



De La Salle University - Dasmariñas
GRADUATE STUDIES



**VITTELOGENIN INDUCTION IN MALE TILAPIA (*Oreochromis niloticus*)
AND 17 β -ESTRADIOL CONCENTRATION IN SURFACE WATER
COLLECTED FROM SELECTED AQUACULTURE AREAS IN
TAAL LAKE AND LAGUNA DE BAY: INDICATION OF
EXPOSURE TO ENVIRONMENTAL ESTROGEN**

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ABSTRACT

Vitellogenin (VTG) is an egg-yolk protein precursor normally produced by sexually mature female fish but can also be synthesized by males under the influence of endocrine-disrupting chemicals (EDCs). Prevalence of EDCs is a threat to aquatic biodiversity and a growing environmental and health concern. This study determined the concentration of 17 β -estradiol (E2) on the surface water of Taal lake and Laguna de Bay, quantified VTG induction in male Nile tilapia (*O. niloticus*), and identified morphological alterations to their testes as indicators of exposure to environmental estrogens. Sexually mature male *O. niloticus* were randomly obtained from fish cages in purposively selected aquaculture areas in Taal Lake and Laguna de Bay. The samples were anesthetized then blood plasma and gonads were individually collected for analysis. The levels of VTG on fish and the concentration of E2 in surface water were obtained using ELISA. Histological sections of gonads were examined for identification of testicular alterations which characterize feminization.

All male *O. niloticus* from both lakes had highly detectable VTG in blood plasma. The fish collected from Taal Lake had statistically higher VTG concentration at 478.90 ± 129.98 ng/mL compared to fish collected from the South Bay of Laguna de Bay at 10.96 ± 1.22 ng/mL. Testicular degeneration and interstitial fluid were observed in male gonads,



indicating evidences of feminization. High E2 concentration in surface water was detected in both lakes, but concentration was not significantly different at $p < 0.05$.

This study provides evidence of induction of VTG production and intersex occurrence in male *O. niloticus* as a biological response to exposure to environmental estrogens and estrogen-mimics. In addition, the study suggests that the measured VTG induction is not only limited to exposure to known ECDs like 17 β -estradiol.

Keywords:

Endocrine Disrupting Chemicals (EDCs); feminization; exogenous; estrogenic disruptors; testicular alteration