



Tropentag, September 17-19, 2014, Prague, Czech Republic

“Bridging the gap between increasing knowledge and decreasing resources”

Response to Elevated Temperature - Organogenesis of the Reproductive Tract of All-Female Tilapia (*Oreochromis niloticus*)

AULIDYA NURUL HABIBAH¹, STEPHAN WESSELS¹, FRANK PFENNIG², WOLFGANG HOLTZ¹,
GABRIELE HÖRSTGEN-SCHWARK¹

¹Georg-August-Universität Göttingen, Dept. of Animal Sciences, Germany

²Technische Universität Dresden, Institute of Zoology, Germany

Abstract

The Nile tilapia, a maternal mouth brooder with high fecundity, is a tropical warm-water fish gaining in popularity as a candidate for freshwater fish production world-wide. In order to overcome stunted growth in ponds, production of all-male stocks in aquaculture is highly recommended. All-male progeny, however, are often obtained through the use of hormone feeding to the sexually undifferentiated fry. Recent studies show, that temperature-treatment might be a sustainable alternative to induce female-to-male sex reversal. The possibility to reach high male ratios via temperature-treatment and selection of highly responsive families has been proven possible. Furthermore in light of global warming, biased sex ratios might also occur in feral populations. Therefore, this study addresses the organogenesis of the reproductive tract of genetically all-female (XX) Nile tilapia reared at elevated temperature of 36°C or control (28°C) during the critical phase of sex differentiation (10–20 days post fertilisation). Groups of 24 fish were sacrificed at different stages of gonadal development, gonadal morphology, gonadosomatic index (GSI), and hepatosomatic index (HSI) were assessed and compared to their control full-sibs. The temperature treatment lead to female-to-male sex reversal resulting in a male proportion of 37 %, compared to only females in the control group. The body weight, GSI, and HSI were comparable among both groups, while showing an age-related increase in either group. The histological investigation of ovarian cross sections revealed a more advanced development in the control groups. Immunohistochemistry indicated early developmental differences (at 90 dpf) between groups subjected to high temperature treatment and controls. Therefore, although only subtle differences in phenotypic appearance of fish were observed, gonadal development of female fish showed a retarded trend of development when treated at high temperature. Retarded gonad development of females might be beneficial in aquaculture. Fitness of feral Nile tilapia populations, however, might be negatively affected on the long run in face of increasing temperatures due to global warming.

Keywords: All-female, elevated temperature, *Oreochromis niloticus*, organogenesis