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Length-weight relationship of *Tilapia niloticus* in concrete pond of Habib ADM, Hub, Balochistan

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Abstract: The length- weight relationship and condition factor was investigated from 500 Specimen of *Orechromis niloticus* maintained in concrete pond at Habib ADM Hub, Balochistan, Pakistan, for six months March to September 2008. The experimental fish was ranged from 15. 5-37. 8 cm and 50. 4 - 635. 4g in length and weight respectively. The value of regression co-efficient obtained for the length-weight relationship b=4. 55. This suggests positive allometry growth from entire specimen sampled. There was no significant statical difference in the regression co-efficients. The mean values of condition factor computed for all the specimen of *Oreochromis niloticus* was 1.07 ± 0.45, which indicated that the specimens were healthy. The length-weight relationship of sexes combined as shown by the following equation:
Log W= 4.07 + 4.55 Log L.

Keywords: Length-weight relationship, Condition factor, *Orechromis niloticus*, Concrete pond,Balochistan.

INTRODUCTION

Orechromis niloticus is locally known as `Daya` belongs to the family percidae of the order perciformes. *Orechromis niloticus* could be easily identified by dark bands or stripes founds on their body and are most prominent in mature forms. They are inhabit of in fresh water and water bodies of low salinity, as is typical of most Tilapia species (Olurin and Aderibigbe 2006). Length –weight relationship give information on the condition and growth patterns of fish (Bengal and Tesch, 1978). Fish are said to exhibit isometric growth when length increases in equal proportions with body weight for constant specific gravity. The regression co-efficient for isometric growth is 3 and values greater of than 3 indicate allometric growth. Condition factor studies take into consideration the health and general well-being of a fish as related to its environment; hence it represents how fairly deep bodied or robust fishes are (Reynold, 1968). Pauly (1983) reported the importance of length-weight relationship in the calculation of an equation of growth in length into an equation of growth in weight. Whereas Arsalan *et al.*, (2004) stated that it is usually easier to measure length than weight and weight can be predicated later on using the length – weight relationship which helps among other fish given its definite length. Olurin and Aderibigbe (2006) calculated the length-weight relationship and condition factor of pond reared Juvenile *Oreochromis niloticus*. But no work is available on to determine the length-weight relationship and condition factor of *Orechromis niloticus* reared in concrete ponds from Pakistan. The present study aims to provide information on the length-weight relationship and condition factor of *Orechromis niloticus* reared in concrete ponds of Habib ADM at Hub, Balochistan with a view to determine the suitability of stocking in concrete pond.

MATERIALS AND METHODS

Experimental fish

Five hundred fish samples were collected from concrete pond at Habib ADM Hub, Balochistan, Pakistan, with the help of fish catching net. The specimens were transported to the laboratory in a large polythene bag with 5% formalin.

Laboratory analysis

The collected specimens were washed and mopped on filter paper to remove excess water from their body surfaces. Length of fishes was measured to the nearest cm and weight up to 0.1g by using a scale sensitive portable battery operated balance (Model No., CT, 1200-S, Made in USA) respectively. The experimental fish were ranging from 15.5 – 37.8 (cm) in total length (TL) and 50.4-635.4g in weight respectively.

Length –weight relationship and condition factor

The regression of weight against length was computed from the logarithmic formula: log a+b log L. Ponderal index (Kn**)** was observed of different length groups. It was calculated for each 5cm length interval. The smoothed mean weights W/W, for each length group has been computed from the log formula as suggested by LeCren (1951) modified formulae: Kn =W/aL^n has been adapted for the calculation of the relative condition factor.

RESULTS

Length- weight relationship

The length –weight relationship equations were determined for sexes combined only. The expression can be transformed logarithmically as suggested by LeCren (1951) log a + b log L. When empirical values of lengths were plotted against their respective weight on an arithmetic scale, smooth curves were obtained **(Fig .1).** A plot of weight against length on double logarithmic paper however yielded a straight line **(Figs. 2)** as expected. The data of length-weight of *Orechromis niloticus* is presented in **(Table 1)**.

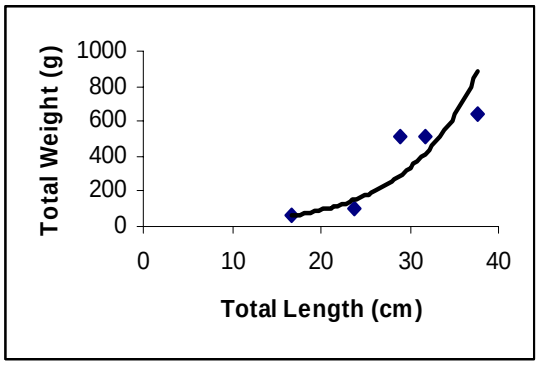

Fig.1. Length-weight relationship of sexes combined *Tilapia niloticus* from concrete pond of Habib ADM, Hub, Balochistan (Empirical values)

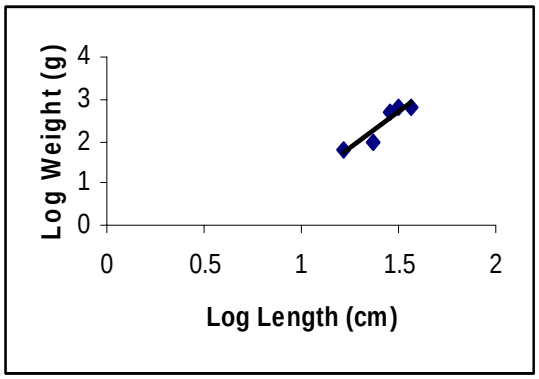

Fig. 2. Log-log relationship of sexes combined *Tilapia niloticus* from concrete ponds of Habib ADM, Hub, Balochistan.

Table 1. Data on length and weight of a *Tilapia niloticus* from concrete ponds of Habib ADM, Hub, Balochistan.

S.No.	Length groups (cm)	Combined sexes	
		Mean length (cm)	Mean Weight (g)
1	15.1-20.0	16.8 ± 0.55	60.9 ± 1.55
2	20.1-25.0	23.7 ± 1.20	101.5 ± 0.99
3	25.1-30.0	29.01 ± 2.0	507.47 ± 1.25
4	30.1-35.0	31.75 ± 1.65	613.81 ± 2.30
5	35.1-40.0	37.7 ± 1.89	635.4 ± 3.35

The regression coefficients, when calculated using the methods of least squares for samples of *Orechromis niloticus* in size ranged between 15.5– 37.8(cm) gave the following equation:
Log W=4. 07 + 4.55 × Log L.

As observed from the above equations values for all specimens were practically identical and followed the cube law (b=3). The agreement between the empirical weight and computed weight from regression can be termed as ideal growth (positive allometry).

Relative condition factor

The relative condition factor (Kn) for all fish samples was determined from the average lengths and weights of 5cm interval of total length groups **(Table 2)**. The relative condition factor (Kn) was determined for all samples in case of sexes combined only Kn values were ranging from 0.49-1.84 with mean was 1.0 ± 0.5. The values of Kn showed ideal or good growth of all specimens in all size groups of fish.

Table 2. Relative condition factor (Kn) values for combined sexes of *Tilapia niloticus* from concrete ponds Habib ADM, Hub, Balochistan.

Length group (cm)	Combined sexes		
	Observed weight	Calculated weight	Kn
15.1-20.0	60.9	30.19	0.49
20.1-25.0	101.50	144.54	0.73
25.1-30.0	507.47	371.53	0.91
30.1-35.0	613.81	562.34	1.42
35.1-40.0	635.4	1174.89	1.84
		Mean Kn =	**1. 07** ± 0.45

DISCUSSION

The present study was conducted to determine the length-weight relationship and condition factor of *O. niloticus* from concrete ponds of Habib ADM, Hub, Balochistan. Khallaf *et al*., (2003) reported differences in length–weight relationships of *Orechromis niloticus* in a polluted canal compared with those of other authors in different localities and times. These differences were attributed to the effect of eutrophication and pollution on growth and other biological aspects of *Orechromis niloticus*. Olurin and Aderibigbe (2006) calculated the length-weight relationship and condition factor of pond reared Juvenile *Oreochromis niloticus*; with a view to determining whether the fishes are in good condition. Recently Edah Bernard *et al*., (2010) computed the wet weight-dry weight relationship of *Oreochromis niloticus* (Tilapia) in significant relationship were found in all cases at ($p<0.05$) with correlation coefficients for males males, females and pooled sexes at 0.9241, 0.9632 and 0.9586 respectively. The length-weight relationship and relative condition factor values indicated positive alometric growth (b= 4.55) of *O. niloticus* in the present study, which accords with the previous findings. A number of factors (e.g. sex, seasons, environmental conditions, stress, and availability of food) also affect the condition of fish. Stewart (1988) observed stress as a result of the reduction in the breeding and nursery ground of *O.niloticus* in lake Turkena, Kenya, as contributing to dramatically lower condition factors. Pollution was seen to affect the condition factors of *Orechromis niloticus* in lake Mariut, Egypt (Bakhoum, 1994). The Kn values computed in the present study were ranged between 0.49- 1.84 (mean Kn 1.07 ± 0.45) confirms the findings of Hile (1936), Martin (1949) and LeCren (1951) who expressed that the exponent value usually lies between 2 and 4. In the present study the values of relative condition factor (Kn) of *Orechromis niloticus* from concrete ponds of Habib ADM at Hub, Balochistan, showed ideal growth.

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