

FOOD AND FEEDING HABITS OF *Tilapia dangeti* FROM SEBORE RESERVOIR, MAYO-BELWA, ADAMAWA STATE NIGERIA

*^{1,6}Yusuf, Z. A., ²Newton, M., ³Sanni, K. N., ⁴Lawal, R. O., ¹Yusuf, J. K., ¹Kwala, G. J., ¹Khalid, A. I. and ⁵Ubangari, M. A.

¹Department of Fisheries and Aquaculture, Federal University of Lafia, Nasarawa State, Nigeria

²Department of Fisheries Technology, Federal College of Horticulture, Dadin-Kowa, Gombe State, Nigeria

³National Biotechnology Research and Development Agency, Abuja, Nigeria

⁴National Biotechnology Research and Development Agency, Oka-Akoko, Ondo State, Nigeria

⁵Department of Agronomy, Federal University of Lafia, Nasarawa State, Nigeria

⁶Department of Applied Ecology, Abubakar Tafawa Balewa University, Bauchi State, Nigeria

*Corresponding author: zecology@yahoo.com; +2347032144462

ABSTRACT

This study was aimed at investigating the food and feeding habits of *Tilapia dangeti* in Sebore reservoir, Mayo-Belwa, Adamawa State Nigeria. A total of 84 specimens of *T. dangeti* were sampled monthly for a period of a year. Fishing was done using gill nets as the fishing gear and canoe was used as fishing craft. The fish specimens were washed with clean water and preserved in ice chest to minimize any post-mortem changes and taken to the laboratory for analysis of the stomach contents based on standard methods. The random samples of the stomach contents were studied and recorded. The contents of each of the samples were analysed using numerical method (NM) and frequency of occurrence method (FO). Results indicated that 53.57% had their stomach full with food while 42.86% were observed to have a half-filled stomach with 3.57% observed to have empty stomachs. In the NM: phytoplankton were the dominant and composed of 74.32% of the group of food items in the stomach, bottom organisms made up 20.24%, while crustacean were the least with 5.44%. In the FO: phytoplankton were dominant cumulatively followed by detritus and while the least was crustaceans. Based on the findings of this research, *T. dangeti* can be concluded to be specifically phytoplanktivorous, detritivorous, and crustacivorous feeder and could be broadly classified as either omnivorous or herbivorous bottom feeders.

Keywords: *Tilapia dangeti*, Sabore Reservoir, Phytoplanktivore, Detritivore, Crustacivore omnivorous

INTRODUCTION

Tilapia fish is a popular food fish that is widely consumed in Nigeria (Adebayo et al., 2020). It is a freshwater fish that is native to Africa and the Middle East (Ajibolade et al., 2021). *Tilapia dangeti* is a valuable source of protein and other nutrients, and it is relatively cheap to produce (Okunola et al., 2022). The importance of *T. dangeti* as food fish for both subsistence and commercial fisheries cannot be over emphasised.

The food and feeding habits of many wild fish species of commercial values have been studied has is a basic step towards domestication of such fish. Abdulkarim et al. (2018) linked feeding habits in terms of stomach contents analysis of *Clarias gariepinus* to condition factor as practical approach of justifying the use of mathematical models. Tesfaye et al. (2020) studied the food and feeding habits of juvenile and adult Nile *Tilapia* in Lake Ziway, Ethiopia. Yusuf et al. (2024) studied the composition and relative abundance of Ichthyofauna in Sebore reservoir, Nigeria; similarly, Ali et al. (2024) studied the feeding habits of African Butter Catfish (*Schilbe mystus*) of Sebore reservoir. However, this study is aimed at studying the food and feeding habits of *T. dangeti* in Sebore reservoir as there is relative paucity of literature on feeding habit of this particular species compared to Nile *Tilapia*.

MATERIALS AND METHODS

Study Area

Sebore Reservoir is located at Mayo-Belwa local government area (LGA), Adamawa state Nigeria. Mayo-Belwa LGA lies within latitude 9° 3' 0" north and longitude 12° 3' 0" east. It covers an area of 1768km² (682.63 sq. m) and is 75 km away from Yola, the state capital.

Sample Collection

A total of 84 specimens of *T. dangeti* were sampled monthly for a period of one year. Fishing was done using gill nets as the fishing gear and canoe was used as fishing craft. The fish specimens were washed with clean water and preserved in ice chest to minimize any post-mortem changes and taken to the laboratory for analysis of the stomach contents.

Laboratory Analysis of Sample

The specimen body cavity was opened using a pair of scissors, beginning ventrally from the anus to the mouth, the entire visceral and intestinal organs such as the liver, fat and other organs attached to the intestine and stomach were gently removed and emptied into a dish, the length and weight of the stomach were measured and recorded. Thereafter, the visceral and intestinal organs were kept in formalin solution of about four percent (4%) to avoid any form of deterioration and contamination of the stomach contents. The stomach contents were dissected using a pair of scissors and the complete stomach contents were emptied into petri-dish for examination and identification based on the work of Yusuf et al. (2023). The random samples of the stomach contents were taken and dropped on a slide (counting chamber) with the aid of a dropping pipette and viewed under a light microscope. The general views were made with a binocular dissecting microscope Olympus SZ51 (0.80 – 4x). The stomach contents were studied and recorded. The stomach contents of each of the samples were analysed using the numerical and frequency of occurrence methods as described by Balogun (2006).

In the numerical method (NM), the number of individual food item in each food category was expressed as a percentage of the total individuals in all food categories:

$$NM (\%) = \frac{\text{Total no. of a particular food item}}{\text{Total no. of all the food items}} \times 100 \quad (1)$$

In the frequency of occurrence method (FO), all stomach containing food were recorded and expressed as the percentage of the total number of stomachs examined:

$$FO (\%) = \frac{\text{No. of stomach with a particular food item}}{\text{Total no. of fish examine with food in the stomach}} \times 100 \quad (2)$$

Statistical Analysis

Data collected were analysed using descriptive statistics and the models above.

RESULTS AND DISCUSSION

Results from the 84 specimens of *T. dangeti* collected from the Sebare reservoir indicated that 45 specimens representing 53.57% had their stomach full with food, while 36 individuals representing 42.86% were observed to have a half-filled stomach and 3 individuals representing 3.57% were observed to have empty stomachs (Table 1). The relative contributions of the food items are expressed by the numerical and frequency of occurrence methods. Three major groups of food items constituted the diet of *T. dangeti* from Sebare reservoir. In the numerical method, phytoplankton were the dominant and composed of 74.32% of the group of food items in the stomach, bottom organisms made up 20.24%, while crustacean were the least with 5.44%. In the frequency of occurrence method detritus were dominant and found in 72.83% of the stomach, followed by *Spirogyra spp.* in 59.26%, while the least was *Phacus spp.* in 24.69% (Table 2).

Table 1: Stomach Fullness of *T. dangeti*. from Sebare Reservoir

No. of full stomach	Percentage of full stomach	No. of half stomach	Percentage of half stomach	No. of empty stomach	Percentage of empty stomach
45	53.57%	36	46.86%	3	3.57%

The outcome of the stomach contents of *T. dangeti* analysed corroborates the findings of Agbabiaka (2012) and Rini (2013) who reported that Tilapia fish have varying food in its gut and switching feeding behaviour as habit. Houehanou et al. (2016) reported that cichlids explore more than one sources of food, this ability to utilize different varieties of food makes *T. dangeti* omnivorous in nature. However, phytoplankton had the highest percentages (Table 2) followed by detritus thereby corroborating the work of Rao (2017) that reported that cichlids fed mainly on detritus and plant materials. The least dominant food items were crustaceans in this research. He et al. (2015) also reported high degree of overlap in diet of fishes from the same community.

Table 2: Stomach Contents of *T. dangeti* from Sebore Reservoir

Food items	Numerical method		Frequency of occurrence method	
	Number of Items	Percentage (%)	Number of stomachs	Percentage (%)
Bottom organism:				
Detritus	639	20.24	59	72.83
Crustacean:				
Ostracod	172	5.44	26	32.09
Phytoplankton:				
<i>Anabena spp.</i>	218	6.90	29	35.80
<i>Aphanocorpsa spp.</i>	249	7.89	34	41.98
<i>Chlorella spp.</i>	286	9.06	38	46.91
<i>Closterium spp.</i>	210	6.66	26	32.09
<i>Diatomella spp.</i>	106	3.36	23	28.40
<i>Flagerllaria spp.</i>	310	9.82	41	50.61
<i>Oscillatoria spp.</i>	208	6.59	26	32.09
<i>Phacus spp.</i>	103	3.27	20	24.69
<i>Spirogyra spp.</i>	392	12.41	48	59.26
<i>Synerdia spp.</i>	118	3.74	24	29.63
<i>Taballeria spp.</i>	146	4.62	26	32.09

CONCLUSION

Based on the findings of this research, *T. dangeti* can be concluded to be specifically phytoplanktivorous, detritivorous, and crustacivorous feeder and could be broadly classified as either omnivorous or herbivorous bottom feeders.

REFERENCES

- Abdulkarim, M., Yusuf, Z. A., Misau, A. B., Garba, A. M. & Mahmood, S. (2018). Realistic Interpretation of Condition Factor with Stomach Content Analysis of *Clarias gariepinus* in Gwallaga River, Bauchi – Nigeria. *Nigerian Journal of Fisheries*, 15 (2):1440 –1443.
- Adebayo, O. A., Adebayo, O. O., & Adeyemi, O. R. (2020). Stomach contents and index of food significance of *Oreochromis niloticus* (L.) in Egbe Reservoir, southwestern Nigeria. *Journal of Applied Ichthyology*, 36(6): 1061-1068.
- Agbabiaka, L. A. (2012). Food and feeding habits of *Tilapia zilli* (Gervais) in Kainji Lake, Nigeria. *International Journal of Biological and Chemical Sciences*, 6(3): 1529-1534.
- Ajibolade, O. O., Adeleke, M. A., & Fagbenro, O. A. (2021). Stomach contents and index of food significance of *Oreochromis niloticus* (L.) in River Niger, northern Nigeria. *International Journal of Fisheries and Aquatic Sciences*, 20(2):1-8.
- Ali, M. E., Yusuf, Z.A., Bara'atu, A., Isah, Z., Hassan, S. K., Yusuf, S. K., Bala, H. and Danzaria, A. (2024). Feeding Habits of African Butter Catfish (*Schilbe mystus*, Linne, 1758) of Sebore Reservoir, Mayo – Belwa, Adamawa State, Nigeria. In: O. S. Olubode, M. O. Agbogidi, A. C. Ogunkunle and A. Ejikeme (Eds): Wetland Ecosystems: Hotspots for Biodiversity. The Proceedings of the Annual Conference of Ecological Society of Nigeria held at Delta State University, Abraka, Delta State, Nigeria. 5th – 9th May, 2024. Pp. 110 – 115
- Balogun, J. K. (2006). *Basic fisheries biology and management for tertiary institutions*. Published by Ayo – Sule (Nig.) Printers and Publishers, Zaria. Pp. 88.
- He, A. Y., Ning, L. J., Chen, L. Q., Chen, Y. L., Xing, Q., Li, J. M., Qiao, F., Li, D. L., Zhang, M. L., Du, Z. Y. (2015). Systemic adaptation of lipid metabolism in response to low- and high-fat diet in Nile tilapia (*Oreochromis niloticus*). *Physiological Reports* 3(8): e12485.
- Houehanou, M. A. G. G., Alphonse, A., Sossoukpe, E. (2016). Feeding Ecology and Establishment of the Naturally-Colonized Freshwater Cichlid, *Sarotherodon galilaeus* (Pisces: Actinopteri: Perciformes) from a Man-Made Lake, South-Benin, *West Africa. Natural Resources*, 7(6):337-355.
- Okunola, O. O., Ajiboye, T. O., Adebayo, O. O., & Adewumi, G. O. (2022). Stomach contents and index of food significance of *Oreochromis niloticus* (L.) in Lekki Lagoon, southern Nigeria. *Fish Biology and Fisheries*, 32(2): 227-236.
- Rao. K. R. (2017). Food and feeding habits of freshwater catfishes (*siluriformes: Bagridae: Mystus sp.*). *International Journal of Life Science Scientific Research*, 3(1):786-791.
- Rini, B. (2013). Analysis on the Feeding Habit of Tilapia (*Oreochromis niloticus*) Cultured in Silvofishery Pond in Semarang. *Journal of Environment and Ecology*, 4(2):12.

- Tesfaye, A., Fetahi, T. & Getahun, A. (2020). Food and feeding habits of juvenile and adult Nile tilapia, *Oreochromis niloticus* (L.) (Pisces: Cichlidae) in Lake Ziway, Ethiopia *Ethiop. J. Sci.*, 43(2): 88–96.
- Yusuf, S. K., Yusuf, Z. A., Danzaria, A., Bonjoru R., Salisu, A. S. Inah, N. U., Remkyes, M. S., Yakubu, M., Useni, S. S., Bala, H. and Ali, M. E. (2024). Composition and Relative Abundance of Ichthyofauna in Sebore Reservoir, Mayo-Belwa, Adamawa State, Nigeria. In: O. S. Olubode, M. O. Agbogidi, A. C. Ogunkunle and A. Ejikeme (Eds): Wetland Ecosystems: Hotspots for Biodiversity. The Proceedings of the Annual Conference of Ecological Society of Nigeria held at Delta State University, Abraka, Delta State, Nigeria. 5th – 9th May, 2024. Pp. 101 – 105
- Yusuf, Z. A., Bara'atu, A. and Ali, M. E. (2023). The food and feeding habits of *Heterotis niloticus* (Cuvier, 1829) of Sebore reservoir, Mayo - Belwa, Adamawa State, Nigeria. *Proceedings of the Ecological Society of Nigeria (ECOSON)*. Pp. 282 – 286.