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How to Sustainably Increase the Proportion of Males in Nile Tilapia (*O. niloticus*) by Temperature Treatment: A two Generation Selection Experiment for Thermal Sensitivity

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Abstract

Stunting still is one of the major problems in production of mixed sex Nile Tilapia stocks. Thus all-male stocks are highly desirable in cultivation of Nile Tilapia. High temperature treatments are capable of changing the phenotypic sex towards maleness. Loss of productivity due to early recruitment in the ponds could be minimised by selection of temperature sensitive lines to sustainably increase the proportion of males by temperature treatment. Therefore a selection experiment over two selection generations was carried out starting with 36 families of *Oreochromis niloticus* from Lake Manzala (Egypt) as a base population.

In order to detect the families' thermal sensitivity they were subdivided into a control (28°C) and treatment group, each consisting of 110 fish. The treatment groups were subjected to a 10 day thermal treatment at 36°C water temperature starting 9 days post fertilisation. After gradual readaptation to 28°C each treatment and corresponding control group was raised separately till sexing (microscopical inspection of gonads at a minimum age of 90 days). For later selection purposes 10 males and females were kept from each control group. Families showing the highest surplus of males in the temperature treated groups were selected. Hence, 14% of the families in the base population and first selection generation were selected. Two generations of selection increased the male percentage in the temperature treated groups to more than 90%. High response to selection and a high realized heritability of 0.83 indicated that temperature sex determination has a strong genetic background. Thus, production of temperature sensitive lines seems to be a feasible approach to significantly increase the percentage of males in a consumer- and environment-friendly way.

Keywords: Male percentage, Nile Tilapia, realized heritability, selection, temperature treatment