



**Cairo University**  
**Faculty of Veterinary Medicine**  
**Dept. of Nutrition and Clinical Nutrition**

**Performance and oxidation status of Nile Tilapia (*Oreochromis niloticus*)  
in Response to some Dietary and Ecological Modifications**  
**Thesis**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

فَلِلَّهِ الْمُلْكُ الْأَمِينُ  
إِذَا دُعِيَ إِلَى اللَّهِ وَالْيَوْمِ  
الْآخِرِ لَا يُفْلِحُ الْكَافِرُ

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### Abstract

Two experimental trials were conducted. The first feeding trial was conducted to study the impact of different Methionine sources on performance and oxidation status of Nile tilapia (*Oreochromis niloticus*) fingerlings. A total of 180 Nile Tilapia fingerlings weighing (8.2) g were randomly assigned into four equal groups with 3 replicates (each of 15 fingerlings), reared in glass aquaria, supplied with clean de-chlorinated tap water with air pumping and filtration system applied throughout the experiment. Fish in different groups were fed on 4 experimental isocaloric, isonitrogenous purified basal diets composed of corn starch, casein, gelatine and cellulose as the main components to cover the nutrient requirements of Nile Tilapia fingerlings as described by NRC feeding standards (2011). The first group (G1) was fed on basal diet without extra Met supplementation (Met deficient), the second group (G2) was fed on the same diet with DL-Met to cover the requirements, the third group (G3) was fed on the same diets with MHA-Ca (BE 88%) supplementation and the fourth group (G4) was supplemented with MHA-FA (BE 65%) The experiment lasted for 3 months. After 2 weeks which served as acclimatization period during which the suitable feeding regime were suggested to be (4% of fish biomass). Growth performance parameters were biweekly recorded. At the end of the experiment, serum samples were collected to determine some selected serum parameters including, Total Protein, Albumin, Globulin, Albumin / Globulin ratio, ALT, AST, Uric acid and Creatinine. Also samples from the homogenates hepatic tissue were collected for determination of the oxidation stress markers including reduced Glutathione (GSH), Malondialdehyde, (MDA), Catalase (CAT), Glutathione peroxidase (GPx), Glutathione reductase (GR) and superoxidedismutase (SOD) activity. Lysozomal activity and NBT (Respiratory Oxygen burst effect) were evaluated to determine the immune status.

Results revealed significant ( $P < 0.05$ ) positive effects of either DL-Met or MHA-Ca supplementation on most of the growth performance parameters, meanwhile the Nile Tilapia (*Oreochromis niloticus*) responded lesser to MHA-FA than DL-Met. None of serum parameters were significantly affected with the different sources of Met. The highest (GSH), (CAT), (GPx), (GR) and (SOD) and lowest significant MDA levels were also observed in the fish supplemented with DL-Met (G2) and those supplemented with MHA-ca (G3), followed by G3 (supplemented with MHA-FA). The non supplemented group (G1) showed the lowest levels of antioxidant enzymes and highest level of (MDA). The DL-Met has a positive effect on the immune status through improving the lysozomal activity and Respiratory Oxygen Burst. These results confirmed the effects of different Met sources noticed on growth performance traits.

The second experimental trial was conducted to study the impact of the use of magnetized water on the same parameters described in first trial also its effect on body composition of fish at the end of experiment. A total of 180 Nile Tilapia (*Oreochromis niloticus*) fingerlings weighing (11.7) g were randomly allotted into two groups each has 6 replicates (each of 15 fingerlings), reared in glass aquaria, the first group was supplied with clean de-chlorinated tap water. Meanwhile the fish in the second group were reared in magnetized water (obtained from water magnetizer that fixed at the main water source) the aquaria in the two groups were supplied with air pumping and filtration system applied throughout the experiment. Fish in the two groups were fed on the same commercial pelleted isocaloric, isonitrogenous basal diets that were prepared to cover the nutrient requirements of Nile Tilapia fingerlings as described by NRC feeding

standards (2011). The experiment lasted for 3 months. After 2 weeks which served as acclimatization period during which the suitable feeding regime were suggested to be (4% of fish biomass).

Results revealed significant ( $P < 0.05$ ) positive effect of magnetized water on the growth performance parameters of Nile Tilapia also the highest (GSH), (CAT), (GPx), (GR) and (SOD) and lowest significant MDA levels were also observed in the fish reared in magnetized water and higher lysozomal activity.

Finally, it could be concluded that the use of both DL-Met and MHA-Ca supplementation had a better effects not only on growth performance, serum parameters but also alleviated oxidative stress and potentiated the immune response of Nile Tilapia (*Orochromis niloticus*) fingerlings. Knowing and understanding the relative biological value (RBV) of MHA-FA compared to DL-Met is an important precondition to cost-effective purchasing, feed formulation and fish production. In addition the use of magnetized water under intensive fish farming condition was advantageous as it has the ability to improve fish growth performance, the antioxidant defence mechanisms as well as potentiating the immune response.

**Key words:** Methionine, Methionine Hydroxy analogues, Nile Tilapia, performance, oxidation stress, Magnetic water.

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