

EFFECTS OF METHYLTESTOSTERONE AND 11-KETO-ANDROSTENEDIONE ON SEX DIFFERENTIATION IN AFRICAN CATFISH, *Clarias gariepinus*.

E.H. Eding, A. Bouwmans and J. Komen

Fish Culture and Fisheries Group, Wageningen Institute of Animal Sciences (WIAS), PO Box 338, 6700 AH, Wageningen, The Netherlands

Summary

African catfish were treated with 50 ppm E2, 11-KA or MT between 13 and 40 days post hatch. None of the treatments induced permanent and complete sex reversal. Fish treated with MT showed paradoxical feminization and were occasionally strippable. A cross between an intersex fish and a normal female produced an all-female progeny.

Introduction

Mortalities in African catfish culture due to agonistic behavior between males and females can be considerable (>80%). The use of all-male or all-female populations of African catfish could result in a reduction in agonistic behavior and lower mortalities. Monosex populations can be produced by crossing hormonally sex reversed fish with their untreated conspecifics. However, to date, there is no good protocol for the induction of sex reversal of African catfish.

Materials and methods

African catfish fry were treated with diets containing 50 ppm 17 β -Estradiol (E2), 50 ppm 11-Keto-Androstenedione (11-KA) or 50 ppm 17 α -Methyltestosterone (MT) between 13 and 40 days post hatching (dph). Feeding rate was 16.8 g kg^{-0.8} day⁻¹. Fish were sampled at 40 and 114 days dph for macroscopical examination of gonads and development of the genital papilla.



Figure 1 Intersex gonads from 11-KA-treated group (light: testis + vesicula seminalis; dark: ovary)

Results (table 1)

At 40 dph, E2, 11-KA and MT treatment resulted in respectively a feminizing ($p < 0.01$) a masculinizing ($p < 0.01$), and a paradoxical feminizing ($p < 0.01$) effect on the gonads. The genital papilla was typical for males and well developed in MT and KA treated groups. It was absent in E2 treated groups. At 114 dph a small

but significant ($P < 0.05$) effect on sex ratio was only observed in the E2 treated groups. In all treated groups small numbers of intersexes were observed (figure 1). Intersexes were not observed in control groups.

Day 40	M	F	I	U	MP
Ctrl.	40	60 ^{NS}	0	0	0
E2	5	80 ^{**}	0	15	0
KA	75	5 ^{***}	5	15	100
MT	0	90 ^{***}	5	5	100

Day 114	M	F	I	U	MP
Ctrl.	44	56	0	0	44 ^{NS}
E2	34 [*]	60	6	0	38 ^{NS}
KA	42	52	6	0	72 ^{***}
MT	46	48	6	0	60 ^{NS}

Table 1: Frequencies (%; pooled duplicates, N=20 for day 40 and 50 for day 114) for gonadal- and external sex per treatment. M= male; F= female; I= intersex; U= undifferentiated, MP= male papilla

Monosex populations

At 6 months, males from the MT treated groups were occasionally strippable. In these fish the vesicula seminalis was not developed. Milt from an intersex fish from the 11-KA group was used to fertilize eggs from a non treated conspecific. The resulting offspring was 100 % female, suggesting a XX/XY type of sex determination in African catfish. All females in the E2 treated group sired progenies with sex ratios not different from 1:1.

Conclusions

- ✓ 11-Keto-Androstenedione is a masculinizing steroid in African catfish.
- ✓ African catfish treated with 17 α -Methyltestosterone occasionally fail to develop a vesicula seminalis.