Rev. Biol. Trop., 44(3)/45(1): 655-658, 1996-1997

BRIEF ARTICLE

Food, size and condition of *Oreochromis niloticus* in Nigeria (Pisces: Cichlidae)

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(Rec. 9-V-1995. Rev. 23-X-1995. Acept. 11-III-1996)

Resumen: Se estudió la tilapia *Oreochromis niloticus* (Peters) en el Río Kaduna, Nigeria. Los machos tuvieron una longitud de 6.5 a 26.0c m y pesaron 11.0 a 529.1g; respectivamente, las hembras midieron 8.6 a 25.7 cm y 29.0 a 593.0 g. La regresión longitud-peso indica que hay crecimiento alométrico negativo. El factor de condición varía en el macho de 2.36 a 4.35 (hembra: 3.35 a 4.35). Estos peces consumen una variada dieta de algas en la que dominan Chlorophyta, Cyanophyta y Chrysophyta.

Key words: *Oreochromis niloticus*, food and feeding habits, length-weight relationship, condition factor.

Oreochromis niloticus (Peters) is highly abundant in River Kaduna and is the most frequently fished species. Cichlids reach high populations and many habitats (Burchard 1967) which explains their popularity in fish culture.

Various aspects of the biology of Cichlids of commercial importance have been studied by Fagade (1971), Fagade and Olaniyan (1973), Fagade (1978), Akintunde and Imevbore (1971), Nwadairo (1985), Omotosho (1987), Ofojekwu Ejike (1992) and Ofojekwu (1993). There is however no published account of the biology of these species from Kaduna river. This study looks at the food and feeding habits, Length-weight relationship and condition factor of *O niloticus (p).*

The Kaduna river has a dry season from November to March (Rabiu 1985).

Fishes were sampled twice monthly for twelve months (August 1986 to July 1987). Gears used by fishermen include gill nets, cast nets, clap nets, traps and hook and line. The stretched mesh sizes of nets were reported to vary from 20mm to 50mm. Routine laboratory measurements were carried out as described by Olatunde (1977). Sexes were determined by examination of internal organs. Stomach contentwere fixed individualy in 5% formalin solution. Points and frequency of occurrence methods were used to analyse the dietary items. The stomach fullness was determined accordingly to Olatunde (1978).

The length-weight was calculated using the conventional Lecren (1951)

$$W = a^{Lb} \quad \ldots\ldots(1)$$

The data was transformed into logarithm before calculations were made. Thus equation (1) was transformed into:

$$\text{Log } W = \text{Log } (axbl) \quad \ldots\ldots(2)$$

Where W = weight of fish (g)
Ñ = Standard length of fish
a = Constant
and b = an exponent

The condition factor ('K' value) was calculated using the formula described by Worthington and Richardo (1930).

$$K = \frac{w \times 100}{L^3} \quad \ldots\ldots(3)$$

Where K = Condition factor
W = Weight of fish
and L = Standard Length of fish

The total sample size was 449. Standard length of males was 6.5 to 26.0cm (females 8.6 to 25.7 cm) and their weight 11.0 to 522.1 g (females 29.0 to 593.0 g). Regression analysis 'b' values were: males 2.25 female 2.14; both 2.23. The correlation coefficient of male length-weight .812 (female .816). There was a linear relationship ($p < 0.05$). Male condition was 2.36 to 4.35 (female 3.35 to 4.35, Table 1)

Food composition appears on Table 2. Higher plant material had 64.4% of total points and 97% frequency of occurrence. Similarly, Algae had 20.34% and 35% while other dietary items had 14.9% and 58.7%. The feeding index (Fig. 1) was highest in September (76%) and lowest in January (24%). There were 254 males and 195 females (1:0.77; Table 3). The difference in sex ratio was not significant ($p > 0.05$).

Females did not differ in size ($p > 0.05$).

Holden and Reed (1972) observed that male tilapias grow to a larger size than females. Fagade (1972) noted that the largest *Tilapia guineensis* are females. Some sampling artifacts have been known to affect the size and sex distribution of captured fish (Olatunde 1983). The regression analysis 'b' values showed negative allometric growth in both sexes. This, however, assumed that the specific gravity of fish remained constant (Tesch 1968). The length-weight relationship was linear. Botros (1970) and Fagade and Olaniyan (1972) also noted an increase in weight with with greater lengths. Siddiqui (1977), Fagade (1978) and Landau (1979) worked on length-weight relationship of various species of tilapia and found that the body length is approximately the cube of body weight. Factors such as gear selectivity, sex and difference seasons of the year can affect the length-weight relationship. The mean condition factor indicated that the fish species were in a stable condition except in January and February when there was general decrease in condition value. Olatunde (1983) notes that there is fall in condition factors of *Clarias Lazera* in Zaria during the dry season. Sexual differences, age, changes in seasons, gonad maturity levels, length and weight, nutri-

TABLE I

Monthly mean condition factor of O. noliticus

Month	Range	Male Mean	Standard Deviation	Range	Female Mean	Standard
August	3.60-4.57	4.03	0.22	3.63-4.82	4.07	0.39
September	3.84-4.85	4.24	0.27	3.51-4.64	4.28	0.38
October	2.13-5.85	3.18	1.00	1.94-4.96	3.35	1.00
November	2.31-4.80	4.74	0.35	3.30-4.59	3.94	0.43
December	3.47-4.43	3.76	0.31	2.98-4.76	3.74	0.47
January	2.31-4-62	3.34	0.70	2.11-4.87	3.50	0.85
February	1.01-5.20	2.76	2.25	1.27-7.86	4.03	0.81
March	3.36-4.88	4.09	0.34	3.46-4.85	4.09	0.38
April	2.22-6.82	4.34	0.93	4.12-4.37	4.16	1.44
May	2.57-4.61	4.12	0.54	2.88-4.93	4.19	0.80
June	2.75-6.27	4.27	0.92	3.15-6.05	4.19	0.35
July	3.87-5.15	4.35	0.82	3.88-5.00	4.35	0.41

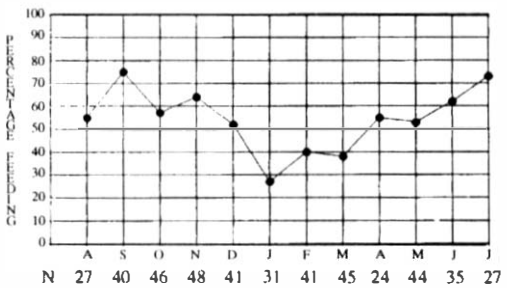

Fig. 1. Monthly feeding index of *Oreochromis niloticus*.

TABLE 2

Food Composition of O. niloticus
Number with food 240 (53.5%)
Number without food 209 (46.4%)

Food Items	Percentage frequency of occurrence	Percentage total Points
Plant twigs	97.0	45.0
Fruits and seeds	48.0	19..4
CHLOROPHYTA		
Pandorina sp.	6.2	1.4
Synura sp.	3.7	0.4
Cosmarium sp.	3.7	0.5
Closterium sp.	16.2	2.9
Oedogonium sp.	3.7	0.6
Wothrix sp.	35.0	8.0
Spirogyra sp.	15.0	3.2
CYANOPHYTA		
Anabaena sp.	7.5	1.2
CHRYSOPHYTA		
Pinnularia sp.	6.2	1.1
Bacillaria sp.	5.4	1.0
Synedra sp.	0.4	0.0
Melosira sp.	0.4	0.0
Unidentified organic remains	58.7	12.3
Insect remains	10.8	2.2
Inorganic matter	1.2	0.4
		99.64

tional level and maturity level of fish can influence the value of the "K" condition factor (Lagler 1952).

This population is herbivorous, feeding on algae and diatoms. Gwahaba (1973) also noted that *T noliticus* is a phytoplankton feeder. Fagade and Olaniyan (1973) observed that the principal food items of tilapia species are algal filaments, diatoms and unidentified organic matter. Akintunde and Imeubore (1979) noted that the main stomach content of *S niloticus* is phytoplankton. Ofojekwu and Ejike (1992) noted that *O. niloticus* feed predominantly on blue-green algae and other phytoplankers.

Table 3

Seasonal Variation in the Sex ratio of O. niloticus

Month	Males	Females	Ratio (M:F.)
August	17	10	1:0.59
September	19	21	1:1.1
October	29	17	1:0.59
November	29	19	1:0.66
December	20	21	1:1.05
January	15	16	1:1.06
February	21	20	1:0.95
March	26	19	1:0.73
April	18	6	1:0.33
May	26	18	1:0.69
June	17	18	1:0.05
July	17	10	1:0.59
Total	254	195	1:0.77 ($p<0.05$)

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