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NUTRITIONAL COMPARISON OF CAPTURED *Clarias gariepinus* AND *Oreochromis niloticus*

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Abstract: *Nutritional comparison was done between two fresh water fish species including Clarias gariepinus and Oreochromis niloticus so as to establish the fish with better nutritional quality among the two fish species. Three replicates of each species was slaughtered and taken to the laboratory for proximate analysis. A total of 6 live Clarias gariepinus and Oreochromis niloticus weighing 700.0 $\pm$ 7.0g and 130 $\pm$ 5.0g respectively were used. Three freshly slaughtered fish of each sample were selected for proximate composition. Clarias gariepinus was superior to Oreochromis niloticus with crude protein composition of 16.375% which is significantly ($P < 0.05$) different from that of Oreochromis niloticus which is 14.328%. Clarias gariepinus lipid is also significantly ($P < 0.05$) different from that of Oreochromis niloticus with Clarias gariepinus having lipid of 2.033% and Oreochromis niloticus having 1.298% lipid. There was also significant ($P < 0.05$) difference in the moisture content between the two fish species with Oreochromis niloticus having the highest moisture content of 78.325% and Clarias gariepinus having moisture content of 75.085%. However, there was no significant ($P < 0.05$) difference in their ash content. This study shows the superiority of C gariepinus over O niloticus thus the current trend where C. gariepinus is the most cultivated fish species in Nigeria should be sustained.*

Keywords: Nutritional comparison, captured fish, *Clarias gariepinus*; *Oreochromis niloticus*;

1.0 Introduction

The global consumption of fish and derived fish products has greatly increased during recent decades (Wim *et al.*, 2007). Change in consumer trend could be based on a number of distinct factors; foremost among these is the growing knowledge that fish constitute an important and healthy part of the human diet, mainly owing to the presence of ω-3 polyunsaturated fatty acids (PUFA),which play an essential role in human health (Ruxton *et al.*, 2004), but also to the presence of vitamins, minerals and proteins with a high biological value. Consequently, it is a well-known fact that fish represent a high-quality nutritional source (Sidhu, 2003). Fish demand is also increasing as a result of the increasing world population, higher living standards and the good overall image of fish among consumers (Cahu *et al.*, 2004). Fish as a whole has a lot of food potential and can therefore be expected to provide relief from malnutrition, especially in developing countries (Ashraf *et al.*, 2011). It provides superior quality protein to that of meat, milk and eggs and well balanced essential amino acid profile, necessary minerals and fatty acids (Hossain, 1996). In addition to the fact that, fish flesh is tasty and highly digestible; it also minimizes the risk of heart diseases and increases life expectancy (Ashraf *et al.*, 2011). Fish like other animals requires variety of different nutrients in sufficient quantities to flourish and maintain other bodily functions (Ashraf *et al.*, 2011). It can synthesize some but not all the essential nutrients which need to be provided from outside sources. Cultured fish is provided with nutrient rich foods in addition to natural productivity in the pond. Captured fish on the other hand has to depend totally on natural food for its sustenance. These variations have direct bearing on body composition, health status and growth of fish. Body composition is therefore, a true reflector of its feeding habits and type of food availability (Ashraf *et al.*, 2011). Tadros *et al*. (2005) reported that major percentage of lysine is found in fish fillets. Hoffman *et al*. (1994) studied the anatomical heterogeneity of sharp tooth catfish, *Clarias gariepinus*, in the percentage of amino acids like glycine, alanine, proline and hydroxylproline. Their concentration increased from anterior to posterior of fish body along the

musculature. Importance of understanding the body composition of fish in relation to growth and reproduction has long been recognized. Proximate composition is used as an indicator of fish quality; it varies with diet, feed rate, genetic strain and age (Austreng and Refstie, 1979). A few quantitative studies have also indicated that body constituents and energy resources vary with seasonal life cycles (Puwastien *et al.*, 1999). Catfishes of the family Claridae comprise the most commonly cultivated fishes in Nigeria (Adewumi and Olaleye, 2011) while Bakir *et al.* (1993) reported that *Sarotherodon galilaeus, Oreochromis niloticus* and *Tilapia zilli* as well as *Clarias gariepinus, Clarias angullaris* and *Heterobranchus longifilis* which belong to the families, Cichlidae and Clariidae respectively are among the species of freshwater fish that are mostly utilized in aquaculture, especially in the developing world.

Thus the need for the use of Clarias and Tilapia species in this study. Consumers' perceptions of fish quality influences fish demand and prices (Trondsen *et al.*, 2003), there is therefore the need to carry out the nutritional comparison of *Clarias gariepinus* and *Oreochromis niloticus* been part of the most cultured fish species in Nigeria so as to identify the nutritional differences between the two fish species so as to enlighten the consumers and nutritionists about the fish with better nutritional quality among *Clarias gariepinus* and *Oreochromis niloticus* species.

2.0 Materials and Methods

Six fish samples including three *Clarias gariepinus* and *Oreochromis niloticus* each were bought by 8am at Eleyele fish landing site Ibadan Oyo State Nigeria. These fishes were chosen because they were the fish just landed by the artisanal fishermen on the day of this experiment; they are usually available, cheap and affordable by Nigerians. They were transported within one hour in a cooler made from Polyethylene terephthalate (plastic) and packed with iced block; they were taken to the fish processing laboratory of Federal College of Animal Health and Production Technology Moor Plantation Ibadan Oyo State Nigeria. They were gutted, thoroughly washed using clean tap water, the head region was discarded. Three replicates of each fish species were randomly selected for proximate analysis.

Proximate Determination

The moisture content was obtained by the difference between the fresh and the dry weight of the samples, dried at 105±1^{o}C until constant weight (AOAC, 1990). The proteins were determined through Kjeldahl method and the fat by Soxhlet method (BIPEA, 1976). The ash fraction was obtained by incineration at 550^{o}C (AOAC, 1990).

Statistical analysis

SAS 9 was used to do the statistical analysis. Analysis of variance (ANOVA) was carried out using F-test to determine the treatments level of significance. Means of the significantly different treatments were separated using Fisher's Least Significant Difference (LSD) at 95% confidence value ($P < 0.05$).

3.0 Result and Discussion

Table 1: Mean proximate composition of *Clarias gariepinus* and *Oreochromis niloticus*

Fish species	Moisture	Protein (%)	Lipid (%)	Ash (%)
Oreochromis niloticus	78.325^{a}	14.328^{b}	1.298^{b}	4.953^{a}
Clarias gariepinus	75.085^{b}	16.375^{a}	2.033^{a}	5.325^{b}
LSD	0.811	0.821	0.624	0.474

*Values with different superscript in the column indicates significant difference at P < 0.05
** Values represent pooled means vertically of triplicate determination

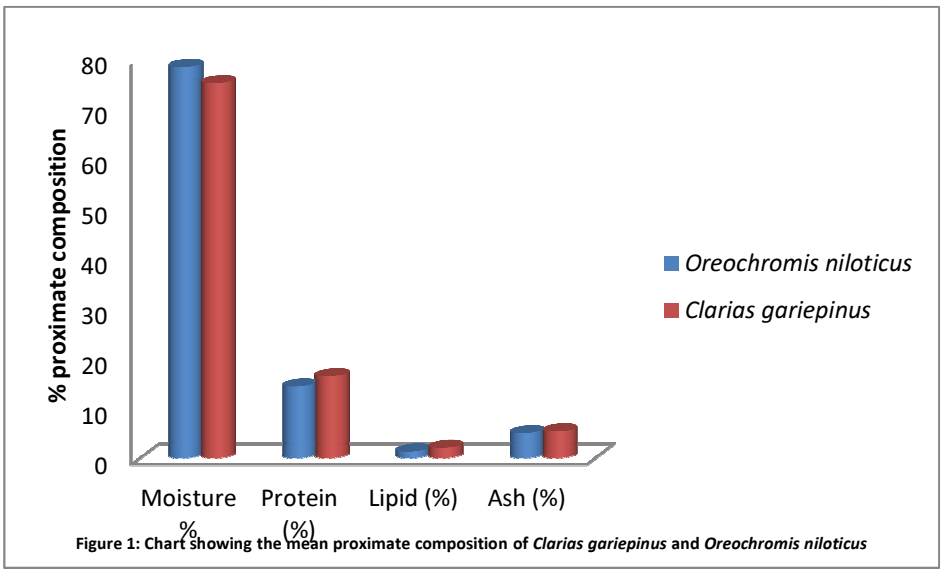

Figure 1: Chart showing the mean proximate composition of *Clarias gariepinus* and *Oreochromis niloticus*

The result presented in table 1 above indicates the nutritional superiority of *Clarias gariepinus* over *Oreochromis niloticus*. There is significant difference (P < 0.05) in all the proximate parameters between *Oreochromis niloticus* and *Clarias gariepinus* with the exception of their ash content, similar results were reported by other authors like Abdullahi (2000) and Egbal (2010). The moisture content of *Oreochromis niloticus* is significantly (P < 0.05) higher than that of *Clarias gariepinus* resulting in Clarias having more concentrated nutrients than *Orechromis niloticus*, this is in agreement with the report of Egbal (2010) between *Clarias lazera* and *O. niloticus* that there was increase in the crude protein of *Clarias lazera* which was about 7.85% while *O. niloticus was* 2.45% when the moisture content of raw *O. niloticus* was higher that of the Clarias species. Therefore indicating that there is significant variation (p<0.05) between the nutrient composition of the two fish species. The crude lipid content were also significantly (P < 0.05) higher in fresh Clarias gariepinus than in *O. niloticus* indicating that C. gariepinus will be more useful for the production of fish oil than *O. niloticus.* Egbal (2010) reported similar results were report that the crude lipids contents were slightly higher in fresh *Clarias lazera* 2.1% than in *O. niloticus* 1.5% on wet basis. The result also indicate that both species belong to the category of low fat classified by Ackman (1989) having fat content below 5%. The result indicates that there is no significant (P < 0.05) difference in the percentage ash composition of the two fish species. The result of the percentage ash content is also similar to that reported by other authors including Ssali (1988), Osibona *et al.* (2006), Oyebamiji *et al.* (2008) and Egbal (2010) where it was reported that the observed range of ash content in raw *Clarias gariepinus* indicated that the fish species are good source of minerals such as calcium, potassium, zinc, iron and magnesium.

4.0 Conclusion

This study shows the superiority of *C. gariepinus* over *O niloticus*. It established that *Clarias gariepinus* have higher crude protein and lipid that *O. niloticus* while the two fish species are good source of minerals. It is thus recommended that the current trend where *C. gariepinus* is the most cultivated fish species in Nigeria (Aderolu and Akpabio, 2009) should be sustained as it has better nutritive value than *O. niloticus* thereby improving food security of Nigeria citizens. More fish should also be eaten by infants and elderly so as to get enough minerals for good healthy leaving rather as they (fish) are cheap and readily available rather than going for the synthetic minerals concentrates.

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