (T4=0.57^a g/L) and were significantly different from T1 and T2, in which T1 was the lowest (T1= 0.41^b g/L). Other parameters, namely red blood cell count, white blood cell count, hemoglobin, and serum protein, had no significant difference (p>0.05). Xanthophyll also had no significant (p>0.05) effect on the immune parameter. In conclusion, the hybrid catfish's diet topped up with an organic mineral cocktail, 45 mg/kg zinc amino acid complex, 0.4 mg/kg selenomethionine, and 0.5 mg/kg chromium-L-methionine has significantly improved the fish's growth performance, health, and immunity. 80 ppm Xanthophyll in the basal diets also shows an effective improvement in the growth performance, while the mineral and xanthophyll have no interaction effect on the growth performance and immunity (p>0.05). Therefore, it is recommended to add an organic mineral cocktail, 45 mg/kg zinc amino acid complex, 0.4 mg/kg selenomethionine, 0.5 mg/kg chromium-L-methionine and include 80 ppm xanthophyll in the basal diet for improving the fish's growth performance, health, and immunity.

Keywords: zinc amino acid complex, selenomethionine, chromium-L-methionine, organic mineral, hybrid catfish

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