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Weight Variation of Seed of an Ecotype Cichlid, 'Wesafu' Bred In Hapa

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Abstract: *'Wesafu', a cichlid fish found in Epe lagoon, Lagos has the attribute of deep body and grows to 1,500g in the wild. Some studies have been carried out on the protein profiling, breeding and molecular characterization of this cichlid by many workers. The present study evaluates the weight variation of the eggs, fry and post fry of the cichlid.The experiment involved single pair mating of gravid broodstock (143.1-310.6g) in triplicate batches in 1m x1m x1m installed in 0.1ha earthen fish pond. Female broodstock were divided into 4 groups based on weight: less than 150g (A), 150-200g (B), 200-250g(C) and 250g and above (D). Fish were fed daily 3% body weight with Coppens feed (45% Crude Protein). The number of eggs fertilized were counted and recorded. The hatchlings were reared for 10, 30 and 60 days using conventional diet and their growth monitored.The results of the study showed that the weight of 'wesafu' egg varied proportionately with the weight of female broodstock between 7.941±0.030mg and 8.532±0.17mg, yolk sac-fry from 6.961 -7.234mg. At ten days of hatching, weight of fry ranged from 0.0531±0.0051g to 0.0533±0.0058g and 0.959g to 1.011g for 60 days post-hatching. The impact of maternal fish was found to disappear over time in this study, probably due to possible compensatory growth exerted by fish that come from smaller eggs. After a rearing period of 30 days and 60 day, there was little or no variation in the weight of the fry across the four treatments.*

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I. Introduction

The name literally means, a fish that is washed clean in lagoon.Tilapias are unique among cultivated fish in breeding freely under normal conditions without the need for any form of artificial inducement. Natural recruitment in production ponds is still the practice by many fish farmers, who view this as a free source of seed for stocking. However, the resultant problems of precocious spawning are crowding and stunting (IIes, 1973), a phenomenon associated with a shift in the balance between somatic growth and gametogenesis.Faced with this habitual problem of over-recruitment and stunting in cultured populations El-Sayed (2006) proffered solution for controlling reproduction and recruitment for subsistence levels of tilapia farming. Ideally, this should involve a stock management system which separates the production and reproductive phases of the life cycle, coupled with genetic or hormonal manipulation of the cultured stock to eliminate normal reproductive activity during the grow-out phase. The reproductive potential of fish largely depend on the fecundity of the fish.

Fecundity can be defined as the number of mature eggs in the female's ovary immediately before spawning (Payne and Collinson, 1983). This definition assumes that all ripening oocytes are ovulated and only a few eggs are retained in the ovary after spawning (El-Sayed, 2006). Many tilapias are characterized by low fecundity and relatively large egg size (Duponchelle *et al*., 1997). For example, Nile tilapia produces from 100 to 3000 eggs per spawn, with egg size ranging from 2 to 7.9mm (De Graaf *et al*., 1999). On the other hand, substrate spawners produce much higher numbers of smaller eggs (1–1.5 mm) than mouthbrooding tilapia (Coward and Bromage, 1999). The production of tilapia seed are usually done in hapas

Hapas have many attributes that make them an excellent hatchery system for cichlids (El-Sayed, 2006). These include easy construction, and management, easy seed harvest and low cost. The presence of "Wesafu", a cichlid of Epe Lagoon, Lagos, which grows to 1500g in the wild (Fashina-Bombata *et al.*, 2005, 2006, 2008, 2010 and Hammed *et al.,* 2010, 2011) appears to be an excellent candidate for genetic improvement of commercial strains for the growing aquaculture industry in the country. This study was conducted to evaluate the fecundity and seed production an ecotype cichlid, Wesafu in hapas.

II. Materials And Method

The experiment involved single pair mating of gravid broodstock (143.1-310.6g) in triplicate batches in 1m x1m x 1mhapas installed in 0.1ha fish pond in a private fish farm in Badagry. Female broodstock were divided into 4 groups based on weight: less than 150g (A), 150-200g (B), 200-250g(C) and 250g and above (D).The hapas were covered with net (2cm mesh size) to prevent fish from jumping out. Fish were fed daily 3%

body weight with Coppens feed (45% Crude Protein), imported from Netherlands and the mouth of both sexes observed daily for the presence of eggs or fry and the condition of the genital papilla which may still be swollen even few days after the female had released eggs.

Individual weight of fish was recorded every 2 weeks. The sex with eggs/ fry in the mouth was noted and recorded for each spawn. The number of eggs fertilized were also counted and recorded. The inter-spawning period (number of days) were also observed and recorded for each hapa. The following reproductive parameters were determined according to Mair *et al*., (2004):

Absolute fecundity: The number of seed per spawning per female

Relative fecundity: The number of seed per unit weight of female

Inter-spawning period: Number of days between successive spawning

The hatchlings were reared for 10, 30 and 60 days using conventional diet in all treatments and their growth monitored.

III. Results

The results of the study showed that the weight of 'wesafu' seed varied proportionately with the weight of female broodstock. The weight of an egg varied between 7.941±0.030mg and 8.532±0.17mg. In like manner, the weight of yolk sac-fry increased with increased weight of female broodstock, the range being 6.961 -7.234g. Furthermore, after ten days of hatching, the weight of fry ranged between 0.0531±0.0051g and 0.0533±0.0058g. At the end of 60 days post-hatching, the weight of the seed ranged from 0.959 to 1.011g. The standard deviation of seed (post-fry) produced from broodstock weighing above 250g was highest indication a wide disparity in the weight of individual seed.

Weight variation of 'Wesafu' seed over 60 -day culture period

Weight of Female Broodstock (g)	Weight of 100 of Fertilized egg Fertilized eggs	Average weight yolk sac Fry(g)	Average Weight 10-day post Post hatchimg	Average weight of 30-day post hatching	Average weight of 60-day post hatching	Average weight hatching
≤150	**0.794±0.03^a**	**7.94±0.30^a**	6.96±0.03^a	0.053±0.0^{a}1	0.314±0.01^a	0.996±0.01^a
150-200	0.825±0.01^a	**8.25±0.09^b**	6.99±0.01^a	**0.053±0.01^a**	**0.318±0.00^a**	**1.084±0.01^a**
200-250	**0.826±0.00^a**	**8.26±0.08^a**	**7.23±0.01^b**	**0.053±0.01^a**	**0.317±0.01^a**	**0.987±0.00^a**
>250	0.853±0.02^a	8.53±0.17^a	**7.23±0.01^a**	**0.053±0.01^b**	**0.319±0.01^a**	1.011±0.00^a

Inter-spawning period and brooding sex of the cichlid

Treatment Class	Average Weight of Female broodstock	Average Weight of Male broodstock	Range of inter spawning period (Days)
A	150.0±8.9	150.0±6.1	25-28
B	190.0±12.7	180.0±15.7	25-29
C	240.0±11.6	225.0±14.9	26-29
D	290.0±16.3	290.0±14.2	25-29

IV. Discussion

The results showed a progressive increase in the weight of egg with increase in the weight of female broodstock. Thorpe (1984) found that, larger eggs produced significantly large swim-up fry of tilapia. Morsy (2001), however reported that, as black carp female body weight increased, egg weight/fish, absolute fecundity, relative fecundity, larvae number/fish and hatchability percentage increased and this may be followed by increase in the number of fry produced by the females but this was not the case in this study.Many studies have shown the impact of egg size and nutrition on growth rate during early life of several fish species (El-Sayed, 2006). The author further reported that the efficiency of broodstock depend largely on genetic purity, size and age. Broodstock of unknown or questionable origin should not be used. The broodstock should not be too small because small fish are less fecund and less efficient at egg incubation and fry protection (Rana, 1986).

The impact of maternal fish was found to disappear over time in this study.This was probable as a result of possible compensatory growth exerted by fish that come from smaller eggs. After a rearing period of 30 days, there was little or no variation in the weight of the fry across the four treatments. When the fry were further reared to 60 days old, the maternal effect was no longer seen; the values being, El-Gamal (2010) reported that, in Nile tilapia, for instance the maternal effect virtually disappeared after 20 days. The author maintained that the maternal effect of egg size on body size of the progeny disappears as the fish grows older. .This can be a problem if selection is carried out before the effect disappears. To avoid this problem, it is advisable to use females of same ages and comparable sizes as possible; otherwise the differences detected in their progeny may be due to mother's age, size or diet and not to genetic composition.

Female 'wesafu' produce only a few hundreds to less than 2,000 eggs per spawn but inter-spawning period varied from 25-30 days in the present study. It was observed that this parameter (inter-spawning period) was not affected by the weight of the broodstock. This is in agreement with the report of Popma and Lovshin (1996) also stated that, under appropriate environmental conditions, tilapia spawn frequently (every 4-6 weeks) and at young age (usually less than 6 months) but overall fecundity is low. Although the inter-spawning period observed in the present study varied between 25 and 30 days, there was a singularexception in class A (weight less than 150g) where the interval between successive spawning was 15 days. This was probably because there were mature eggs that were not shed during earlier spawning. Coward and Bromage (1998, 2000) reported that immediately after spawning, the tilapia ovary regenerates very rapidly and pre-vitellogenic stages are recruited into vitellogenic and late vitellogenic stages in as little as 1 week. As a result of different gonadal developmental stages in tilapia, spawning intervals were expected to vary considerably among species, and even within the same species. For example, Siraj *et al*. (1983) found that first- and second-year classes of Nile tilapia spawned at short intervals (7–12 days), while third-year class fish spawned at longer intervals (10–20 days).

Although 'Wesafu' could be seen as a commercially important fish species based on its credentials of deeper body, high economic value, in terms of price, white flesh and good taste, its aquaculture potential may be affected by its low fecundity. This is not a desirable aquacultural trait because greater number of female brood stock is required to sustain a commercial aquaculture production. On the positive side, however, the need for many broodstock decreases the risk of inbreeding depression, an important management problem in the farming of more fecund fish species such as *Clariasgariepinus* (deGraff,1995).

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