ASN 53rd Annual Conference Proceedings (Sub-Theme: Soil Conservation, Fertility and Water Mgt.)

Proximate Compositions of *Clarias gariepinus* from Selected Dams in Niger State

H. L. Muhammad, A. M. Orire and S. O. E. Sadiku
Department of Water Resources, Aquaculture and Fisheries Technology, Federal University of Technology, P.M.B 65, Minna, Niger State, Nigeria
E-mail: muhadiza63@gmail.com

ABSTRACT
This study was conducted to evaluate the proximate compositions of *Clarias gariepinus* from selected dams in Niger state, Nigeria. Niger state comprised of three geo-political zones namely Zone A, B and C. the selected dams were Agaie Lapai dam in zone A, Shiroro dam in zone B and kainji dam in zone C respectively. *Clarias gariepinus* were collected from the selected dams from each zones. Crude protein, moisture, ash, lipids and nitrogen free extract contents were analyzed using the AOAC methods. The species shows significant differences ($p<0.05$) in the results of the proximate analysis. However, Moisture content was recorded significantly high $p<0.05$) in all the species of *Clarias gariepinus* from Agaie- lapai dam in zone A(75.18±0.01) and low in kainji dam in Zone C(72.34±0.01). The crude protein content was significantly high ($p<0.05$) in zone C *Clarias gariepinus* (10.68±0.01) and low in in Agaie-lapai dam in zone A, lipids contents recorded highest in *Clarias gariepinus* in zone A (5.04±0.01) and significantly low ($p<0.05$) in zone C (3.86±0.0). The ash content in *Clarias gariepinus* was high in Zone C (2.72±0.01) and low in zone A (1.44±0.01) while the nitrogen free extract was significantly highest in shiroro dam in zone B (11.22 ±0.01) and low in zone A (9.16±0.01) respectively. The research revealed that, Zone C *Clarias garipinus* is high in crude protein while Zone A has high lipid content.

Keywords: *Clarias gariepinus*, Moisture, Crude Protein, Ash, Lipids

Introduction

Fish is an important animal protein and has been widely accepted in the world, as a good source of protein and other elements for the maintenance of healthy body compared to meat (Adeniyi *et al.*, 2012).With the world's population expected to reach 8.2 billion by 2030, and with 842 million people estimated undernourished during 2011–2013, food supply will present a growing challenge in the next two decades. With increase in income along side with demographic changes related to family size, population growth, urbanization and consumer trends such as concerns for eating healthy foods and sustainable production, there will be a great shift in demand and major changes in the composition of demand. This situation will in turn have an impact on food supply, which will need to increase and become more efficient if it is to grow within the constraints presented by the availability of natural resources and existing technology (FAO, 2014). Presently, fish consumption has been increasing worldwide, mainly due to the availability, accessibility and price in relation to meat consumption, such as, poultry, pork, and beef. Therefore, some concerns begin to emerge, primarily regarding the quality of fish available in the market. Chemical residues could be present in any product of animal origin causing economic losses and putting into a risk of human and animal health. According to Bostock *et al.* (2010), aquaculture contributes nearly half of all food of aquatic origin for the purpose of human consumption, as a vital part of the global food industries. The chemical components of fish comprises of mainly water, proteins, and lipids. These components are the most important in terms of nutritional value (Ros *et al.* 2010).Nutritional value of the fish depends on many factors that can further be divided into intrinsic factor, dietary factors and Environmental factors (Grigorakis, 2007).The fisheries sector of Nigeria consists of capture and aquaculture fisheries. Capture fisheries is further sub-divided into industrial and artisanal which flourish well inside and outside to the open deep waters of 200nm EEZ across the 9 coastal states of the country's coastline (Ipinmoroti, 2012; Oladimeji *et al.*, 2013; Okeowo *et al.*, 2015).

Materials and Methods

African catfish (*Clarias gariepinus*) of average body weight of 200g at 25cm in length were collected from Agaie-lapai dam located in Zone A on lat. 9°23"N, long. 6°58"E, Shiroro dam located in Zone B at lat. 9°53"N,long. 6°50"E, and Kainji dam located in zone C on lat.10°21"N, long.4°32"E and were analyzed according to Association of official Analytical chemist (A.O.A.C, 2002) was used to determine moisture, lipids, crude protein, ash and nitrogen free extract respectively.

Result

Proximate Compositions of *Clarias gariepinus* From Some Selected Dams In Niger State

Table 1: The Proximate composition of whole *Clarias gariepinus* from Agaie lapai dam in zone A has a significantly high $p<0.05$) moisture content of 75.18% while zone C exhibited a significantly low ($p<0.05$) moisture value (72.34%). The crude protein was significantly high ($p<0.05$) for Zone C (10.68%) however, Zone A (9.18%) and B (9.25%) are not significantly different ($p>0.05$) from each other. Zone A also has a significantly high ($p<0.05$) lipids content (5.04%) while zone C had a significantly low ($p<0.05$) lipid value (3.86%). The ash was significantly high $p<0.05$) for Zone C (2.72%) and significantly low ($p<0.05$) for Zone A (1.44%). The nitrogen free extract was significantly high ($p<0.05$) for Zone B's *C. gariepinus* (11.22%) while those of Zone A gave a significantly low ($p<0.05$) NFE value (9.16%).

Discussion

The proximate compositions of *Clarias gariepinus* (protein, lipid, moisture, ash and nitrogen free extract) were the major contents which were considered in evaluating the nutritional value of the specie studied. The proximate compositions of *Clarias gariepinus* vary considerably. Stansby (1985); Azim *et.al* (2012) reported that variation in proximate composition of fresh fish may vary with species variation, season, age and feeding habit of the fish. The result of the present study shows that there was fluctuation in moisture and lipid value of whole *Clarias gariepinus* from different zones in Niger state. This variation in moisture and lipid content of the samples showed that with a gradual decline in moisture content, fat content gradually increased, this result agrees with the previous works reported on freshwater fisheries by Sadiku and Oladimeji (1991); Bake and Sadiku (2012); Bake *et al.*, (2014). Huss 1995;Saoud, *et al.*, (2007), also reported that fat content has shown inverse proportionality to water content in some semi fatty fish species muscle, this may be attributed to the seasonal differences, availability of food and changes in the reproductive cycle having considerable effect on the tissue biochemistry of the fish particularly changes in the lipid and water content of their body system. The nutritional elements showed variable values in all the fishes analyzed; with crude protein recording the highest value and lipid recording the lowest. This makes the fishes important living resources of dietary protein as other sea and freshwater fish (Zuraini *et al.*, 2006). High lipid fishes had less water and more protein than low-lipid fishes. This is in-line with the report of Steffens (2006), that protein forms the largest quantity of dry matter in fish. The high moisture content would increase the deterioration level of fish when kept for a long time. This is because micro-organisms would be highly active with high moisture content (Love, 1980). Similar observation has been reported by Aboluade and Abdullahi (2005), Otitologbon*et al.* (1996).

Conclusion

This study shows that fresh fish from some selected dams from Niger State Nigeria are of good and wholesome biochemical quality for immediate consumption. However, they can be utilized maximally by food processors in fish canning and other value-added fish products such as fish burger, fish cake and fish crackers and also for use in controlling diet while the wastes recovered can be used for fish meal or silage production for animal feeds. Hence, they are suitable as potential industrial material for possible utilization for different products.

Recommendation

It is therefore recommended that, fresh fishes under good physiological condition are good for consumption as food in relation to health status of individuals and the community. The fishes have high protein that can supplement the protein needs of the people in the communities in and around the dam.

References

Aboluade, D.S. and Abdullahi, S.A.(2005). Proximate and mineral contents in component parts of some fresh water species in Zaria. Nig. Food J., 23:41-44.

Adeniyi, S.A., C.L. Orikwe, J.E. Ehiagbonare and S.J.Joshia (2012). Nutritional Composition of three different fishes (*Clarias gariepinus, Malapterurus electricus* and *Tilapia guineenisis*). *Pakistan Journal of Nutrition*, 8:793-797.

AOAC, (2000). Association of Official Analytical Chemists. Official Methods of Analysis 17th Edition., pp: 153-162.

Azim M A, Islam M R, Hossain M B and Minar M H (2012). "Seasonal Variations in the Proximate Composition of Gangetic Sillago, *Sillaginopsis panijus* (Perciformes:Sillaginidae)", *Middle-East Journal ofScientific Research*., Vol. 11, No. 5, pp. 559-562: ISSN 1990-9233, IDOSI Publications.

Bake G.G. and S.O.E. Sadiku (2012).Basic morphometric measurements and growth pattern of Heterotis niloticus from River Kaduna flood plains, *Nigeria Journal of Science,Technology and Mathematics Education*Vol.8 (1) 113-118.

Bake G.G. Kpotun, A., Egwin, E.C and Sadiku, S.O.E. (2014) Growth pattern, condition factor and proximate composition of *Synodontis membernaceus* from River Kaduna flooded plains in Niger state of Nigeria. *International Journal of Applied Biological Research 2014 Vol.6 (1) 31-44.*

Bostock, J., McAndrew, B., Richards, R., Jauncey, K., Telfer, T., Lorenzen, K., Little, D., Ross, L.,Handisyde, N., Gatward, I., 2010. *Aquaculture: global status and trends. Aquaculture 365,* 2897–2912.

FAO, Food And Agriculture Organization of the United Nations (2014). Economic Analysis of Supply and Demand for Food up to 2030 —Special Focus on Fish and Fishery Products, Rome, 2014(Audun Lem, Trond Bjorndal, Alena Lappo).

Grigorakis K. (2007). Compositional and organoleptic quality of farmed and wild gilthead sea bream (*Spaurus aurata*) ans sea bass (*Dicentrarchus labrax*) and factor affecting it:A review. Aquaculture 272: 55-77

Huss, H.H. (1995). Quality and quality changes in fresh fish, FAO Fisheries Technical Paper No. 348. FAO, Rome, Italy, pp. 20-92..

Ipinmoroti, O. (2012). Salvaging fisheries systems in the face of climate change. *In*: Etim, L. and Oribhabor, B.(eds). Current issues in sustainable Tropical Agriculture. Faculty of Agriculture, University of Uyo, *Uyo*,18: 167– 175.

Okeowo, T. A., Bolarinwa, J. B., & Ibrahim, D. (2015). Socioeconomic Analysis of Artisanal Fishing and Dominant Fish Species in Lagoon Waters of EPE and Badagry Areas of Lagos State. *International Journal, 38.*

Oladimeji, Y. U., Abdulsalam, Z., Ajao, A. M., & Adepoju, S. A. (2015). Determinant of rural household poverty nexus fuel consumption among Fisher folks in Kwara State, Nigeria. *Journal of Scientific Researchand Reports, 7*(3), 185-194.

Otitologbon, S.A., Oniye, S.J., Peter, O.A., Agbaji, E.B. (1997).Proximate and mineral composition of three Nigerian fresh water fishes. J. Sci. Food Agric., 75: 312-314.

Love, R.M. (1980). The chemical biology of fishes.Academic press. New York and London 11th edition, 467

Sadiku, S.O.E and Oladimeji A. A.(1991) Relationship of proximate of composition of *lates niloticus* (L) *Synodontis shall* (Broch &Schneider) and *Sarotherodon galilaeus* (trewaues) from Zaria Dam Nigeria Bioscience Research Communications 3 (1) 29-40.

Saoud,P.I.; Malek B.; Ghanawi ,J ; and Nada L.(2007). Seasonal Variation in Highly Unsaturated Fatty Acid Composition of Muscle Tissue of Two Fishes Endemic to the Eastern Mediterranean Ecology of Food and Nutrition, Volume 46, Issue 2,77 – 89.

Stansby, M., (1985). Fish or Fish oil in the diet and heart attack. Mar. Fish. Review 46(2): 60-63.Steffens W. (2006). Freshwater fish- wholesome foodstuffs. Bulg. Journal Agriculture Science, 12: 320-328.

Zuraini, A., M.N. Somchit and M.H. Solihah, (2006). Fatty acid and amino acid composition of three local Malaysian Channa spp. Fish Food Chem., 97: 674-678.

Zones	Proximate compositions (%)				
	Moisture content	Crude protein	Crude Lipids	Ash	Nitrogen free extract
A	$75.18^{a}\pm0.01$	$9.18^{b}\pm0.01$	$5.04^{a}\pm0.01$	$1.44^{c}\pm0.01$	$9.16^{c}\pm0.01$
B	$73.31^{b}\pm0.01$	$9.25^{b}\pm0.01$	$4.27^{b}\pm0.01$	$1.95^{b}\pm0.01$	$11.22^{a}\pm0.01$
C	$72.34^{c}\pm0.01$	$10.68^{a}\pm0.01$	$3.86^{c}\pm0.01$	$2.72^{a}\pm0.01$	$10.40^{b}\pm0.01$