

COMUNICACIONES

**The use of synthetic and natural androgens for the production of monosex male
Oreochromis niloticus (Pisces)**

Lady B.M.B. Ladu* and A.A. Madara

* Federal University of Technology P.M.B. 2076, Yola Adamawa State, Nigeria.

(Rec. 2-III-1993. Acep. 8-IV-1994)

Resumen: Se estudiaron 290 alevines de la tilapia *Oreochromis niloticus* (L.) con hormonas naturales y sintéticas para producir exclusivamente machos mediante el sistema de inversión de sexo. El uso de testosterona de macho cabrío, más barata que la industrial, produjo un 60% de machos contra un 88% de la industria.

Key words: Tilapia, new technique, hormonal treatment.

The use of synthetic sex hormones to induce functional sex reversal has been the emphasis of aquacultural research in tilapia. An investigation was carried out on 290 fry of *Oreochromis niloticus* (L) using both synthetic and natural hormones to investigate the possibility of developing an effective, economical and local approach to the production of monosex populations of this species. At the end of the 8 weeks study, the results obtained were encouraging and show promise for controlling over-population although improvement and standardization would be required.

Oreochromis niloticus (L) is a popular and commercially important pond fish in Nigeria. While the market for fish demands the production of larger fish, a major draw back in the culture of this species is excessive reproduction i.e. prolific fecundity. This ability of high fecundity leads to overcrowding of young which in turn causes high competition for the available food and thus repression of growth of the entire population. This generally tends to minimize the yield of harvestable size of the fish (Hickling 1960) and thus reduces the profit ratio when cultured for commercial purposes.

Various methods for controlling this high prolific fecundity have been tried and some suggestions and practices have been evolved by aquaculturists. One such practice is the monosex culture of fish. This is a technique that involves stocking ponds with fry of only one sex in order to check overpopulation. A more recently developed monosex culture is the hormonal control of over population by sex reversal (Balarin, 1979, Donaldson and Hunter 1982). This involves the use of either androgen or estrogen hormone treatment to override the endogenous sex-determining mechanism in the developing embryo of the fish and directs it in a male or female direction.

Hormonal control by sex reversal is relatively inexpensive and does not involve any technological complexity. Besides, if a hundred percent sex reversal is achieved in either direction, reproduction will be eliminated thus permitting high stocking densities of all-male or all-female fish depending on which sex is desired for culture (Guerrero 1975).

This study was aimed at looking into the feasibility of using goat testis as a source of natural testosterone to sex reverse *Oreochromis niloticus*. Thus the efficacies of the natural

androgen and a synthetic androgen 17 - a - methyltestosterone in sex reversal of the fish were compared. The growth patterns and survival rates of the hormone-treated and untreated fish were also compared. It is hoped that result of this study will provide a preliminary data for further research into the culture of this species in Nigeria.

Production of fry: Fifty local brood fish from earthen ponds of the Ministry of Agriculture, at Yola, Nigeria were selected at a sex-ratio of three females to one male (3:1) and set at a stocking density of 10/m² in concrete ponds provided with clean soil substrate. When the eggs hatched and the fry of the same age left the female's mouth, the parents were removed and returned to the earthen ponds to prevent over crowding. When the fry were two weeks old, they were transferred to a container filled with well-aerated water for transport to the treatment facility, so that fry handling was held to a minimum and survival enhanced. The fry were sorted out in the laboratory according to the desired total length of 9-11mm (Guerrero 1975, Tayamen and Shelton 1978).

The experimental systems: The Experimental System consisted of nine (64 litres each) plastic containers, three replicates for each treatment. Each tank was aerated to supplement the dissolved oxygen using an oxygen pump.

Hormone and feed preparation: Methyltestosterone tablets were used as synthetic hormone. The testo tablets were obtained from Dumjos Chemists Ltd. Hormone treatment of the feed was by alcohol evaporation method of Guerrero (1975). Six testo tablets (equivalent of 30mg Methyltestosterone) were ground to fine powder and mixed with 1Kg of the feed (a proteinous trout feed from Rockwater Fish Farm, Jos). This mixture was then put in an electric blender containing 1 Litre of 95% ethanol and mixed properly before drying at 35°C for 6 hours in an oven.

The He-goat testis used as a source of natural testosterone was dried in the oven at 35°C

for 12 hours, then ground to fine powder. One hundred grammes of this powder were then mixed with 100ml of 95% ethanol in a blender before drying at 35°C for 6 hours.

Hormone treatment and feeding rate: The fry were stocked in 9 tanks (3 replicates in each of 3 treatments) at a density of 30 fry per tank. They were acclimatized for a week, after which feeding with the prepared feeds commenced. The fry were fed at 10% of body weight and each daily ration was divided into 3 feeding times (Morning, Afternoon and Evening). To avoid waste and reduce individual size variation in a group, the amount of food fed to the fry were adjusted weekly by measuring the weight of a random sample (10) of the population to allow for growth.

The tanks were cleaned daily to remove feces and uneaten food. Water quality parameters monitored were: temperature 25° - 28°C., Dissolved oxygen 6.4-8.6mg/l and pH 7.8 - 8.4. These values remained relatively stable.

The results of the study are shown in Table I below:

TABLE I

The survival rate, growth rate and percentage of males in all three treatments

Treatment	Survival Rate (%)	(mg/g/d)	Males (%)
CO	93.40	28.15	29.76
NT	66.70	25.85	60.00
MT	80.00	29.46	88.10

Synthetic Methyltestosterone (MT), Natural Methyltestosterone (NT) and Control (CO).

The percentage survival of males in treatments with synthetic and natural testosterone were both higher than in the controls. The result from this study shows that the growth rate of fish was higher in experimental treatments than the controls. No variability was observed within treatments. Survival rate differed in all the treatments but it was lowest (66.70%) in the natural testosterone-treated fish and the differences in survival rates could have been due to other factors (nutritional imbal-

ances, accumulation of organic materials) and not because of the hormonal effect.

Hormonal control of over population by sex-reversal to males as obtained from this study may thus provide a means of sexing and culture in aquaculture. The use of the natural testosterone could be economically feasible and cheaper when the source is nutritionally balanced and an approximate quantity of testosterone is determined. The economics and health implications for consumers should be considered so as to encourage and improve its application on commercial basis. Therefore, it should be refined and its use as local source of testosterone encouraged to reduce dependence on synthetic testosterone and also save foreign exchange that could be used to import these synthetic testosterone.

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