PROXIMATE COMPOSITION OF NILE TILAPIA (*Oreochromis niloticus*) (Linnaeus, 1758) AND TILAPIA HYBRID (RED TILAPIA) FROM OYAN LAKE, NIGERIA

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Abstract

The aim of this study was to determine and compare the proximate composition of Oreochromis niloticus and hybrid Tilapia, from Oyan Lake. Parameters proximate composition which includes protein, lipid, ash and moisture content were estimated. The average moisture content for O.niloticus was in range of 81.11 to 81.67% and 80.01 to 80.17% for hybrid Tilapia. %. Results revealed that there was a significant difference in the mean protein values of O.niloticus and hybrid tilapia with the females of the two fish species were observed to have significantly higher ($p < 0.05$) crude protein content than their male counterparts. The fat content values were low but significantly different ($p<0.05$) between the hybrid Tilapia and O.niloticus. Ash content ranged from 1.24 to1.48% for the O.niloticus and 1.30 to 1.24% for the hybrid Tilapia.

Keyword: Protein, fat, moisture, ash, hybrid Tilapia, *Oreochromis niloticus*

Introduction

Tilapia (Family Cichlidae) have been important source of food for man at least since recorded history began (Fryer and Iles, 1972).The Nile tilapia, *Oreochromis niloticus* is an important fish in the ecology of tropical and sub-tropical region including Nigeria. It is the most popular species of the bony fish in Africa (Abdel *et al*., 2007; Offem *et al*., 2007). Tilapias represent an important freshwater species of fish for aquaculture in different regions of the world. They are characterized by fast growth, adaptability to a wide range of environmental variables, disease resistant and high flesh quality. They have the ability to reproduce under varying culture conditions and readily convert food low in plant protein to high quality flesh (El-Sayed, 2006). However, the real constraint to profitable fish farming is 'its profile breeding, resulting into overpopulation and stunted growth. In an attempt to solve the problems and raise fish production, several hybrids and variants resulting from various selective breeding has been developed over the years. Currently, Nile tilapia *Oreochromis niloticus* and various hybrids are the most commonly produced tilapine species (Green, 2006).These hybrids are expected and often generate higher productivity and are more sought after than it original variant by fish farmers.

One of the fish species that have benefited from hybrid development is Nile tilapia otherwise referred to as *O. niloticus*. *Nile* Tilapia (*O. niloticus*) has various variants including the 'Red tilapia'. The genetic heritage of red tilapia is generally attributed to the crossbreeding of mutant reddish-orange *O. mossambicus* (a normally black/grey species) with other species, including *O. aureus*, *O. niloticus*, and *O. hornorum* (Kuo, 1984). 'Red Tilapia' is a blend that is appreciated by consumers not due to colouration (as against silvery –grey or black –coloured) but on account of large size.

It is necessary to determine the proximate composition of hybrid fish varieties and strains, and compare it with it's original variant. This can only be answered through the proximate analysis, that is the concentration of macro and micro-nutrients in fish carcass in relation to their counterparts (Dempson *et al*., 2004).The aim of this study was to determine and compare the proximate composition of *O. niloticus* with Tilapia hybrid

Materials and Methods

Fish samples of pure breed Nile tilapia (*O. niloticus*) and hybrid Tilapia (red tilapia) constituted the main materials for the study. The fish samples were sourced from fishers in Oyan dam at various landing sites. Samples were kept in ice, transported immediately to the Department of Fisheries laboratory, Olabisi Onabanjo University, College of Agricultural Sciences, Ayetoro, Ogun State. Upon arrival, the samples were weighted, measured and separated into male and female. All samples were washed thoroughly and homogenized by taking only meat portion (fillet) used in human consumption excluding head and innards to determine crude protein, total lipid, dry matter and ash content. Crude protein was detected

by Kjeldahl method (Matissek *et al.*, 1989) while total lipid was determined according to the method described in AOAC (2000) and each analysis was carried out in triplicates.

Statistical Analysis

Data were subjected to analysis of variance (ANOVA) and mean comparison was carried out using Duncan's test. Statistical analysis was performed with SPSS 15.0. Significance was established at $P<0.05$.

Results

Total Length and body weight of O. niloticus and Hybrid Tilapia

The average length of sampled fish ranged between 30.37 to 30.64cm for *O. niloticus* and 30.13 to 31.18cm for hybrid Tilapia while the average weight of *O. niloticus* ranged between 513.0 to 523.88g and weight of hybrid Tilapia ranged from 539.66 to 566.33g (Table 1).

Proximate composition of *O. niloticus* and Hybrid Tilapia

Table 2 shows the proximate composition of two tilapia species populations from Oyan Lake. The average moisture content for *O. niloticus* was in range of 81.11 to 81.67% and 80.01 to 80.17% for hybrid Tilapia. These values were found statistically not significant (p>0.05). The results showed variation in the values of crude protein obtained with female hybrid tilapia had the highest value of 16.14 % followed by female *O. niloticus* (14.26%), male hybrid Tilapia (13.73%) and male *O. niloticus* (13.25%). Results revealed that there was a significant difference in the mean protein values of *O. niloticus* and hybrid tilapia with the females of the two fish species were observed to have significantly higher (p<0.05) crude protein content than their male counterparts. The crude protein content of hybrid Tilapia was higher than the crude protein content of *O. niloticus,* irrespective of the fish sexes. The fat content values were low but there was significantly different (p<0.05) between the hybrid Tilapia and *O. niloticus*. The fat content showed no significant difference (p>0.05) between male and female in each species. Ash content ranged from 1.24 to1.48% for the *O. niloticus* and 1.30 to 1.24% for the hybrid Tilapia.

Discussion

The values obtained for proximate composition on the *O. niloticus* and hybrid tilapia during the study agreed with the findings of Suzuki(1981) who reported that the main constituents of fresh fish are water (65-80%), protein (15-24%), fat (0.1-22%), carbohydrate (1-3%) and inorganic substances (0.8-2%). The moisture contents values ranged from 81.11 to 81.11% in *O. niloticus* and the values in hybrid Tilapia ranged between 80.01 and 80.17% .The moisture content values are similar to those reported by Afolabi *et al.* (1984). The crude protein content of hybrid Tilapia was higher than the crude protein content of *O. niloticus,* irrespective of the fish sexes. The females of *O. niloticus* and hybrid Tilapia were observed to have significantly higher (p <0.05) crude protein content than their male counterparts. This is not surprising as nutritional value of the freshwater fish has been reported to differ between species, sexes, sizes, season and geographical localities (Zenebe *et al.*, 1998). El-Zaeem (2011) reported that, genetically modified *O. niloticus* was significantly higher in protein and fat contents when compared with the other non-transgenic genotypes of tilapia (*O. niloticus, O. aureus* and their reciprocal hybrid). The results of crude protein contents in both fish species were lower than those reported by Fawole *et al.*, (2007) and Olopade *et al.*, (2013); however, it was similar to El-Hawarry (2012) who obtained 11.32% and 9.8% in O. niloticus and hybrid (O. aureus × O. niloticus). The fat contents of the hybrid tilapia ranged from 0.55% to 0.64% while that of the *O. niloticus* ranged between 0.49% and 0.58%.The finding in this research disagrees with the results of Garduno-Lugo et al. (2003), who reported that the lipid content in red hybrid tilapia (Florida red Tilapia x Stirling red *O. niloticus*) fillets (0.33%) was significantly lower (P>0.05) than that of the stirling Nile tilapia fillets (2.07%). Ash content values ranged from 1.24 to1.48% for the *O. niloticus* and 1.30 to 1.24% for the hybrid Tilapia.

Conclusion

The fat and protein content of a fish is a crucial factor to evaluate the nutritional condition. The proximate composition of *hybrid Tilapia* meat is similar to that of *O. niloticus*, but the hybrid contains a slightly higher protein and lower lipid contents than the *O. niloticus*.

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Table 1: Total Length and body weight of *O. niloticus* and Hybrid Tilapia

Variables	*O. niloticus*		Hybrid Tilapia	
	Male	Female	Male	Female
Length (Cm)	30.64±2.09	30.37±1.63	30.13±1.05	31.18±1.25
Weight (g)	523.88±64.40	513.0±16.31	539.66±41.41	566.33±26.35

Means with the same letter within rows are not significantly different ($p > 0.05$).

Table 2: Proximate composition of *O. niloticus* and Hybrid Tilapia.

Variables	*O. niloticus*		Hybrid Tilapia	
	Male	Female	Male	Female
Moisture %	81.11±2.76	81.67+1.66	80.17+2.82	80.01+2.50
Crude protein %	13.25+1.79^{c}	14.26+2.48^{d}	13.73+1.11^{a}	16.14+0.89^{b}
Crude fat %	0.57+0.07^{b}	0.50+0.08^{b}	0.56+0.05^{a}	0.63+0.02^{a}
Ash %	1.24+0.15	1.48+0.39	1.42+0.21	1.30+0.22

Means with the same letter within rows are not significantly different ($p > 0.05$).