STUDIES ON THE GENETIC IMPROVEMENT OF TILAPIA FISH

By

Dalia Mohsen Thabet Ahmed

B.Sc. Agric. Sci. (Animal Production-Fishes). Fac. Agric.,

Fayoum Univ., 2020

Thesis

Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Science

In

Agricultural Sciences

(Fish Breeding)

Department of Animal Production,

Faculty of Agriculture

Fayoum University

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ABSTRACT

The experimental work was undertaken in two areas: Fish farm and the laboratory of breeding and production of fish, animal and fish production department, Faculty of Agriculture (Saba-Basha), Alexandria University. The Nile tilapia fish used in this study were descended from a randomly mating population. Adult Nile tilapia, *O. niloticus*, with an average live weight of 187.00 ± 4.56 g for males and 165.00 ± 6.24 g for females were selected. Then, the female's fish (9) were stocked and kept separately from the male's fish (6) in hapas until they acclimated to the farm water condition. Offspring from genetically engineered Nile tilapia and their control, designated as base generation (F0), were collected. In The fry were fed a diet containing 30% CP to help them with the best growth. At the middle of December 2023, The fry reached approximately 50 g and were then transferred into the six fiberglass aquaria in the fish lab. and exposed to cold temperatures gradually, with recorded fish dying. The results revealed that, the highest mean values of final body weight (FBW), daily gain (DG) and SGR were recorded by genetically modified *O. niloticus* treated with *Salmo salar*-DNA and these records were significantly higher ($P \leq 0.05$) than those of the control. Despite the adverse effect of low temperature on growth, the genetically modified *O. niloticus* showed higher growth performance than the control. No significant differences were detected in moisture content among treatments. Yet, crude protein was insignificantly and lower ($P \leq 0.05$) in genetically modified *O. niloticus* treated with *Salamo salar*-DNA than control. Moreover, the highest mean values of lipids content were achieved by control fish and differed insignificantly ($P \leq 0.05$) from those of genetically modified *O. niloticus* treated *Salamo salar*- DNA. The mean values of feed intake were

equal for all fish groups. The best or lowest means of food conversion ratio (FCR), and the best protein efficiency ratio (PER were achieved by treated fish, and differed significantly ($P \leq 0.05$) from those of control. Improved FCR and PER for fish injected with *Salamo salar*-DNA than control may be attributed to the effect of elevated growth hormone in fish plasma that resulted from those treated with DNA. All amplification products were reproducible when reactions were repeated using the same reaction conditions. The results also showed that the number of amplified bands detected varied, depending on the primers and DNA treatment. The highly genetic polymorphic percentage ranged from (50 to 85%) using different ISSR primers.

Keywords: Nile tilapia, *gsr* gene, ISSR, Low temperature tolerance, Genetically Modified Fish.