

Role of Ultrasound in Evaluation of the Presence of Ovaries in *Oreochromis niloticus* (L)

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Abstract: Ultrasound is a non-invasive diagnostic tool used to examine a variety of conditions in aquatic animals. Prolific breeding in the family Cichlidae resulting in overpopulation and stunting is a major challenge to the culture of the Cichlidae. 25 samples of *Oreochromis niloticus* were scanned using SIUI CTS-500 digital ultrasound machine with a sector probe of 6.5MHz transducer frequency and curvilinear probe of 3.5MHz transducer frequency. Ultrasound was employed as a diagnostic tool in gender determination in *O. niloticus*. The probe with 6.5MHz transducer frequency was effective in gender determination in *O. niloticus*. Results showed that *O. niloticus* examined attained sexual maturity at a small size with mean weight of 40g. Ultrasound has proved to be a useful tool for detection of matured ovaries. This finding has its application in accurate separation of sexes in *O. niloticus* to improve growth of the sexes.

Key words: Ultrasound % *O. Niloticus* % Ovaries and Artificial Spawning

INTRODUCTION

Oreochromis niloticus belongs to the family Cichlidae commonly called Tilapia which is a freshwater fish species and is endemic to Africa [1]. It was grouped with other Cichlids that were mouth brooders as *Sarotherodon* species. The mouth brooders were separated into maternal mouth brooder referred to as *Oreochromis* and bi-parental mouth brooder called *Sarotherodon* [2]. *Oreochromis* is the most commercially cultured species of the Cichlids in Nigeria it grows relatively faster than other Cichlids. The culture of the Cichlids is due to the ability of the fish to withstand low oxygen concentration and accept artificial feed.

The general problem with this family is prolific breeding. They attain sexual maturity at small size of about 20g of body weight [3]. This results in spawning and the culture system is filled with small-size fish this condition is referred to as runtting [4].

Ultrasound is a non-invasive diagnostic tool used to evaluate a variety of conditions in aquatic animals. It has been used to observe gonads of some fishes, examples: *Salmo salar* (Atlantic salmon), *Morone saxatilis* striped bass and channel catfish [5-7]. The presence of single

ovary instead of the normal two ovaries was demonstrated in *Clarias gariepinus* using ultrasound [8]. Some of the methods proffered to solve the problem of overpopulation in Tilapia culture include: cage culture, delayed sexual maturity, manual sexing, sterility and hybridization. The reduction or elimination of reproduction in culture ponds in the Cichlids would result in significantly improved yields of marketable fish [3]. Some authors have carried out research using ultrasound but the experiments were not performed using fish [9-12]. There is paucity of information on methods of observing the ovaries without sacrificing the fish. This is the first reported work on ultrasound in the Cichlids. The objectives of this study are to use ultrasound in detection of the ovaries of *O. niloticus* and to separate male and female *O. niloticus* using ultrasound images of the ovary, it is hoped that this will provide an accurate method of sexing Tilapias over the manual method.

MATERIALS AND METHODS

25 specimens of *O. niloticus* standard length range were 10.00cm-12.00cm, Total weight range were 27-50g, used in this study were collected from Ministry of

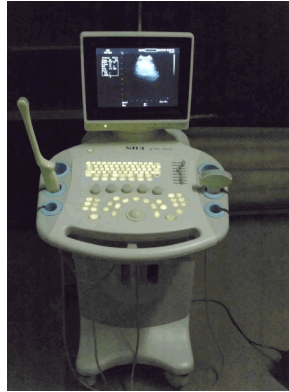


Fig. 1: Ultrasound Machine.



Fig. 2: Probe used in scanning the fish.



Fig. 3: Photograph of *Oreochromis niloticus*.

Agriculture, Hatchery farm Ilorin, kwara State. They were acclimatized in tanks of size 0.9x1.2x0.98m and fed with Coppen floating feed (2mm). About 48 hours to the time of ultrasound examination feeding was stopped to enhance scanning. During ultrasound imaging the fish were held down to display the ventral region. Transverse ultrasound imaged was recorded for each fish.

A SIUI CTS-500 digital ultrasound machine (Fig 1) with a sector probe of 6.5MHz transducer frequency was employed in sex determination of *O. niloticus* as showed in Fig. 2 and to produce images of ovaries in females. Gender determination was carried out and males were

Table 1: Length and weight of *O. niloticus*

SEX	n	TW (g)	SL (cm)	TL (cm)
Female	3	27	10	12
Female	5	34	10	13
Female	6	36	10	13
Female	2	41	11	14
Female	4	44	12	16
Female	5	50	11	14

returned to the water, some females were sacrificed to validate the position and identity of ultrasound images. Fig. 3 shows a female *O. niloticus* before dissection.

RESULTS

25 females of *O. niloticus* (Table 1) were examined using ultrasound imaging. The obtained ultrasound image are shown in Figures 4 and 5; Figure 6 shows the picture of sacrificed fish to validate the position and identity of the ultrasound images. Gender of female *O. niloticus* was verified using ultrasound imaging. Females of *O. niloticus* showed paired masses of ovary-like tissue which extends interiorly from the anal fins to the abdomen, Figs. 4 and 5 showed prominent images of paired ovaries.

Visual methods were not very accurate but ultrasonic imaging is an efficient and accurate method to determine gender of mature females of *O. niloticus*.



Fig. 4: Ultrasound image showing the ovaries of *O. niloticus*



Fig. 5: Ultrasonic images showing ovaries of *O. niloticus*



Fig. 6: Photograph showing Ovaries of *O.niloticus*

DISCUSSION

Gender determination using ultrasound was successfully performed in *O. niloticus*. Similar results were obtained by Jennings *et al.* [7] Nzeh and Jimoh [8]. Sector probe with transducer frequency of 6.5MHz was effective in determining *O. niloticus* gender. Jennings [7] made similar observation in striped bass *Morone saxatilis* in Savannah River estuary in Georgia Atlanta USA. Nzeh and Jimoh [8] also made similar observation in *C. gariepinus*. This technique is more accurate than visual sex determination. Early detection of eggs may help in management of runting in *O. niloticus*.

Ultrasound may be a useful method of separation of sexes in *O. niloticus*.

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