

Paradox Effect due to Overdose 17alpha-methyltestosterone on Electrical Sex Reversal

On commercial fish farms male tilapia is the desired sex as they grow about 25% faster and divert less energy into reproduction: well-fed females turn most of their resources into egg production. For this reason, various methods have been employed to control unwanted reproduction by female tilapia. The traditional technique has been carried out by offering feed treated with a synthetic androgen hormone (male) of 17alpha-methyltestosterone (MT) by using 30-60 mg of MT/kg of diet (5 times/day) to tilapia fry before the primal gonadal cells of the females have differentiated into ovarian tissue. However it is a prolonged process of about 28-30 days to ensure that fry have developed to be 86%-92% male. In our research we proposed a novel method to enhance all-male of sex reversal using a rapid technique of transient pulse-electric fields inductions combined with immersion technique to reach 89.23% male. Nevertheless, with the realization of the MT effects on the environment and the inefficiency and cost of current techniques, our technique needs to verify to avoid the excess use of MT, lessen the duration of treatment and lower the cost of MT hormone used relative the traditional technique of sex reversal by the feed-fry hormone treatment. The present study examines the exact value of the optimized concentration of MT that should be the maximum dose for electrical sex reversal technique. In our experiments, Nile tilapia (*Oreochromis niloticus* L., Chitralada III) has off-spring ratio of male:female as 0.89 ± 0.12 (mean \pm SD) possessed the number of male as 47%. Tilapia's eggs were selected as the stage development during segmentation-pharyngula (2-3dpf) (day post fertilization) for electrical inductions with the induced voltage of 375 VDC, 5 square wave pulses, 50 μ s pulse durations with 1:1 mark-space ratio. Variation of MT concentrations between 500-1,000-1,500-5,000-10,000-100,000-200,000-500,000 μ g.l⁻¹ were carried out to investigate for hatching, survival and sex reversal rates. The results showed that the induced eggs had hatching rates varied from $91.00\% \pm 2.65\%$, $79.33\% \pm 6.11\%$, $90.33\% \pm 2.08\%$, $81.67\% \pm 12.42\%$, $75.23\% \pm 2.52\%$, $73.87\% \pm 2.42\%$ and $68.67\% \pm 1.74\%$, respectively. Increasing MT concentrations shifted survival rates of tilapia to the lower values as $83.33\% \pm 3.06\%$ to $57.00\% \pm 1.41\%$ ($P < 0.01$) as for 1,000-10,000 μ g.l⁻¹ MT, respectively, and $52.43\% \pm 2.46\%$ to $49.57\% \pm 1.40\%$ ($P < 0.01$) as for 100,000-500,000 μ g.l⁻¹ MT. It was interesting that sex reversal rates of using 1,000-10,000 μ g.l⁻¹ MT were increased from to $89.23\% \pm 1.16\%$ (with immersion) and $81.25\% \pm 1.13\%$ (without immersion) but for 100,000-500,000 μ g.l⁻¹ MT sex reversal rates decreased from $53.45\% \pm 3.25\%$ to $48\% \pm 2.86\%$ (approach to off-spring ratio of male) which was the paradox effect of using excessive androgen hormone of MT for electrical inductions.

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