FOOD AND FEEDING HABITS OF *Tilapia guineensis* IN UREJE DAM, ADO EKITI, EKITI STATE, NIGERIA.

BY

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FAQ/12/0468

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NOVEMBER, 2017.

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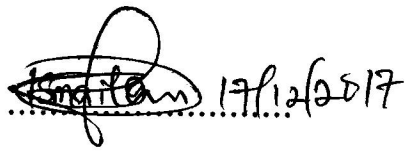
A PROJECT IN THE DEPARTMENT OF FISHERIES AND AQUACULTURE, FACULTY OF AGRICULTURE IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF DEGREE OF BACHELOR OF FISHERIES AND AQUACULTURE (B. FISHERIES AND AQUACULTURE).

FEDERAL UNIVERSITY OYE-EKITI, EKITI STATE.

DECLARATION

I hereby declared that the content of this work is a product of my own research effort, undertaken under the supervision of Prof. P.A. Araoye and has not been presented elsewhere for the award of degree. All sources have been duly distinguished and appropriately acknowledged.



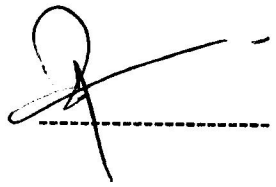
17/12/2017

OGUNREMI ISMAILA TOPE

FAQ/12/0468.

CERTIFICATION

This project has been read and certified as meeting the requirement of Faculty of Agriculture Federal University Oye-Ekiti for the award of bachelor of fisheries and aquaculture (B. Fisheries and Aquaculture).



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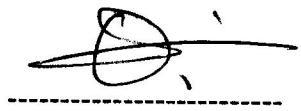
Prof. P.A. Araoye **Date**

(Project Supervisor)



27/02/2018

Dr. T.O Babalola **Date**

(Head of Department)

DEDICATION

This study is dedicated to almighty Allah for His numerous mercies and guidance over me from t he inception of the Research work to its completion.

I dedicate this Research work to my Parents Mr & Mrs Ogunremi who gave me all the moral and Parental support throughout the period of the Research work. I will also like to dedicate this work to my sister Ogunremi Kafayat and my brother Lasis Wasiu, for their prayer assistance and love which I enjoyed and their constant prayers which has been a source of inspiration and strength to my academic pursuit.

ACKNOWLEDGEMENT

I acknowledge the almighty Allah for being very faithful to me throughout the course of my study and this research project.

My appreciation goes to my project supervisor, Prof. P.A Araoye for his intellectual support given to me during the course of this study may Almighty Allah continue to increase your knowledge and your post Amen!.

My sincerely profound gratitude goes to the head of department of Fisheries and Aquaculture of Federal University Oye-Ekiti , Dr. Babalola for his intellectual and Fatherly assistance to me during the course of my studies. May God strengthening and boost you with prosperity in all ramifications.

I acknowledge the immeasurable efforts and fatherly assistance of my great lecturer Dr. Akinsorotan for standing me throughout the course of my studies. I acknowledge the commendable efforts of my lecturer Mr. Omobepade Bayode for priority attention given to me during my studies.

I acknowledge the effort and financial support of my Family most especially my parents Mr. Ogunremi Sulimon and Mrs. Ogunremi Ajibola and also my beloved brothers and sisters who are Ogunremi Muideen, Ogunremi Kafayat, Ogunremi Kazeem, Ogunremi Ganiyat and Lasis Wasiu.

My appreciation also goes to my bosom and enviable friends who assisted in my academics and moral support, they are Emmanuel Babatunde, Adeyemi Ayomide and my Course mates: Akinola Adedapo Michael, Olukayode Toyosi Lawrence, Rabiu Halimat, Odeyemi Kemisola Mary, Ajisodun Abimbola Funmilayo, Ogunmola Temiloluwa Peter, Alaka Damilola, Olatoye Dolapo, Omoniyi Samuel, Oyinloye Emmanuel, Alabi Abisola, Ojo Omowumi, Omisanmi Tosin, Nuhu Hauwa, Olaleye Oyindamola and Busari Olatorera.

Finally, my sincere appreciation goes to Jarham members most especially my Alfa Ismail the founder of Jarham for the emotional and physical support given to me during the course of my studies.

May Almighty Allah bless you all, your contribution in all ramifications is highly appreciated.

ABSTRACT

The study investigated the food and feeding habits of *Tilapia guineensis* in Ureje Dam, Ekiti State, Nigeria. A total of hundred (100) fish specimens were collected from artisanal fishermen at different stages of life, from July to August 2017, 56 specimens were male and 44 specimens were female in ratio 127: 1, respectively. They all examined for the stomach content analysis, frequency of occurrence and numeric method was used, using the gut content analysis. Frequency of occurrence showed that the most common food items were Algae with 26% follow by Diatoms 18%, Duck weed 14%, Detritus 11%, Cyanobacteria 11%, Dinoflagellates 9%, Worm 7%, and variety of other food items. Numeric method showed that the most common food items that were found are Algae with 25.33%, followed by Diatoms 18.18%, Cyanobacteria 14.39, Detritus, 12.99%, Duck weed 12.33%, Dinoflagellates 7.79%, Worms 5.8% and 2.60% of unidentified food items. Out of 56 males specimens 37% had full stomach, 12% had half stomach and 6% had empty stomach. Out of 44 females 7% had full stomach, 14% had half stomach and 4% had empty stomach. The result revealed that *Tilapia guineensis* as omnivorous fish and there was no significant difference in feeding habit of male and female specimens.

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CHAPTER ONE

1.1 INTRODUCTION

Fish is desirable and highly nutritive food. It is considered as a rich source of protein, calcium, phosphorous, vitamins, long-chain omega-3 polyunsaturated fatty acids DHA (Docosahexaenoicacid) and Eicosapentaenoic acid which are associated with many health benefits(Amany *et.al* 2016).

Tilapia guineensis is one of the most economic fish species and are among the most widel y produced fishes in the world, alongside other cichlids (Ozigbo E, 2014).

In Nigeria, fish consumption is particularly high among fishing communities and groups and other people with low capital income (Kawarazuka N, 2010).

Tilapia is an important food fish in many Tropical and subtropical countries including Nig eria. More than 20 species of tilapia have been cultured in developing countries where animal pro tein is lacking (Al Pilot, 2014).

Tilapia guineensis is considered suitable for culture because of their euryhaline, high toler ance to diverse environmental conditions, their relative fast growth and the ease with which they can be bred. It is widely distributed in Nigeria waters and second most abundant fish species (Ag babiaka, 2010).

Tilapias are among the easiest and the most profitable fish species due to their omnivorous diet, mode of reproduction and rapid growth (FAO, 2009). Tilapia aquaculture practices are however a rarity in Ekiti despite its great potentials.

Stomach content analysis provides important insight into fish feeding pattern the need arises to evaluate the food and feeding habits of the fish fauna with a view to establishing fresh water aquaculture. The food and feeding habits of fish will be continue to be studied because it

forms the basis of a good aquaculture management systems and quantitative assessment of food habits is an important aspect of fisheries management (Fayeofori, e*t all*) 2013.

Fish culture is assuming greater popularity as an alternative means to capture fisheries for increasing fish supply due to habitat degradation, over population and pollution of natural water bodies in developing countries including Nigeria (FAO, 2004; Singh *et al.*, 2007).

However, the scale of commercial fish culture is hampered by among other factors, the no n-availability of suitable and cost effective supplementary feed. Consequently most small-scale a nd home-stead fish farmers resort to the primordial practice of feeding with single ingredient feed s which are usually in meal or bran form (Nnaji *et al.*, 2010).

1.2 SCOPE OF STUDY

This research work is limited to food and feeding of *Tilapia guineensis* in Ureje Dam, Ado Ekiti, and Ekiti State Nigeria

1.3 AIM

This research work is aimed at determination, Evaluation, analysis and identification of food item and feeding habit of *Tilapia guineensis* in Ureje Dam Ado Ekiti.

1.4 OBJECTIVES

a) To determine food and feeding habit of *Tilapia guineensis* in Ureje Dam

b) To determine the intestinal length of *Tilapia guineensis* in Ureje Dam

1.5 JUSTIFICATION

To justify that food and feeding habit of *Tilapia guineensis* give clue to their nutrient requirement which contribute significantly to growth, survival and reproduction in their natural environment

1.6 SIGNIFICANT OF STUDY

This research provide scientific information about the food and feeing habit of *Tilapia guineensis* in Ureje Dam, Ado Ekiti and facilitate necessary information for interested people proposing to e ngage in *Tilapia guineensis* farming in Ekiti State and environs, as it gives basic information in f ormulating the fish diet in cultured fisheries.

CHAPTER TWO

2.0 LITRATURE REVIEW

2.1 IDENTIFICATION

The usual coloration of *Tilapia guineensis* is shiny, dark greenish yellow on the back and flanks becoming lighter in shade near the abdomen. The lower lip is white. The ventral part is usually white although in some specimens black and red coloration appears. All scales on the flanks have a black spot at the base. The anal fin is grey and the ventral fins are grey or black and marked by a white line in the anterior edge. The dorsal fin is gray or transparent with the black "tilapia" mark very prominent. The tail is bluish grey and banded with lighter colored spots and a distinctly shaded upper and lower portion.

Tilapia guineensis is closely related to *Tilapia zilli*. It is most easily differentiated from the latter by the mean number of spines in the dorsal fin (*Tilapia zilli* = 15; *Tilapia guineensis* = 16) and coloration (*Tilapia zilli* has two horizontal dark bands, *Tilapia guineensis* does not).

Philippart and Ruwet (2012) noted that *Tilapia guineensis* is geographically separated from other similar species (*Tilapia zilli*, *Tilapia rendalli*, *Tilapia tholloni, Tilapia congica*) and that they exclude each other.

2.3 **CLASSIFICATION**:

Phylum Vertebrata

Subphylum Craniata

Superclass Gnathostomata

Series Pisces

Class Teleostomi

Suborder Percoidei

Family Cichlidae

Genus Tilapia

2.4 **LIFE HISTORY**

2.5 **REPRODUCTION**:

Tilapia guineensis is a typical substratum spawner. There is a firm pair bonding with prolonged association, at least during one breeding cycle. The pair establishes a territory and both defend it. Inside the territory is a spawning nest. The nest consists of a series of holes, the form and dimensions varying considerably depending on the nature of the substrate and the size of the individual fish. In sandy clay soils, a typical nest will be in the form of a large basin, diameter 50 cm, with a series of holes leading from the bottom, each hole 10 to 15 cm in diameter with a maximum recorded depth of 1 meter (Legendre, 2003). It is not known if one or both of the sexes take part in building the nest.

When spawning, an area near one hole is cleaned of debris, and the female passes laying a single line of eggs. The male follows immediately and fertilizes them. The female then deposits another line, and the process continues until all eggs are spawned. The entire process takes any where from 5 to 15 minutes. When guarding the eggs, the black 'tilapia' mark disappears in the male but is retained by the female (Fryer and Iles, 2002).

Tilapia guineensis will easily spawn in aquaria, the eggs adhering to the glass. Fertilized eggs have also been observed attached to dock pillars and mangrove roots, particularly when the natural substrate is very soft mud. On the fish farm, in 100 m3 cages, feed bags were partially filled with sand and placed in the lower corners of the cage to retain the cubic form. Using the bag as a substrate, *Tilapia guineensis* couples spawned even at densities as high as 200 fish/m3 or 20,000 fish per cage.

2.6 **EGGS AND HATCHING:**

Hanon (2005) reports that the length of the egg is 2.7 mm and the larvae are 5 to 5.5 mm at hatching. In the Niger Delta, eggs measure 1 × 2 mm and the larvae are 5 to 6 mm at hatching.

The eggs are yellowish-green in color and adhesive. The eggs can be moved from hole to hole in the nest by the female. The female, and to some extent the male, guard and ventilate the eggs. As the fry hatch, the female removes them with her mouth and places them at the side of one or more of the holes in the nest where the young larvae remain attached through the use of the head gland.

At temperatures greater than 26 C the eggs hatch in two days and the yolk sac is absorbed 4 to 5 days later. The newly hatched fry weigh 1 to 2 mg.

Both parents continue to guard the fry after the yolk sac is absorbed and the fry begin actively feeding, although the exact length of time the association continues is unknown. The parents and brood will leave the nest and travel extensively in shallow water (less than 10 cm) where the fry begin feeding. Estimations based on the size of the fry captured with continuing parental care indicate that the care continues at least 10 days after re-absorbtion of the yolk sac.

2.7 **FECUNDITY**

Fecundity is defined here as the number of fry produced per spawn. The number of fry increases with increasing size of the female, although there is considerable variation per spawn. Using the number of eggs in the ovaries as an indication. Saeed (2008) found an exponential value of 2.5 for increasing fecundity with increasing total length. Campbell et. al. (2006) used actual fry counts from females of 8 to 5 cm standard length which were spawned in controlled concrete tanks. A linear relationship gave the best fit, with $Y = 219 \times - 1019.5$ ($r = 0.635$) where Y is the number of fry produced and × the standard length. There was a range of 200 to 3116 fry produced per spawn with an average value of 1355. Dadzie (2008) used hapas and fish of 30 to 66 g and found a range of 200 to 1532 fry with an average of 1202.

Issac-Harry (2006) investigated the various relationship between the number of eggs in the gonad, the gonad weight, the standard length and weight of the female, and the gonado-stomatic index. There was a significant correlation ($r = 0.5873$) between the number of eggs and the weight of the ovary as would be expected, and there was a negative correlation ($r = -0.384$) between the gonado-stomatic indeed and increasing standard length. There was a surprisingly random relationship between the number of eggs in the ovary and the standard length and weight of the female as well as the weight of the gonad and female weight.

2.8 SPAWNING FREQUENCY

With a relatively stable water temperature greater than 26 C and if the fry are removed from the female as soon as the yolk sac is absorbed or 6 to 7 days after spawning, the female will spawn again in as little as 3 weeks (Issac-Harry, 2006). The number of fry can be either more or less in subsequent spawns. If two females are stocked in a hapa with one male, the male will breed at 10 to 14 day intervals with both females (Dadzie, 2008)

It is probable that in the extreme northern range of the species that lower temperatures during certain seasons will increase the spawning interval, and there may be definite spawning seasons under these conditions. In most of its range, it spawns the year around.

2.9 SIZE AT FIRST MATURITY:

Legendre (2003) under culture conditions in enclosures found first sexual maturity in females of 154 mm fork length. In brackish water ponds in the Niger Delta, first maturity begins at 25 to 35 g (standard length 8 to 9 cm). However, specimens from the wild in the Nigeria Delta will spawn at smaller sizes (10 to 15 g). One individual female actually spawned viable eggs in an aquarium at 8.5 g.

2. 10 HABITAT DESCRIPTION

Tilapia guineensis generally prefer shallow, vegetated areas in a tropical climate but will live over sand, mud, or rock; tolerating a range of pH between six to nine. While temperature between 20 to 32 degrees Celsius are optimal for *Tilapia guineensis* it can tolerate temperature between 11 to 36 degrees Celsius, becoming lethargic and vulnerable to predators and disease below 16 degrees Celsius. Mostly occurring in freshwater, Tilapia *guineensis* are often found in brackish water and

has occasionally been reported to be found in marine waters; tolerating salinity levels up to 29-45ppt9 (Costa Pierce, 2003; FishBase, 2008; GSMFC, 2005).

2.11 FEEDING HABITS

2.11.1 LARVAE AND FIRST FEEDING

First feeding is defined as the transitional phase where the larvae shift from the yolk sac to external sources of nourishment. Feeding habits and preferences of larvae T. guineensis at this stage are poorly understood. Whereas other tilapia species at first feeding will accept and digest either zooplankton or plant material (Bodganova, 2007) and there is usually no problem at this stage using artificial compound feeds, this is not the case with T. guineensis. Poor success using compound feeds has discouraged several workers. Legendre (2003) noted a heavy mortality at first feeding using a mixture of egg yolk, powdered molk, and vitamins. In the Niger Delta, there was a poor survival with a variety of mixtures using crab meal, powdered molk, and powdered cereal baby rood. Although survival rates are not available, growth was very poor using other artificial diets (see Table I). These same or very similar formulae are often used successfully with other species of tilapia, indeed other genera of fishes (Legendre, 2003, Campbell, unpubl.).

The only available data on first feeding **using** natural feeds comes from fish that have been held in some kind of captivity, either aquaria or concrete tanks out of doors.

Table 1: **GROWTH RATES OF TILAPIA GUINEENSIS FRY**

Initial weight (mg)	Final weight (mg)	Period (days)	Growth rate (mg/day)	Feeding	Source
5	17	30	0.4	aquaria, 38.5% protein diet	(NIOMR, 2011)
5	28	30	0.76	aquaria, 30.5 % protein diet	(NIOMR, 2011)
5	13.5	30	0.28	Aquaria, egg yolk	(NIOMR, 2011)
2	500	60	8.3	circulating water tanks, egg yolk, powdered milk, vitamins	(Legendre, 2003)
2	83 – 172	30	2.5 – 5	aquaria, crab meal, powdered milk, baby food	(Idoniboye-obu, unpubl.)
5	500 – 700	30	16 – 23	circular tanks, 26 % protein diet	(Campbell, unpubl.)
2	400 – 800	30	13 – 26	6 m3 outdoor concrete tanks, heavily fertilized	(Mahatane, 2006)
2	2,160	16	135	fertilized ponds (chicken manure)	(Campbell, unpubl.)
2	6,000	45	133	fertilized ponds (brewers waste)	(Aleem, unpubl.)
30	7,900	45	174	ponds, 30 % protein diet	(Dadzie, 2008)

In these cases, survival is poor (5 to 50 %) and gut analysis was inconclusive as the stomachs were either empty or contained the algae most prevalent in the container at the time of stocking. There was however 100 % survival when large numbers of mosquito larvae were present, both in the container and stomachs. A survival rate of 60 to 80 % with good growth (Table I) were found when the larvae were stocked in a previously fertilized pond (Aleem, unpubl.).

It would appear then that the larvae of T. guineensis require a more specific food at first feeding, probably zooplankton of a particular size range. In practical aquaculture terms, the difference in the results obtained from pond rearing the larvae and all other attempts using artificial feeds is so striking that for now, it appears that ponds are necessary for successful and efficient rearing of this species at this life stage.

2.10.2 FRY AND JUVENILES

In the estuaries of Sierra Leone, Payne (2008) reported that the fish of less than 6 cm in length fed on algae, and principally filamentous blue greens which they are able to digest. In brackish water ponds in the Niger Delta receiving only inorganic fertilizers, fish of 1.1 to 5.5 cm standard length are benthic feeders showing a strong preference for rotifers (Limnia, Pholidina, Branchionus sp.). They also fed on copepod nauplii, small (2 to 5 micron) benthic diatomes, and detritus (Mahatane, 2006).

2.10.3 ADULTS

Apparently the adults of the species consume and are able to digest a variety of natural and artificial feeds. Cisse (2005) considers the fish a benthic grazer, and these results are confirmed from stomach analysis in the Niger Delta (Mahatane, 2006). However, Payne (2008) found adults feeding on decaying leaves in the estuaries in Sierra Leone, and this author considered this

species the only true estuarine leaf chewer (Payne, 2008). Fagade (1971) found the fish feeding on algae, detritus, sand, and invertebrates in the Lagos Lagoon. Philippart and Ruwet (2012) considered the species to be macrophagous. One can only conclude that T. guineensis is an opportunistic feeder, apparently able to consume and digest a variety of food items. The stomach pH values are extremely low; 1.0 to 3.7 with 75% of the observations being less than 2.0. A pH value of less than 2 will considerably help in the digestion of algae and bacteria (Payne, 1978). The fish has been observed actively eating holes in the leaves of the aquatic weed Nynphea lotus.

Fayeofori *et al* (2013) reported that Food and Feeding Habits of *Tilapia guineensis* in Rumuolumeni Creek, Niger Delta. The results indicate that the juveniles of Tilapia guineensis feed mainly on zooplankton while the adult fish depend more on aquatic plants and invertebrates. Fish samples were obtained between May and October 2009 from artisanal fishermen. Fishing gear used includes cast nets; gill nets and cane traps. A total of 565 juveniles and 465 adults were examined. The result of the findings in this study indicate that the dominant food items for *Tilapia guineensis* juveniles at the Rumuolumeni Creek, Niger Delta, Nigeria are rotifers (Brachuoius spp, Limnia spp, and Pholidina spp), 19.17, 14.38, 15.97 percent respectively. Cyannobacteria and benthic diatoms 17.57% and 11.18% respectively are also important. Other food items of some relevance include detritus/mud 9.58% and copepod nauplii 7.99% . The gut-content analysis of the adult T. guineensis using the 'points method revealed the dominant food item as decaying aquatic leaves 30.77% and detritus/mud 19.23%.

2.11 **ARTIFICIAL FEEDS**

Juveniles and adults accept any variety of artificial feeds under a variety of forms and presentations. The fish will readily accept hard or soft pellets, feed in ground and powdered form, as a wet mash, or simply in the unconditioned state of an agricultural by-product. They feed actively on the surface or bottom of ponds and generally accept the feed as soon as they are aware of its presence.

CHAPTER THREE

3.0 MATERIAL AND METHODS

3.1 MATERIAL USED

The materials used are: Meter rule, Weighing balance, Microscope, Dissecting kit, 4% formalin and identification guides.

3.2 STUDY AREA

The study areas, Ureje Dam lies at Longitude 005^0 18`25.87"E and Latitude $07^0$ 36` 23.82"N (Olowe kayode. et al 2015)...

3.3 SAMPLE COLLECTION AND MORPHOMETRIC MEASUREMENT

The Tilapia guineensis species used in the study were purchase from artisanal fishermen in Ekiti State water works fish market, Ureje Ado Ekiti. The Fishing gears used are gill net and drag net, during the period of investigation which lasted from July to August 2017. A total of one hundred specimens were collectively used during the course of this study. The sex of each specimen were Identified and the specimen were identify using identification guide for fresh water fish in Nigeri a (Udodo Umeh).

3.4 LABORATORY ANALYSIS

The specimen were brought to the Federal University Oye Ekiti Laboratory Ikole campus. Basic Morphometric measurement such as total length (from the tip of the snout to the tip of the tail fin) using calibrated meter rule in centimeter. standard length (from the tip of the snout to the beginn ing caudal fin) using calibrated meter rule in centimeter, intestinal length using calibrated meter r ule in centimeter, body weight and intestinal weight using electric sensitive weighing balance. Th e stomach of each specimen were removed and preserved in 4% of formalin in sample bottle for f

urther examination with a microscope using x4, x10 and x40 objective for identification. The con tents of the stomach were empty into separate perti dishes and were analyzed immediately using l ight microscope examination.

3.5 METHODS OF ANALYSES

Analysis was done using frequency of occurrence and numerical method.

Frequency of occurrence of feed items: This can be calculated as total number of stomach that have the particular food item divided by the total number of stomach multiply by one hundred. It simply means occurrence of items in the total stomach in percentage.

$$\text{F.O} = \frac{\text{Total number of stomach with particular food items}}{\text{Total number of stomach}} \times 100$$

Numerical method: This involves the counting of individual food item present in the stomach of a fish divided by the total number of food items.

$$\text{N.M} = \frac{\text{Total number of each food item}}{\text{Grand total of food item}} \times 100$$

CHAPTER FOUR

4.1 RESULTS

One hundred (100) specimens of *Tilapia guineensis* were principally used for investigation. Fifty six (56) specimens were male and 44 specimens were female. Out of 56 male specimens, 37 specimens were full stomach, 12 specimens were half stomach and 6 specimens were empty stomach. Out of 44 female specimens, 27 specimens were full stomach, 14 specimens were half stomach and 4 specimens were empty stomach. The percentage index of full stomach was 64, percentage index of half stomach was 26 and the percentage of empty stomach was 10. The stomach index in relation to sex of *Tilapia guineensis* was presented in table 2.

The result of the research findings in this study indicated that the dominant food items eaten by *Tilapia guineensis* in Ureje dam are Algae 25.33%, followed by Diatom 18.18, Duck week 12.34%, Detritus12.99%, Cyanobacteria 14.94%, Dinoflagellate 7.79%, Worm5.84%, and 2.60% variety of unidentified food item (show in table 3).

The result of the research findings in this study indicated that the dominant food items eaten by *Tilapia guineensis in* the ureje dam Ado Ekiti, Ekiti State Nigeria are Algae with 26% follow by Diatom 18%, Duck weed 14%, Detritus 11%, Cyanobacteria 11%, Dinoflagellate 9%, Worm 7%, and 4% variety of unidentified food items using frequency of occurrence (show in table 4).

This research work similar to Fayofori (2013) on Food and Feeding Habits of *Tilapia guineensis* in Rumuolumeni Creek, Niger Delta, the following are the result of the study rotifers (Brachuoius spp, Limnia spp, and Pholidina spp), 19.17, 14.38, 15.97%, benthic diatoms 11.18%, cyanobacteria 17.57% , with detritus/mud 9.58% and copepod nauphii 7.99% as minors and further corroborated by that of and Agbabiaka (2012) Food And Feeding Habits Of Tilapia Zilli In River Otamiri South

Eastern Nigeria, showed that vegetative matter ranked highest with value of 15.70%,followed by algae, invertebrate larvae, fish scales, plant seeds and annelids having values of 8.82, 11.76, 11.52, 10.52, and 7.89 percent respectively. This result show *Tilapia guineensis* is omnivorous predator fish.

However, as a result of research finding using descriptive statistic show that the lowest body weight is 43.40g and the highest body weight is 134.50g, the lowest body length is 13.70 cm and the highest is 18.90 cm, the lowest intestinal length is 40.00 cm and the highest intestinal length is 79.50cm, the lowest intestinal weight is 3.20g and the highest intestinal weight is 9.90g, (presented in table 5).

Moreover, the result of research finding also show the condition factor of *Tilapia guineensis* in Ureje Dam Ado Ekiti, the lowest condition factor in male is 1.60 and the highest is 4.90, the result also show the condition factor of the female, the lowest condition factor is 0.86 and the highest is 2.72 (still in table 5). This result show that the male *Tilapia guineensis* are in good condition, good fitness and wellbeing than female *Tilapia guineensis*, this can be as a result of food availability, age, more energy are used for reproduction in female or fishing pressure. But both male and female have good condition factor greater than 1 but some female did not have good condition factor and it can be as a result of the factors stated above.

The result of Correlation Matrix of Some Morphometric Parameters of Male *Tilapia guineensis* collected from Ureje Dam, Ekiti State, Nigeria, show that there is perfect relationship between the Morphometric parameter of male *Tilapia guineensis*, the relationship between body length and body weight is 1.00, and finally the relationship between intestinal length and intestinal weight is 0.53 which is moderate relationship, (shows in table 6). This means that as the body length

increases the body weight increase, intestinal length increases and finally intestinal weight also increases. All shows linear relationship with respect to stages of life and age.

The result of Correlation Matrix of Some Morphometric Parameters of Female *Tilapia guineensis* collected from Ureje Dam, Ekiti State, Nigeria, show that there is perfect relationship between the Morphometric parameter of female *Tilapia guineensis,* the relationship between body length and body weight is 1.00, and finally the relationship between intestinal length and intestinal weight is 0.82 which is moderate relationship (shows in table 7). This means that as the body length increases the body weight, intestinal length increases and finally intestinal weight also increases. All shows linear relationship with respect to stage of life and age.

The result of Length and Weight relationship of Male *Tilapia guineensis* collected from Ureje Dam, Ekiti State, Nigeria. Show that the Regression fit Body length = 12.30 + 0.05 Body Weight indicated that body length depends on body weight by 73.6% and the Regression fit Intestinal length = 1.73 + 0.07 Intestinal Weight indicate that intestinal length depends on intestinal weight by 27.7% (shows in figure 1, 2, and table 8 respectively).

The Length and Weight relationship of Female Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria show the Regression fit Body length = 10.40 + 0.07 Body Weight indicated that body length depends on body weight by 69% and the Regression fit Intestinal length = -5.19 + 0.17 Intestinal Weight indicate that intestinal length depends on intestinal weight by 67% % *(shows in figure 3, 4 and table 9respectively).*

Table 2: **Determination of stomach index in relation to sex** Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria

	Male	Female	Combined Sex
Number Examined	**56**	**44**	**100**
Percentage of full stomach	**37**	**27**	**64**
Percentage of half stomach	**12**	**14**	**26**
Percentage of empty stomach	**6**	**4**	**10**

Table 3: Numerical method showing the percentage of food item in the stomach conteint contained in the stomach of Tilapia guineensis collected from Ureje Dam.

Food item	Number of food item	% of neumeric methgod
Algae	39	25.53
Diatoms	28	18.18
Detritus	20	12.99
Cyanobactaria	23	14.94
Worm	9	5.84
Duck weed	19	12.34
Dinoflagellate	12	7.79
Unidentified food item	4	2.6
Ground total	154	100

Table 4: **Frequency of occurrence method showing the food item in the stomach content contained in the stomach of** *Tilapia guineensis collected from Ureje Dam, Ekiti State,*

Food item	Number of stomach	% of occurrence
Algae	26	26
Diatom	18	18
Detritus	11	11
Cyanobacteria	11	11
Worm	7	7
Duck weed	14	14
Dinoflagellate	9	9
Unidentified food item	4	4
Grand total	100	100

Frequency of occurrence method

$$F.O = \frac{\text{Total number of stomach with particular food items}}{\text{Total number of stomach}} / \times 100$$

Table 5: **Descriptive statistic of male and Female Tilapia guineensis from ureje Dam** *collected from Ureje Dam, Ekiti State, Nigeria*

	Male		Female		Mean ± S.E		T- Stat	
Parameters	**Minimum**	**Maximum**	**Minimum**	**Maximum**	**Male**	**Female**	**T-ratio**	**P-value**
Body Weight (g)	**43.4**	**134.5**	**44.3**	**156**	**81.12 ± 3.06[a]**	**84.36 ± 3.20[a]**	**0.83**	**0.41**
Body Length (cm)	**13.7**	**18.9**	**44.3**	**26.3**	**17.15 ± 0.21[a]**	**16.94 ± 0.30[a]**	**0.55**	**0.59**
Intestinal Length (cm)	**40**	**79.5**	**44.3**	**91.4**	**65.98 ± 1.46[a]**	**64.05 ± 1.62[a]**	**0.86**	**0.4**
Intestinal Weight (g)	**3.2**	**9.9**	**44.3**	**13.5**	**6.45 ± 0.19[a]**	**6.00 ± 0.34[a]**	**1.18**	**0.24**

Stomach Length (cm)	1.5	4.6	44.3	6.3	2.80 ± 0.99[a]	2.81 ± 0.13[a]	0.4	0.97
Stomach Weight (g)	1.36	2.22	44.3	5.9	1.73 ± 0.03[a]	3.24 ± 0.18[b]	-7.96	0
Condition Factor (gcm^{-1})	1.6	4.9	44.3	2.72	3.47 ± 0.13[b]	1.75 ± 0.05[a]	13.27	0

Table 6: Correlation Matrix of Some Morphometric Parameters of Male *Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria*

Parameters	*Body Weight (g)*	*Body Length (cm)*	*Intestinal Length (cm)*	*Intestinal Weight (g)*
Body Weight (g)	**1.00**			
Body Length (cm)	**0.86**	**1.00**		
Intestinal Length (cm)	**0.82**	**0.78**	**1.00**	
Intestinal Weight (g)	**0.63**	**0.60**	**0.53**	**1.00**

Table 7: Correlation Matrix of Some Morphometric Parameters of Female *Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria*

Parameters	*Body Weight (g)*	*Body Length (cm)*	*Intestinal Length (cm)*	*Intestinal Weight (g)*	*Stomach Length (cm)*	*Stomach Weight (g)*
Body Weight (g)	**1.00**					
Body Length (cm)	**0.83**	**1.00**				
Intestinal Length (cm)	**0.82**	**0.80**	**1.00**			
Intestinal Weight (g)	**0.77**	**0.73**	**0.82**	**1.00**		

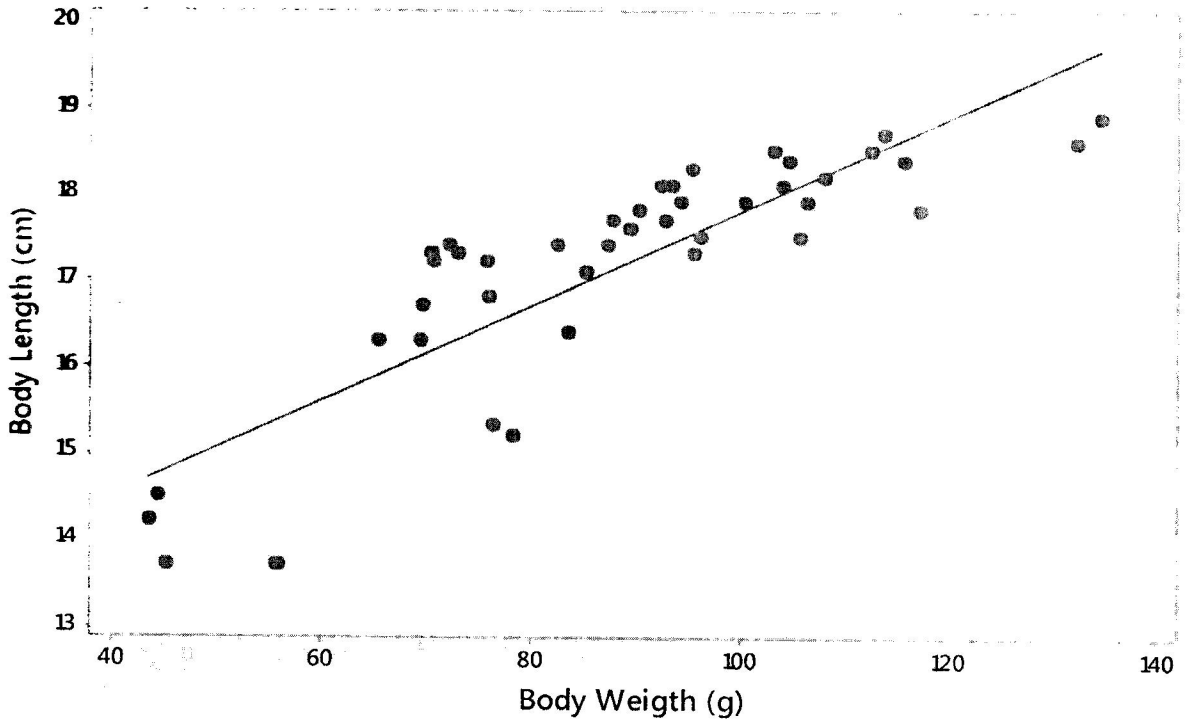

Figure 1: **Body Length and Weight relationship of Male Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria**

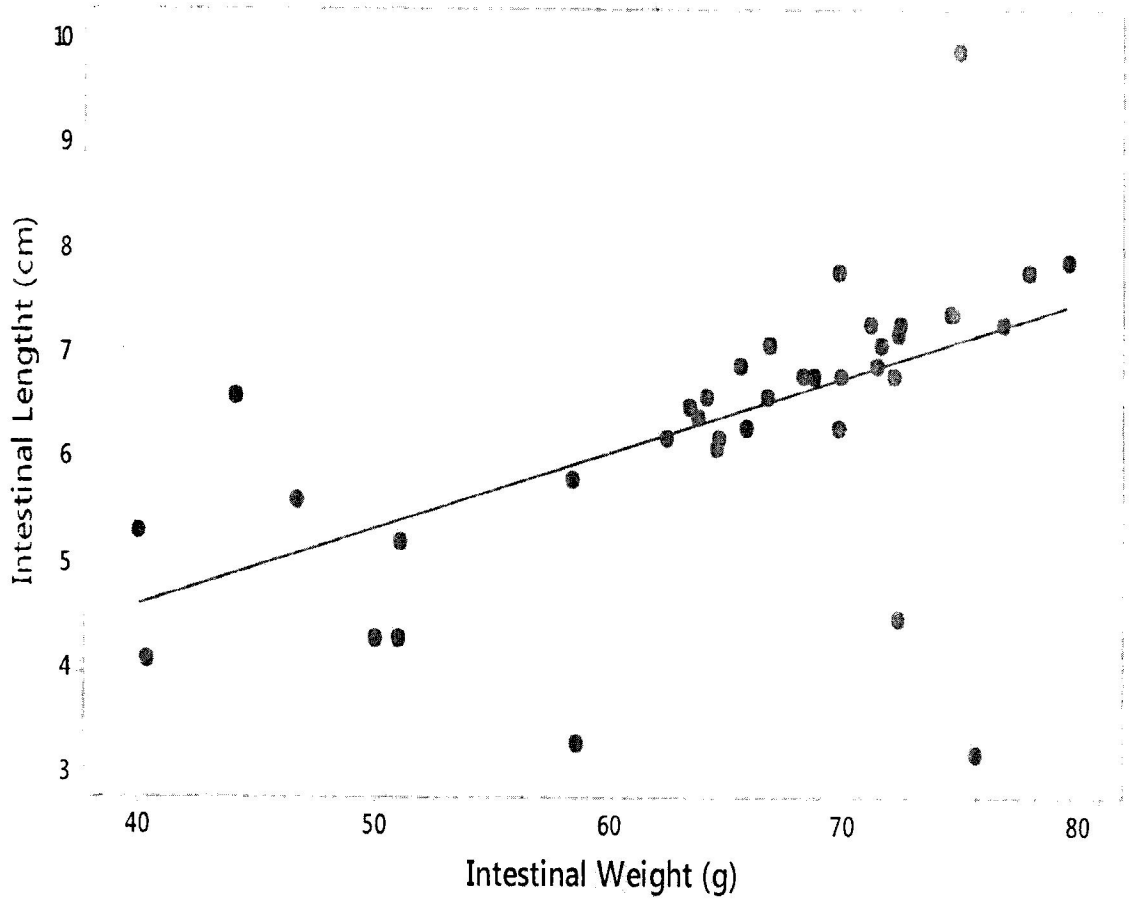

Figure 2: **Intestinal Length and Weight relationship of Male Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria**

Table 8: Length and Weight relationship of Male Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria

Parameters	*A*	*b*	*R*	R^2
Body Length / Body weigh	*12.30*	*0.05*	*0.86*	*0.73*
Intestinal Length / intestinal Weigh	*1.73*	*0.07*	*0.53*	*0.27*

Equations

Regression fit Body length = 12.30 + 0.05 Body Weight

Regression fit Intestinal length = 1.73 + 0.07 Intestinal Weight

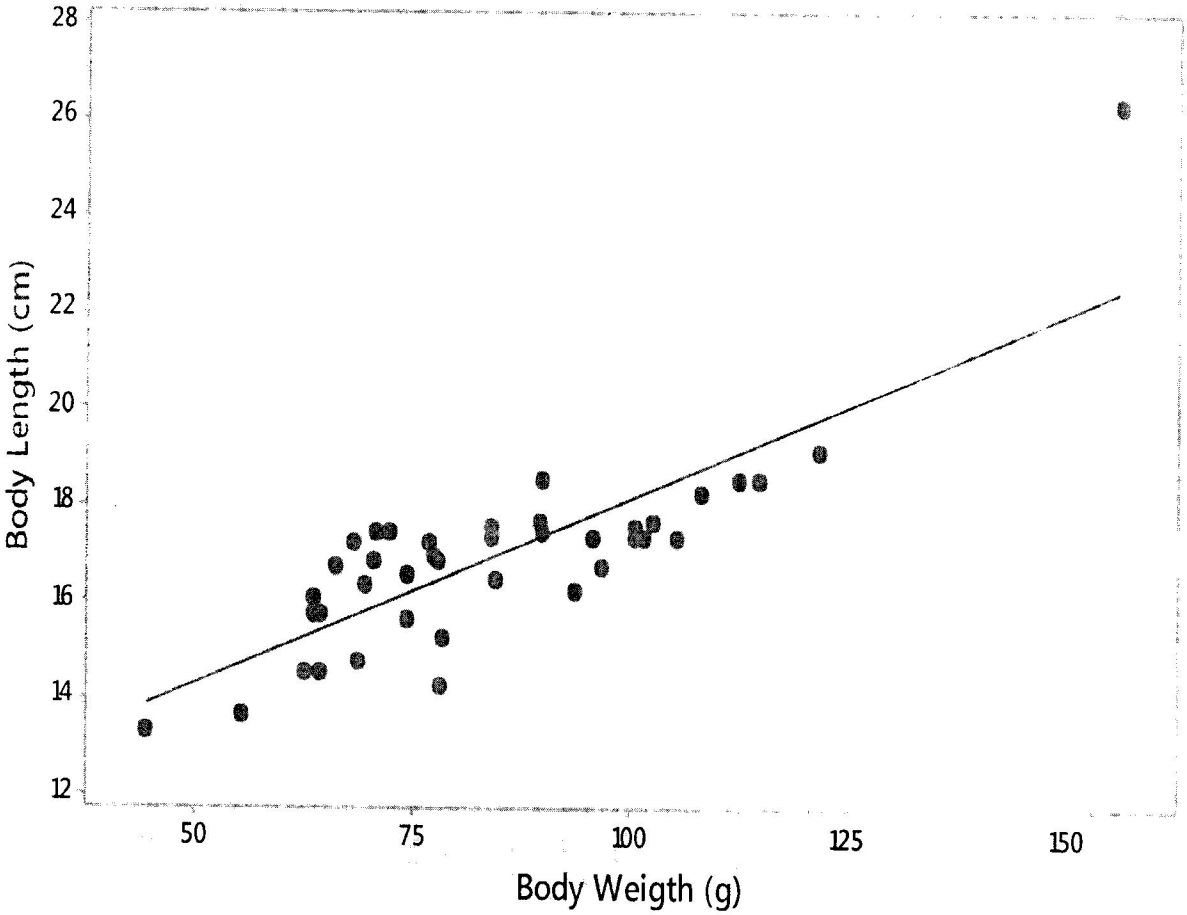

Figure 3: **Body Length and Weight relationship of Female Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria**

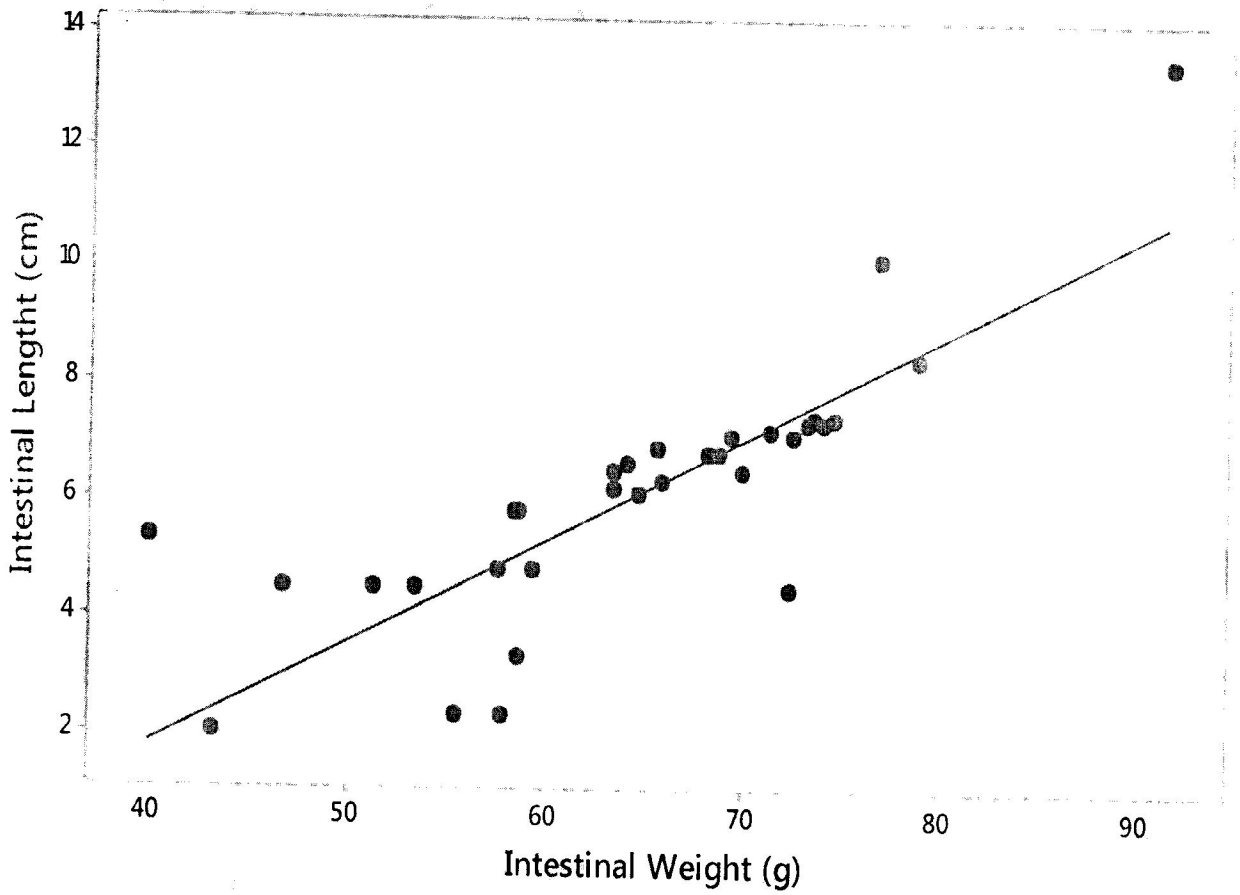

Figure 4: **Intestinal Length and Weight relationship of Female Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria**

Table 9: Length and Weight relationship of Female Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria

Parameters	*A*	*b*	*r*	R^2
Body Length / Body weigh	*10.40*	*0.07*	*0.83*	*0.69*
Intestinal Length / intestinal Weigh	*-5.19*	*0.17*	**0.82**	*0.67*

Equation

Regression fit Body length = 10.40 + 0.07 Body Weight

Regression fit Intestinal length = -5.19 + 0.17 Intestinal Weight

4.2 DISCUSSION

The research on food and feeding habit indicated that there is availability of food during the month April – August due to rainfall that supported the growth of phytoplankton and zooplankton. The stomach index of full stomach was relatively higher than the index of half and empty stomach where are 64%, 26% and 10% respectively. There is availability of live food during this period and there is no introduction of supplementary feed. The content of food item in their stomach is much more which implies higher availability of zooplankton and phytoplankton in ureje dam.

As the result of this research, dominant food items are Algae with 26% follow by Diatom 18%, Duck weed 14%, Detritus 11%, Cyanobacteria 11%, Dinoflagellate 9%, Worm 7%, and 4% variety of unidentified food items. This indicated that Tilapia guineensis is omnivorous fish because the research shows that it feed on both plant and animal source. This study is also comparable to earlier reports by Fayeofori *et al* (2013), whose study investigated the food and feeding habit of a brackish water fish *Tilapia guineensis* in the Rumuolumeni Creek of the Niger Delta, Nigeria. His findings indicated that the juveniles of *Tilapia. guineensis* feed mainly on zooplankton while the adult fish depend more on aquatic plants and invertebrates.
It is opined that this mode of feeding could give an insight in feed formulation for intensive culture of *Tilapia guineensis*.

According to the study using mathematical analysis, the lowest condition factor in male is 1.60 and the highest is 4.90, the result also show the condition factor of the female, the lowest condition factor is 0.86 and the highest is 2.72. This result show that the male Tilapia guineensis are in good condition, good fitness, good management and wellbeing than female Tilapia guineensis. Thus this can be as a result of food availability, more energy are used for

reproduction in female or fishing pressure. But both male and female have good condition factor greater than 1.

It is important to determine the relationship between the Morphometric parameter, the study shows that there is perfect relationship between the Morphometric parameter of male *Tilapia* guineensis, the correlation coefficient between body length and body weight is 1.00, the correlation coefficient between intestinal length and intestinal weight is 0.53 which is moderate correlation. Never the less there is perfect correlation between the Morphometric parameter of female Tilapia guineensis, the relationship between body length and body weight is 1.00, the correlation between intestinal length and intestinal weight is 0.82 which is moderate correlation. This means that as the body length increases the body weight increase, stomach length increases, stomach weight increase, intestinal length increases and finally intestinal weight also increases. The interactions between the Morphometric parameters show that there is a moderate linear relationship between the parameter with respect to stages of life and age.

Regression fit Body length = 12.30 + 0.05 Body Weight indicated that body length depends on body weight by 73.6%, the Regression fit Intestinal length = 1.73 + 0.07 Intestinal Weight indicate that intestinal length depends on intestinal weight by 27.7%, the Regression fit Stomach length = 1.55 + 0.69 Stomach Weight also indicate that stomach length depends on stomach weight by 39% (shows in figure 1, 2, 3 and table 6 respectively). The Length and Weight relationship of Female Tilapia guineensis collected from Ureje Dam, Ekiti State, Nigeria show the Regression fit Body length = 10.40 + 0.07 Body Weight indicate that body length depends on body weight by 69%, the Regression fit Intestinal length = -5.19 + 0.17 Intestinal Weight indicate that intestinal length depends on intestinal weight by 67% .