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FOOD AND FEEDING HABITS OF *Oreochromis niloticus* IN LAKE GBEDIKERE, BASSA, KOGI STATE.

Adeyemi, S.O., Akombu, P.M, Toluhi, O.O.
Department of Biological Sciences, Benue State University, Makurdi.

ABSTRACT
The food and feeding adaptations of *Oreochromis niloticus* in Gbedikere Lake, Bassa, Kogi State Nigeria were studied. A total of 146 fish samples were collected between July and December 2008; the stomach contents were analyzed using numerical and frequency of occurrence methods. The result shows that the fish is an omnivore, feeding mainly on plant parts (34.02%), detritus (11.35%), algae (22.68%), insect part (6.16%), crustaceans (7.56%), sand grains (8.51%) unidentified particles (9.71%).The length-weight relationship implied that adult female fish had the highest standard length (19.50cm) followed by the adult male (15.30cm) and the juveniles (5.90cm). The diversity of food substances found in the stomach and their occurrences in the juveniles and adults varied with the water bodies and season.

KEYWORDS: *Oreochromis niloticus*, stomach content, feeding adaptations, Gbedikere Lake.

INTRODUCTION

The fish family Cichlidae is presented mainly by genus *Oreochromis* commonly known as Tilapia. Tilapia is widely distributed in Africa and many parts of the world (Trewavas, 1983). *Oreochromis niloticus* could easily be identified by dark bands or stripes found on their bodies which are most often prominent in mature forms, they inhabit fresh water bodies and water with low salinity.

They are broadly classified into 3 sub-genera which include *Tilapia, Sarotherodon* and *Oreochromis* species the latter are mostly mouth brooders (Pauly, 1976). The family cichlidae is highly diversified with wide area of distribution spreading across Africa and most part of India and Ceylon (Balarin, 1979).

Oreochromis niloticus is a fast growing and highly prolific species, though an indigenous African fish, it is also an inter-continental traveler (Bardach, *et.al.*, 1972). It has high tolerance to environmental conditions and its ability to accept compounded and natural feeds makes it economically cultivable and viable. It is characterized by the caudal fin with elongated body and a number of narrow bands on the back.

The study present information on the food and feeding adaptations of this valuable fish species in order to aid its management in the Lake.

MATERIALS AND METHODS

STUDY AREA

Lake Gbedikere is a natural lake located between Latitudes $3^{0}24^{0}$ and Longitudes $5^{0}14^{E}$ and is about 10km to the East of Oguma the Head quarter of Bassa Local Government Area of Kogi State.

Water enters the Lake from tributaries that run from River Benue during rainy or flood season. When the season is over, the Lake separates out. The Lake is about 450m north of Gbedikere village. The water body covers about 400 – 450m and a depth of 10 – 14m deep, depending on the season.

The Lake is used for fishing and other domestic activities; consequently most of the settlers around the Lake are fishermen (Upper Benue River Basin Development Authority, 1985). The lake experience two seasonal periods; the rainy season starts in the month of May and last till October and is characterized by heavy down pour which sometimes have an extensive flood action. The dry season is from late October to April and is characterized by cold, dusty -dry wind followed by intense heat. The lake contains fish, other aquatic animals and some macrophytes such as wire grass (*Cyperus articulatus*) which are used for waving mats.

SAMPLE COLLECTION

Fish samples were obtained from the fishermen catches using gill nets, cast nets, hooks and lines and Malian traps. A total of one hundred four six (146) fish samples were identified and collected between July and December 2008. The specimen were put into ice-block soon after capture and transported to biological sciences laboratory, Kogi State University, Anyigba for further analysis. In the laboratory, the fish were serially numbered and the weight of each specimen were measured by the means of measuring board and recorded in centimeters (CM). The total length was taken from the tip of the head to the tip of the tail.

The gut length of each specimen was taken and the stomach content was also weighed, using a weighing balance the gutted weight (GW) was taken after removal of the viscera organ.

Each stomach was split open and the contents emptied into a Petri-dish. Adequate measure was taken in order not to cut the internal organ of the fish; the stomach was also dipped into alcohol to avoid post-deterioration. The various food contents were then analyzed using microscopic examination.

STOMACH CONTENT ANALYSIS

Numerical Method

The number of each food category was expressed as a percentage of the total individual of all food categories; this is often called percentage composition by number (Crisp, *et.al*, 1978). The limitation of this method is that it over emphasized the important of small prey found in a large number of fish (Hyrus, 1965). It is difficult to identify the number of food for each stomach because of mastication problem.

Frequency of Occurrence Method.

In the frequency of occurrence method, the stomach content was analyzed as described by Hynes, (1950). Each food item was identified and number of stomachs in which each food occurred was counted and expressed as a percentage of stomach containing food. The method showed the proportion of individuals eating a particular food item in a species. The occurrence of each food item was expressed as a percentage of all stomach with food.

RESULTS

FOOD CONTENTS

Analysis of the fullness of the stomach shows that juveniles had highest stomach content 0.8378 (50.92%) followed by adult female and male 0.3953 (28.26%) and 0.3459 (20.82%) respectively (Table 1).

Table 1 Mean Stomach Content Analysis of *Oreochromis niloticus* Obtained in Gbedikere Lake, Bassa, Kogi State.

Food items	AM	AF	JV	Sub total	% Total
Plant part	0.09	0.125	0.285	0.5	34.02
Algae	0.06	0.0833	0.19	0.3333	22.68
Detritus	0.03	0.0417	0.095	1.1667	11.35
Insect	0.0164	0.0227	0.0518	0.0909	6.16
Crustaceans	0.02	0.0278	0.06330	0.111	7.56
Sand grain	0.0225	0.0313	6.0713	0.1251	8.51
Unidentified particles	0.0257	0.0357	0.0814	0.1428	9.71
Grand Total	0.3459	0.3953	0.8378	1.4699	100%

AM = ADULT MALE, AF = ADULT FEMALE, JV = JUVENILES

Length and weight frequency distribution of *Orechromis niloticus* is shown in Table 2. The standard length (cm) and the weight (g) for adult male, adult female, combined sex and juveniles were 6.10cm – 15.30cm/8.70 – 138.30g, 5.90cm – 19.50cm/6.50 – 309.40g, 5.90cm – 19.50cm/6.50 – 309.40g and 5.90cm – 19.50cm/6.5 – 309.40g respectively.

Table 2 Length weight frequency distribution of *Oreochromis niloticus* in Gbedikere Lake, Bassa, Kogi State.

Sex	*Standard length (cm)*				*Total weight (g)*		
	n	Min	Max	Mean ± S.D	Min	Max	Mean ± S.D
Males	18	6.10	15.30	9.91±2.57	8.70	138.30	47.37 ± 36
Females	25	5.90	19.50	11.11 ± 3.42	6.50	309.40	76.14± 7.55
Juveniles	57	5.90	19.50	11.11 ± 3.42	6.50	309.40	76.14±72.55
Combined sex	46	5.90	19.50	10.8 ± 3.42	6.50	309.40	58.63 ± 65.94

n = Number, Min = Minimum, Max = Maximum, S.D = Standard deviation.

The males length-weight relationship is express by the regression equation Log TW = 13.695 + -87.714 Log TL (r = 0.9629) as shown in figure 1.

The females' length-weight relationship is expressed by the regression equation Log TW = 0.0261 + 3.191 Log TL (r = 0.9778) as shown in figure 2.

The combined sexes' length-weight relationship is expressed by the regression equation Log TW = 0.0267 + 3.1817 Log TL (r = 0.9797) as shown in figure 3.

The juveniles' length Log TW = 0.0402 + 2.9528 Log TL (r = 0.9575) as shown in figure 4.

The condition factor (CF) ranged between 1.59 - 5.24, 2.14 – 5.62, and 5.62 for males, females and combined sexes (Table 3).

Table 3: Condition factor of *Oreochromis niloticus* Gbedikere Lake, Bassa, Kogi State.

Sex	*Minimum*	*Maximum*	*Condition factor (k) (Mean ± SD)*
Males	1.59	5.24	3.58±0.68
Females	2.14	5.62	3.71±0.74
Combined sex	1.59	5.62	3.64±0.71
Juveniles	0.557	1.58	0.26±1.12

The b-values of 2.76, 2.87 and 2.81 indicate that males and females showed negative allometric growth, based on Begenal and Tesch (1978) criteria of 3. Similarly Pauly (1984) reported that a slope value greater than 3 denotes positive allometric growth that was not similar to the findings Anibeze (1995). This indicates that *Oreochromis niloticus* did not obeyed the cube law of growth (Le Cren, 1951) which is not commonly obeyed by most fishes. Etim (2000) and Fafioye and Oluajo (2005) respectively reported 2.951 and 3.042 b-value *Chrysicthys nigradigitatus* combined sex which are similar to the findings of the study. The value recorded during this study were similar with 1.53 to 2.55 reported by Ekanem (2006) for *Chrysicthys nigrodigitatus* (Lacepede) from Cross River and also higher than 0.79±0.15 which is less than 1.0 as reported by Fafioye and Oluajo (2005) from Epe Lagoon, this could be due to difference in the condition of the habitat such as Physico-Chemical parameters, plants and animal communities. Female juveniles have better condition factor than the males during the period of this study.

DISCUSSION

The result shows that *Oreochromis niloticus* at the juvenile stage feeds mainly on zooplankton, insect and crustaceans while the adult feeds extensively on phytoplankton such as algae, plant parts and detritus. This is in

consonant with Tudorancea, *et.al*, (1988) and Abdel, (2001) who reported that Nile *Tilapia* is a phytoplanktivore and a facultative detrivorous fish. Also Anizebe (2001) found that Nile *Tilapia* in Agulu Lake basin Nigeria subsisted mainly on a wide variety of plankton however, considerable quantities of phytoplankton and zooplankton were present in the food contrasting the results of Northcott, *et.al*, (1991) who stated that insects and crustaceans could also comprise large portion of the diet of Nile *Tilapia*.

CONCLUSION

O. niloticus is an omnivore, feeding on diverse plant and animal food substances. However, the juveniles show more indignation towards zooplankton such as insects, crustaceans and sand grains while the adult feeds mainly on zooplankton such as algae, detritus and plant parts. This fish explore food items of aquatic and terrestrial origin depending on availability as influenced by season and water hydrology.

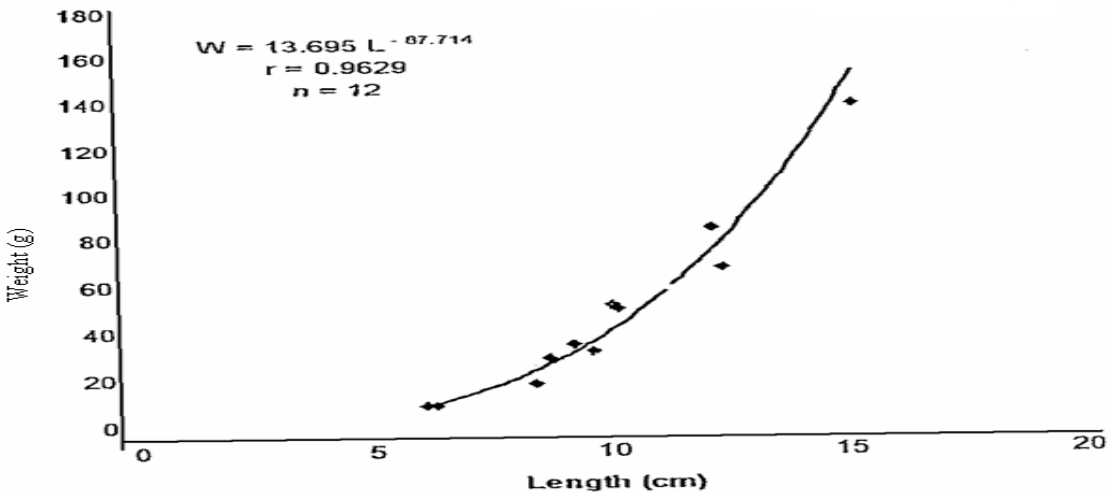

Fig 1: Lenght-weight relationship of male Oreochromis niloticus in Gbedikere Lake, Bassa, Kogi State.

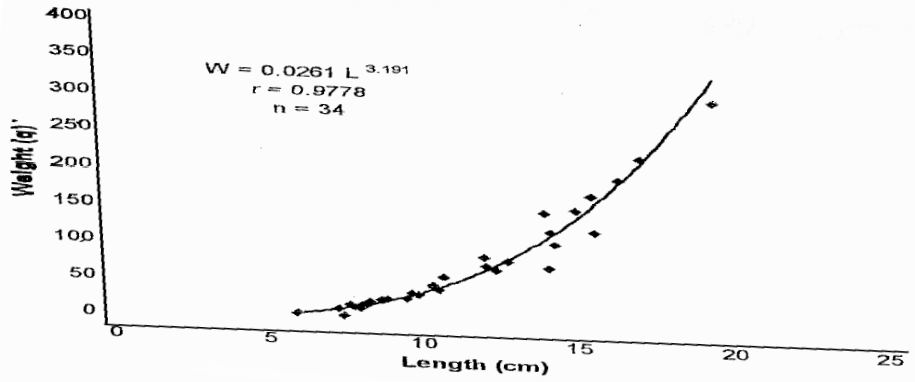

Fig 2: Length weight relationship of female *Oreochromis niloticus* in Gbedikere lake, Bassa, Kogi State.

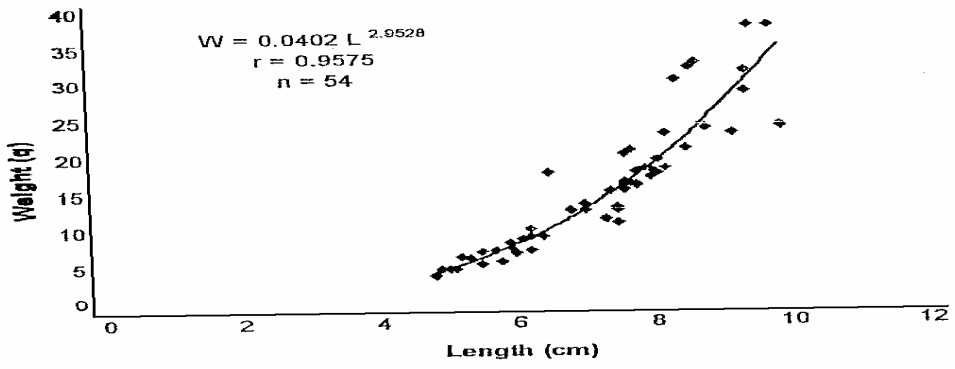

Fig 3: Length-weight relationship of juvenile *Oreochromis niloticus* in Gbedikere Lake, Bassa, Kogi State

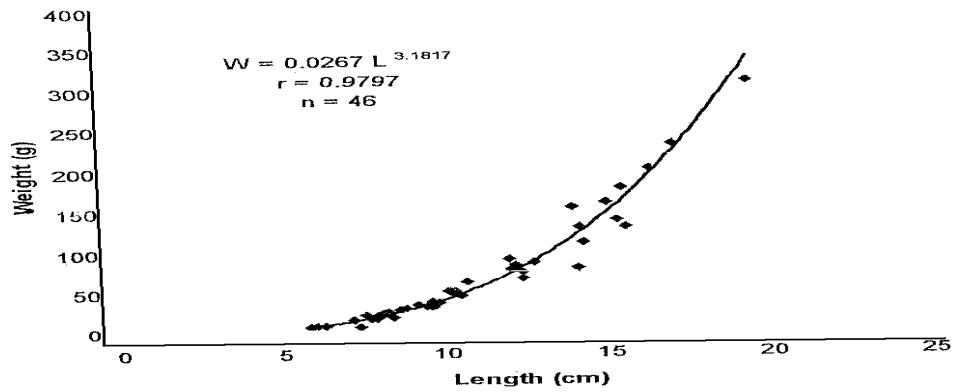

Fig 4: Length-weight relationship of combined sexes of *Oreochromis niloticus* in Gbedikere Lake, Bassa, Kogi State.

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Corresponding Author:
Adeyemi, S.O.
Department of Biological Sciences, Benue State University, Makurdi.
sadeyemi2003@yahoo.com