

Electrical sex reversal of Nile tilapia from prototypes toward commercial product

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The present project has been extended from our previous lab-scale work of sex reversal for monosex-male Nile tilapia by using a transient pulse-electric field induction toward commercial products. All male sex reversal rate from 89.25% to 92.5% is achieved. Our newly equipment (to be patented) of electrical sex reversal was developed for large-scale of more than 10,000 eggs for each induction. This version of the equipment is designed for commercial propose (> 1 million induced eggs/day) without distortions of the signal (less than 5% error). In this work we demonstrated the boundary conditions of reversible and irreversible electropermeabilised eggs (critical values) (when they perform in temperature between 20-35 °C) suspended in electrical sex reversal mediums (to be patented through NSTDA) to optimize survival rate and hatching of the induced fry. This work we also clarified the most suitable stage of egg development (day post fertilization: dpf) to be selected for the best electrical sex reversal process. We found that all stages during (a) zygote–1 dpf (b) cleavage–1 dpf (c) blastula–1 dpf (d) segmentation–2 dpf and (e) pharyngula–3 dpf before hatching–5 dpf could be employed for electrical sex reversal but pharyngula was the optimized phase. Long-term monitoring of the stable-sex reversal of all induced fry had been verified in order to test for 4-6 months old fish of table size, 6-9 months old and 9-12 months old (parent breeding stocks). Study of hormone delivery through the permeabilised membrane including hormone remaining in the electrical sex reversal medium for reuse propose of commercial product. Details of the sex reversal process including our equipment cannot be revealed since they are being in the patent process.

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