

Effects of Mesterolone in the physiology, welfare and masculinization of the Neotropical tambaqui *Colossoma macropomum*

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INTRODUCTION

For Brazilian aquaculture, tambaqui *Colossoma macropomum* is the main native species. In farming conditions, females can grow up to 50% more than the males, most likely for entering puberty later than males. As tambaqui sex-determination system is XX/XY, there is the possibility to generate monosex population of females by crossing out normal females with neo-males (genetic females -XX displaying male phenotype). The goal of this study was to invert the sex phenotype of female tambaqui using mesterolone, which is a synthetic androgen derivative of dihydrotestosterone. Since in fish the hematological parameters may alter as a result of pollutants or drugs used in aquaculture, we evaluated the welfare of treated fish through biomarkers of liver function, i. e. biochemical parameters and histopathological analysis of the liver.

METHODS

Three doses of mesterolone (Proviron[®]) were dissolved in ethanol, mixed with polyvinilpirrolidone and sprayed over the fish pellets: T1-10, T2-20, and T3-40 mg/kg of food, besides a control group. Each treatment was done in triplicates of 100 juvenile tambaqui (30 days old; 2.5 cm total length) during 90 days. After treatment, 3 fish/tank were sampled to evaluate blood biochemical parameters. After deep sedation with benzocaine, blood was sampled for analysis of hemoglobin, hematocrit and erythrocyte counts, glucose and plasma protein. After intracranial perforation, the liver was removed for histology. The remaining fish were transferred to net cages in a common pond for further growth. At 7 months of age, fish were sedated and killed as above, and gonads were sampled for histology for the sex identification of each fish (n = 30/replicate).

RESULTS & DISCUSSION

After the treatment, the fish from T2 and T3 were larger (p=0.0048 and 0.010, respec.) and heighthier (p=0.008 and 0.045, respec.) than the other groups (including control). These two treatments also had higher values in the hematological parameters of hemoglobin (p=0.0001 and p<0.0001, respec.), but within acceptable levels for the species. There were no infiltrations in the sinusoids nor decentralizations in the nuclei of hepatocytes, and the liver structure was preserved in all groups. Glucose and protein were slightly higher at T2, but without statistical significance. We assumed that this was a reflection of stress during sampling, since these parameters were not altered in any other group. Regarding masculinization, again the 2 highest concentrations of mesterolone were effective, resulting in 79% (p=0.0016) and 77% (p= 0.0008) of males in the T2 and T3 groups, respectively. We conclude that mesterolone at 20 mg/kg during 3 months at early stages of life does not impact tambaqui health and results in 79% of males. Therefore, it remains to be investigated if this phenotype is permanent and if the neo-males, once genetically identified, go through puberty as the normal males, in order to be used as founders for female monosex population.