

Tsegay T^{1*}, Natarajan P² and Zelealem T¹

¹Tigray Agricultural Research Institute (TARI), Mekelle, Ethiopia

²Ambo University, Department of Biology, Ambo, Ethiopia

Abstract

A study was conducted to investigate the biochemical composition and diet type of Nile tilapia (*Oreochromis niloticus*) collected from Tekeze reservoir and Lake Hashenge, Ethiopia between December, 2014 and March, 2015. A size. The stomach contents were analyzed using frequency of occurrence and numerical methods. The food items in the stomach covered a wide variety, ranging from various types of phytoplankton to zooplankton and macrophytes. The food composition of *O. niloticus* major food items in terms of frequency of occurrence collected from the stomach of *O. niloticus* in Tekeze reservoir were Pediastrum (68.85%), Microcystis (60.45%), Peridinium (59.70%) and Staurastrum (41.56%) and from Lake Hashenge were Daphnia (63.12%), Copepods spp (56.90%), Nauplii (52.11%), and Macrophytes (45.56%). The contribution of zooplankton (Daphnia, copepods and Nauplii) was higher in case of Lake Hashenge but Pediastrum spp., Microcystis spp. and Peridinium composition such as crude protein, crude fat, moisture, ash, carbohydrate and some minerals. The chemical analysis 15.31-16.32% of wet weight. The crude fat content and ash ranged between 1.20 and 2.45, 0.81 and 1.16% of the K>Na>Ca>Mg>P>Fe>Zn>Cu>Mn. This investigation is an important measure towards the data needed to create information of the relationship between food type and biochemical composition. As the present study revealed that the

Keywords: Daphnia; Food items; Lake Hashenge; Nile tilapia; proximate composition

Introduction

Nile tilapia (*Oreochromis niloticus*) [1] is widely distributed in tropical and subtropical Africa in the Volta, Gambia, Senegal, Niger Rivers and the Nile River basin and is native to Lakes Chad, Tanganyika, Albert, Edward, and Kivu [2,3].

Ethiopia has relatively large area of inland water bodies that contain diverse aquatic ecosystems giving great scientific interest and economic importance. There are different economically and ecologically

*Corresponding author: Teame T, Tigray Agricultural Research Institute (TARI), Mekelle, Ethiopia, Tel: (+251) 34 440 2801; E-mail: tsegayteam331@yahoo.com

Received December 24, 2015; Accepted February 22, 2016; Published March 15, 2016

Citation: Tsegay T, Natarajan P, Zelealem T (2016) Analysis of Diet and Biochemical Composition of Nile Tilapia (*O. niloticus*) from Tekeze Reservoir and Lake Hashenge, Ethiopia. J Fisheries Livest Prod 4: 172. doi: 10.4172/2332-2608.1000172

Copyright: © 2016 Tsegay T, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Citation: Tsegay T, Natarajan P, Zelealem T (2016) Analysis of Diet and Biochemical Composition of Nile Tilapia (*O. niloticus*) from Tekeze Reservoir and Lake Hashenge, Ethiopia.

reservoir were mostly phytoplankton and in case of Lake Hashenge zooplankton were the most abundance food items. The types of food items found in the stomachs of *O. niloticus* collected from Tekeze reservoir were different from the stomach content of fish collected from Lake Hashenge in type and abundance. In addition to zooplankton and phytoplankton, detritus and aquatic macrophytes were also considerable importance in the diet of *O. niloticus* due to some nutritional benefits. Several authors have provided similar interpretations about the importance of detritus and macrophyte in different parts of Africa [2,29]. In the present study, proportion of phytoplankton was higher from the stomach of *O. niloticus* collected from Tekeze reservoir. The stomach content proportion of the fish collected from Lake Hashenge was higher in zooplankton than in phytoplankton. The composition differences and relative contribution of food items may partly explained by difference in habitat occupied of the fish.

Proximate composition of Nile tilapia

The proximate composition of the muscle of *O. niloticus* was estimated and presented in Table 3. Data on moisture, crude protein, crude fat, ash and carbohydrate content were expressed as percentage composition. The proximate composition of the fillet of *O. niloticus* collected from the two water bodies showed significant difference ($P < 0.05$). This variation may be many possible factors such as size, sex, maturity of samples and sampling locations that can affect the differences in proximate composition of fish [30].

Sex has no significant ($P > 0.05$) effect in the proximate composition (moisture, ash, crude fat, crude protein and carbohydrate) of the fish species collected from the two water bodies. Moisture content among the fish species was observed between 77.55 and 79.83%. The results showed that there was significant difference ($P < 0.05$) in the moisture content of the fish species collected from the two water bodies. The moisture content of male fishes was higher than the female fishes within the species even though they were not statistically significant ($P > 0.05$). This result was in line with the results of Edirisinghe, et al [30]. Results obtained from the moisture analysis of the fish species collected from the two water bodies showed that the fish samples, *O. niloticus* from Tekeze reservoir, which was locally harvested in large quantities had the highest percentage of moisture content (79.83 ± 0.34 for male and $79.11 \pm 0.14\%$ for female) than *O. niloticus* from Lake Hashenge had the lowest moisture content ($77.55 \pm 0.22\%$ for female and $77.69 \pm 0.39\%$ for male). This shows that, *O. niloticus* from Hashenge have concentrated nutrients than *O. niloticus* from Tekeze Reservoir which agreed with the report of Egbal et al. [31] between *O. niloticus*. Zmijewski et al [32] found a reverse correlation between the fat and water content to be common among fish species, and it was in line with the present result in sorf for [31].

FAO [33] moisture and lipid contents in fish fillets are inversely related. The percentage range of the moisture content of fish muscle was within the acceptable level (60%-80%) in all the samples which could be due to the stable water levels in the environmental location where the fish were collected [34]. In this study, the moisture content of male fish was higher than the female fish, and this may be due to the higher level of organic materials in females [35]. In connection with this work different researchers have reported that moisture content of male fish was higher than the female fish [36,37].

The content of crude protein of the fish species collected from the two water bodies ranged between 15.32 and 16.32%, which was in the range of permissible limit (15-28%) for fish and fisheries products, and the protein content of female *O. niloticus* from Hashenge was higher (16.32 ± 0.30%) and male *O. niloticus* from Tekeze reservoir showed significantly lower ($p < 0.05$) protein content (15.32 ± 0.28%) [38]. Alemu et al. [23] reported that the protein content of male and female *O. niloticus* collected from Zeway was 14.5 and 14.6% respectively which was lower than the result of present study. Higher crude fat and protein content in *O. niloticus* collected from Lake Hashenge may

that remains after the organic matter has been burnt off. The highest ash content was recorded from *O. niloticus* collected from Tekeze reservoir (1.16% in male) and lowest value from female *O. niloticus* from Lake Hashenge (0.81%). Similar values of ash have also been reported by Alemu et al. [23] for *O. niloticus* Lake Ziway. Results of Job et al. [1] are in disagreement with the present results in the ash content of *O. niloticus* which was lower (0.57%).

The carbohydrate content ranged between 1.22% for female *O. niloticus* and 1.61% for male *O. niloticus* from Tekeze Reservoir. The results observed for carbohydrate showed no significant difference ($p > 0.05$) within fish species collected from the two water bodies (Table 3).

The biochemical composition of tilapia varies considerably depending on growing conditions (temperature, dissolved oxygen, pH, salinity, turbidity, altitude, light or luminosity, among other factors)

53. Alli M, Salam A, Igbal F (2001) Effect of environmental variables on body