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CONDITION FACTOR AND DIETARY COMPOSITION OF *Oreochromis niloticus* FROM ERO DAM IN IKUN EKITI, EKITI STATE, NIGERIA

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ABSTRACT

This study focused on the condition factor and dietary composition of *Oreochromis niloticus* in Ero dam, Ekiti State, Nigeria during which a total of 84 specimens of the fish species were examined. In this study, the condition factor (K) of the fish species was higher than 1 and ranged between 3.15 and 4.71 in the males and 3.16 – 4.37 in the females. This showed a good health condition of the fish species. Analysis of the stomach contents of the specimens using frequency of occurrence and numerical abundance method revealed *O. niloticus* to be an omnivore with phytoplankton as the dominant food item followed by Copepods, *Amoeba* and insect parts. Results also showed that 90.48% of the sample had food in the stomach while 9.52% were empty.

Keywords: Condition factor, Dietary composition, *Oreochromis niloticus*, Ero dam

INTRODUCTION

According to Haruna and Bichi, (2005), condition factor provides an understanding of the lifecycle of fish species which contributes to a proper management of the species as well as the maintenance of the ecosystem equilibrium. Froese, (2006) reported that condition factor acts as an index that reflects interactions between biotic and abiotic factors in the physiological condition of fishes and serves as indicator of health in the study of the biology of fish species. Tilapia (Family Cichlidae) is an important source of food for man (El-Wakil *et al.*, 2010) and has been observed by Bwanika *et al* (2007), as a species with the ability to exhibit trophic plasticity based on the nature of the environment and the other species existing within the ecosystem.

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The dietary habit of fish, based on stomach analysis is widely used in fish ecology as a means of investigating trophic relationship in aquatic environment (Fagbenro *et al*., 2000). The knowledge of the food and feeding habits of fish enables the farmers to have proper understanding of the dietary requirements of fish with a view to providing supplementary feeds for the fish, (Malami *et al*., 2004). In addition, diet analysis of fishes provides information on the feeding strategy, intra- or inter-specific potential interactions (competition and predation) and indirectly community energy flow within the fishery system, (Ramirez-Luna et al., 2008). It is noteworthy that various works on condition factor and dietary composition of Cichlids and other fish species have been carried out in different water bodies in Nigeria. These include the studies carried out by Ndimele *et al* (2010) who worked on the condition factor and dietary composition of *Sarotherodon melanotheron* in Ologe Lagoon, Lagos, Nigeria; George *et al* (2013) who carried out an examination of the diet and condition factor of *Ethmalosa fimbriata* in the Cross River Estuary, Akombo *et al* (2014) who worked on the condition factor and feeding habits of *Synodontis schall* in river Benue at Makurdi, Nigeria and the research conducted by Kotos (1998) on food, size and condition factor of *O. niloticus* in Kaduna river Nigeria. Also, Oso and Fagbuaro (2006) worked on the food and feeding habits of *Oreochromis niloticus* and *Sarotherodon galilaeus* in Ero reservoir and as a follow-up to this research, this present study focuses on the determination of the condition factor and food composition of *O. niloticus* in the reservoir.

MATERIALS AND METHODS

Study area:

The study area, which is Ero dam situated at Ikun Ekiti, Moba Local Government Area of Ekiti State, Nigeria, had been previously described by Oso *et al.* (2006).

Sampling and laboratory procedures:

The dam was demarcated into five zones based on the input from its tributaries. Fish specimens were collected fortnightly with the help of fishermen operating on the dam. Gears employed included gill nets, cast nets, traps, hooks and lines. Samples were iced in sealed plastic containers at the point of collection before being transported to the laboratory in the Department of Zoology, Ekiti State University for analysis. Identification of fish species was done using fish identification guide by Babatunde and Raji (1998), FAO (1992) and Idodo-Umeh (2003). The weight of each specimen was taken using a top loading metler balance (model PN1200) to the nearest 0.1g after draining excess water with a pile of filter papers while their total and standard lengths were measured in centimeter using a measuring board. The total length was measured as the distance from the snout to the tip of the caudal fin while the standard length was measured as

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the distance from the snout to the caudal peduncle. The condition factor (k) which shows the degree of well-being of the fish in their habitat was estimated by using the equation:

$$K = 100\ (W/L^3)\ \text{(Pauly, 1984).}$$

Where: W = the observed weight for each fish in gram
L = the observed standard length for each fish in centimeter
K = the condition factor.

Specimens were dissected and the gut taken out to remove the stomach and preserved immediately in 4% formalin for subsequent examination of the food items. The stomachs were scored 0, ¼, ½, ¾, or full (Table 2) according to their fullness as described by Olatunde (1983). Each stomach was then opened and the content emptied in a Petri dish. Some food items such as insect parts were identified with the naked eye, while others were identified with the aid of a microscope. Slides were made prepared and examined under the light microscope using the x10 and x40 objectives. Analysis was done using frequency of occurrence and numerical methods as described by Hyslop (1980), Costal *et al* (1992) and Ugwumba and Ugwumba (2007). Frequency of occurrence was calculated using the formula:

$$F = \frac{N_i}{N} \times 100\%$$

Where F = Frequency of occurrence of the $_i$th food items in the sample
N_i = number of stomachs in which the $_i$th item was found
N = total number of stomachs with food in the sample;

While numerical abundance was determined using:

$$N_i = \frac{F_i}{F} \times 100\%$$

Where N_i = Numerical percentage of the $_i$th food item in the space
F_i = total number of $_i$th food item
F = total number of all food items.

RESULTS

Condition factor

Table 3 shows the values of the condition factor in this study for males, females and combined sexes were 3.837, 3.782 and 3.837 respectively. In this study, the males were observed to be larger than the females. Lower "k" values indicate that fish are relatively growing in length more than in weight and have more elongated shape. However, "k" values in this study revealed that the species are in good condition.

Food and feeding

A total of 84 specimens of *O. niloticus* from Ero dam were analyzed. The total length and standard length ranged from 12.0cm to 20.4cm and 9.4cm to 16.2cm respectively while the weight ranged between 31.9g and 166.9g. Table 1 shows the summary of the stomach content analysis in *O. nioloticus*. Using the frequency of occurrence method (Fig 1), *Closterium* species under the green algae division accounted for the highest with 11.84% followed by *Oscillatoria* with 10.53%. In the numerical analysis, *Oscillatoria* (20.69%) constituted the most important diet of *O. niloticus* followed by two other items of the division (green algae), *Closterium* (17.08%) and *Chlamydomonas* (15.72%) while *Euglena species* occurred as the least diet in both methods (1.32% and 0.35%). Insect parts were also found in the stomach as well as some unidentified food items. Table 2 shows the analysis of the stomach fullness of the fishes where it was revealed that 9.52% of the stomachs were empty while 27.38% had varied quantities of food. Stomachs with 75% fullness (25%) were more than those with 100% fullness (20.24%).

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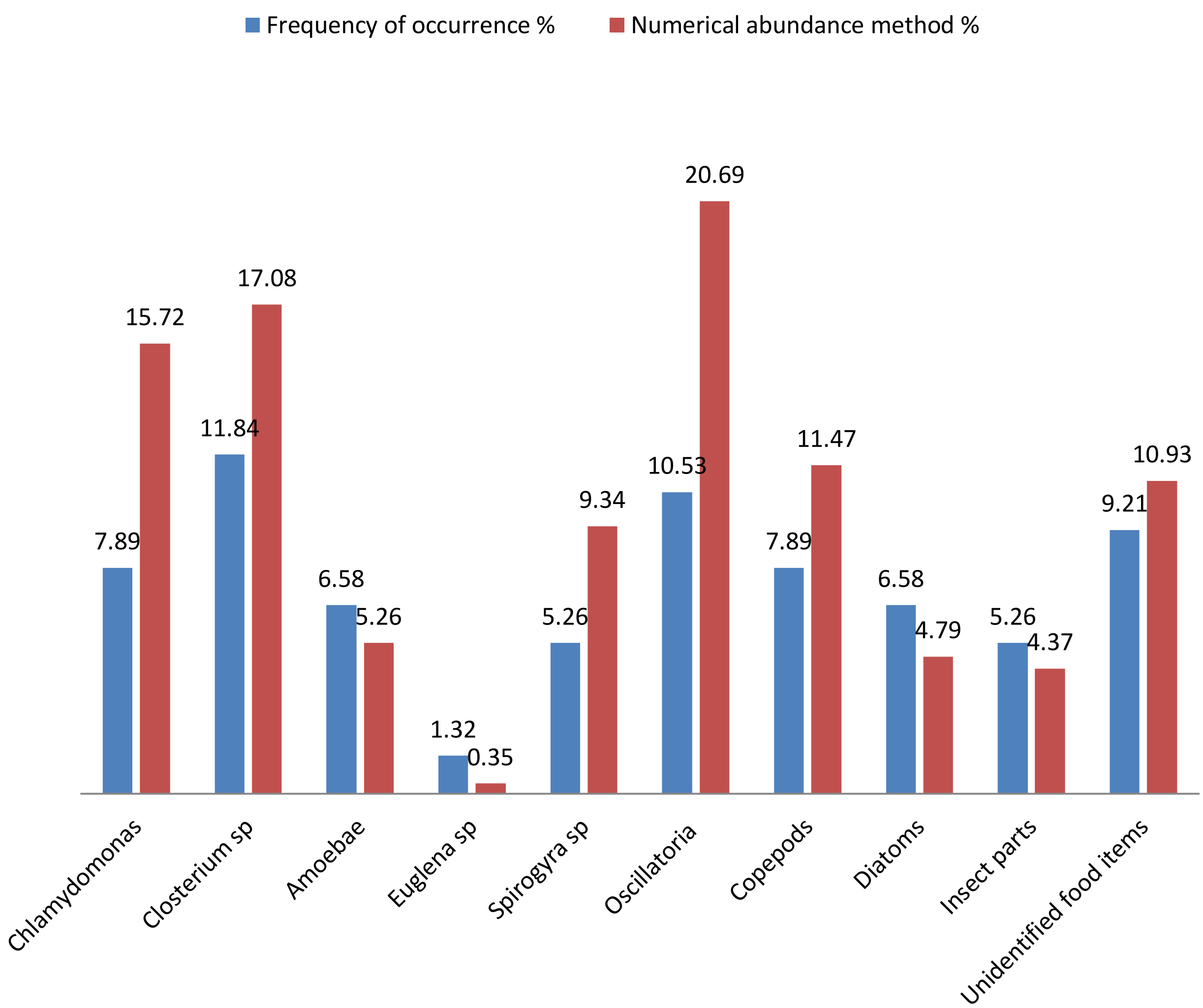

Fig 1: The food organisms of *O. niloticus* by Frequency of Occurrence and Numerical Abundance

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Table 1: Summary of the stomach contents of *O. niloticus* from Ero dam by Frequency of occurrence and Numerical Abundance method.

Food items	Frequency of Occurrence		Numerical abundance method	
	No	%	No	%
Green algae:				
Chlamydomonas	6	7.89	266	15.72
Closterium sp	9	11.84	289	17.08
Protozoa:				
Amoebae	5	6.58	89	5.26
Euglena sp	1	1.32	6	0.35
Filamentous algae:				
Spirogyra sp	4	5.26	158	9.34
Oscillatoria	8	10.53	350	20.69
Copepods	6	7.89	194	11.47
Diatoms	5	6.58	81	4.79
Insect parts	4	5.26	74	4.37
Unidentified food items	7	9.21	185	10.93

Table 2: Stomach fullness of *O. niloticus* from Ero dam in Ikun Ekiti

Stomach Fullness	Number of Fishes	% Fullness
0 (empty stomach)	8	9.52
¼	23	27.38
½	15	17.86
¾	21	25.00
Full	17	20.24
Total	**84**	**100**

Table 3: Mean condition factors for male, female and combined sex of *Oreochromis niloticus* from Ero dam.

Sex	Range	Mean $\pm$ SD
Male	3.15 - 4.71	3.837 $\pm$ 0.3662843
Female	3.16 - 4.37	3.782 $\pm$ 0.2875270
Combined sex	3.15 - 4.71	3.837 $\pm$ 0.3662843

DISCUSSION

Condition factor (k) is essentially a measure of relative growth and it is a good indicator for robustness and well being of the fish. In this study, there was no significant difference (P>0.05) in the condition factor 'k' in the male and female of *O. niloticus*. The males were observed to be larger than females. Lower "k" values indicate that fish are relatively growing in length more than in weight and have more elongate shape. However, k values in this study revealed that the species were in good condition which also agreed with the values reported by Akombo *et al.*, (2014) and Crab *et al* (2009) where it was stated that "k" values greater than 2 indicates good fish and culture conditions.

Food items identified in this present study were of plant and animal origin, suggesting that the fish was an omnivore. This assertion was supported by Malami *et al*., (2004) who worked on the feeding adaptations of ten fish species in River Rima North Western Nigeria. The variety of food organisms consumed by this species depended on their availability which also agreed with the works of Ogbeibu and Ezeunara (2005) who worked extensively on the food composition and feeding pattern of fish communities in the Ikpobia River Southern Nigeria. Food of plant origin was the main components of the diet of *O. niloticus* in this study, which is similar to the findings of Helguile *et al*., (2013) on *Tilapia zilli* and *T. guineenensis*. *O. niloticus* fed on similar food items during the dry and wet season except for the addition of *Euglena sp* during the rainy season which agrees with the findings of Komolafe and Arawomo (1998). Filamentous green algae and diatoms found to be prominent in the diet of *O. niloticus* were reported by Getachew *et al*., (1989) as food of *O. niloticus* in Lake Awassa, Ethopia. The general low numbers of zooplankton in the stomachs of *O. niloticus* could probably be attributed to turbidity of the lake water (Omondi *et al*., 2011) which could affect reduces the visibility of the predators and the feeding rhythms.

The overall result of gut fullness revealed that approximately 10% of the guts were empty, while varied quantities of food items were found in 90% of guts. The greater number of gut with food was attributed to good feeding strategy adopted by the specimens (Haroon, 1998) and probably due to food abundance during the season.

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