Quality Assessment of Fresh and Frozen *Clarias gariepinus* and *Tilapia zillii* from Shiroro and Tagwai Dam Reservoirs in Niger State, Nigeria

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Abstract

Proximate composition, mineral content and sensory evaluation of both fresh and frozen *Clarias gariepenus* and *Tilapia zilli* from Shiroro and Tagwaidam reservoirs in Niger state, Nigeria were analyzed for consumer acceptability. Forty (40) *Clarias gariepenus* and *Tilapai zilli* were purchased from Shiroro and Tagwai dams and kept at -4^{0}C for six weeks. Analysis for freshness, proximate chemical composition, and mineral composition were carried out on the samples that were subjected to analysis of variance (ANOVA). Significant difference ($P<0.05$) were obtained on the proximate composition between the two species, the percentage of total moisture and protein contents increased due to decrease in ash and lipid content throughout the weeks of both fishes from the two dam reservoirs ranging from 1.20 to 2.64% and 5.09 to 5.90% (Shiroro *Clarias* ash and lipid content), 1.80 to 2.58% and 4.08 to 6.87% (Tagwai *Clarias* ash and lipid content), 1.12 to 2.08%, 2.80 to 5.43% (Shiroro *Tilapia* ash and lipid content), 1.40 to 2.02%, 3.07 to 6.52% (Tagwai *Tilapia* ash and lipid content) respectively. With respect to oganoleptic analyses, the eye colour of *Clarias* from Tagwaidan was significantly higher than those from Shiroro. Thus eye colour can be regarded as on the site quality assessment parameterthat that is easily feasible.

Keywords: oganoleptic ; proximate ; consumer acceptability ; quality assessment ; fresh and frozen *Clarias gariepenus*;*tilapia zillii*

1. INTRODUCTION

Fish as chip source of animal protein is widely accepted allover the world. These fishes are caught from different sources (water reservoir) including sea, lakes, lagoon, swamps, rivers, streams, creeks, ponds, tanks etc. The dependence on fish as chip protein source has made fish farming a common practice all over the world. Shagua (1982) and Autret (1990) reported higher value of animal protein than vegetable protein. The nutrients derivable from these fishes could be different due to the nutrient available in the environment and the ability of the different species of fish to utilize and retain these nutrients in their body. Fawole *etal*. (2007) studied the mineral and proximat composition of dried fish samples, Babalola *etal*. (2011) from their proximate analyse, classified *Clariasgariepinus* as having relatively average protein and lipid content.

Consumers of fish prefer fresh fish, but due to availability of storage facilities and spoilage these fishes can be dried before sold to the consumers. Rate of spoilage of fish attributed to the quality and consumer acceptability. Eyo (1987) estimated 50% of fish produced in the remote coastal centers and inland areas of Nigeria perish before reaching the final consumer, due to the poor handling, preservation and processing technique adopted by artisan fishermen, fish farmers and fish entrepreneurs. The presence of non-protein-nitrogen (NPN) in large quantities and trimethylamine oxide aid bacterial action in spoilage of fish (Gram and Dalgaarrd, 2002).Lester (1996) stressed deteriorative activities to action of myoglobin to metamyoglobin in the blood of fish in freezer. The release of mucous or hyperemia, autolysis and bacteria decomposition are main activities that affect the quality of fish post mortem.

Apart from the oganoleptic (aesthetic appearance) assessment by the consumers as measure of quality of fish, the nutrient of the fish could also be affected. Chemical, physical, bacteriological analysis as measure of freshness. Among physical analyses are pH, muscletexture, muscleelectrical properties and for chemical etc, degradation metabolytes are used by some authors.Sigurgisladottir *etal*. (2000) studied the effects of freezing/thawing on the microstructure and the texture of smoked Atlantic salmon, Tan and Fok (2009) worked on the effect of shape of tilapia fillets in freezing, while Chen and Pan (1997) predicted shelf-life of tilapia to be 2.7 months at −20°C for tilapia frozen with liquid nitrogen.

However, since fish is a good source of protein for humans, the focus of this study is to assess the quality of fish source that people consume, particularly as most fish that are not of good quality may not be healthy or fit for human consumption. Therefore, nutrient content and organoleptic assessment to examining the quality of fresh and frozen fish species (*Clarias gariepinus* and *Tilapia zillii*) from river Tagwai and Shiroro dam in Niger state, Nigeria.

2. MATERIALS AND METHODS

The sampling stations of the study were the landing sites of River Shiroro and Tagwai Dam in Niger state, Nigeria. Ten *Clarias garipenius* and ten *Tilapia zilli* with average body weight 105.46gm and length 25.46cm were purchased from fishermen at each of the landing sites of River Shiroro and Tagwai Dam in Niger state immediately after catch and kept in the plastic cooler with ice water for transportation to the laboratory of the Department of Water Resources, Aquaculture and Fisheries, Federal University of Technology, Minna, Nigeria. In the lab, the fish were kept in a deep freezer at average temperature of -4^{0}C. Two specimens were taken from each of the two species on the first day and subsequently at one week interval of six weeks of storage for organoleptic and proximate analyses after manually filleted.

2.1 Quantification of Proximate Chemical Composition

The quantification of crude protein, lipid, ash and moisture contents of the fish muscle were done using standard method of Association of Official Analytical Chemistry, (A.O.A.C.), 1994). Crude protein determination was done by the modified micro-kjedah method Kjeldahl method (Kjeltec System 2100, Sweden). Lipid extraction was done using using soxhlet method (SoxtecTM 2050, Sweden). For the ash content ashing was done in the muffle furnace (Carbolite Sheffield® muffle furnace, England) 550^{o}C for 3 hours. Moisture content was determined by drying to constant weight in an air oven at temperature of 105^{o}C for 24 hours.

Table 1 : Criteria for Freshness rating of fish

Criteria	Rating Mark			
Part of fish inspected	3	2	1	0
Appearance Skin	Bright, pigmentation, discolouration	Indescent pigmentation No but lustrous	Bright pigmentation in the process of becoming discoloured and dull	Dull pigmentation
	Aqueous transparent mucus	Slightly cloudy mucus	Milky mucus	Opaque mucus
Eye	Convex (bulging)	Convex and slightly sunken	Flat	Concave in the center
	Transparent cornea	Slightly opalescent cornea	Opalescent cornea	Milky cornea
	Black, bright pupil	Black dull pupil	Opaque pupil	Grey pupil
Gills	Bright colour	Less coloured	Becoming discoloured	Yellowish
	No mucus	Slight trace of clear mucus	Opaque mucus	Milky mucus
Flesh (from abdomen)	Bluish, translucent, smooth, shining	Velvety, waxy dull	Slightly opaque	Opaque
	No change in original colour	Colour slightly changed	Colour changed	
Condition				
Flesh	Firm and elastic	Less elastic	Slightly soft (flaccid), less	Soft (flaccid),

			elastic	scales easily detached from the skin surface
	Smooth surface	Surface becoming dull	Waxy (velvety) and dull surface	rather wrinkle, inclining to mealy
Peritoneum	Sticks completely to flesh	Sticks	Sticks slightly	Does not stick
Smell				
Gills	Seaweed smell	No smell of seaweed or any bad smell	Slightly sour	Sour

Source: modified after Shewan *et al.* (1953)

2.2 Mineral Analysis

After digestion, the sample is diluted appropriately before being used for the actual determination in Atomic Absorption Spectrophotometry (AAS). Appropriate filters were used for calcium and magnesium while flame photometry was used for sodium and potassium.

2.3 Freshness Assessment

A five man panel of assessor was briefly trained on the freshness rating quality assessment of fish. Questionnaire was prepared having a hedonic scale of 0 to 4 points score for the physical characteristic of the fish. Scoring was done immediately the fishes were brought from the landing site with 4 points being the maximum score for excellent skin, eye, gill, flesh from abdomen and body flesh condition as the limit of acceptability of the parameters as enumerated in the questionnaire in table 1 above.

3. RESULTS

3.1 Proximate Composition of Tagwai and Shiroro *Clariasgariepinus*

The results of proximate composition *Clarias gariepinus* is presented in Tables 2 where the species have a range of crude protein from 17.43 to 18.54% (Tagwai) and 16.95 to 17.40% (for Shiroro), moisture ranges from 74.40 to 76.87% for Tagwai *Clarias* and 74.64 to 78.77% for Shiroro *Clarias*, lipid ranges from 4.11 to 6.54% for Tagwai and 5.31 to 5.70% for Shiroro, while the ash ranges from 1.82 to 2.31% for Tagwai and 1.50 to 2.37% for Shiroro. From the analyses, the percentage moisture content of Tagwai at weeks 5 and 6 were significantly higher ($p<0.05$) than weeks 2 and 3 which were also higher than control, but for Shiroro, week 2, 3, 5 and 6 were significantly higher than control. The ash content for both Tagwai and Shiroro were significantly higher ($p<0.05$) at week 6 than the rest of the weeks. While percentage crude protein and lipid of Shiroro Clarias show no significant variation through the weeks, Crude Protein was higher at control and week 2 and the lipid at control was higher than weeks 2, 3, and 5 which were higher than week 6 ($p>0.05$).

3.2 Proximate Composition of Tagwai and Shiroro *Tilapiazillii*

The results of proximate composition *Tilapia zillii* is presented in Tables 2 where the species had a range of crude protein from 16.28 to 20.42% for Tagwai and14.87 to22.75% for Shiroro, moisture ranges from 74.35 to 77.26% for Tagwai *Tilapia* and 76.35 to 77.45% for Shiroro, lipid ranges from 3.44 to 6.25% for Tagwai and 2.80 to 5.20% for Shiroro, while the ash ranges from 1.67 to 1.85% for Tagwai and 1.42 to 1.88% for Shiroro.

From the analyses, the percentage moisture content of Tagwai at weeks 5 and 6 were significantly higher ($p<0.05$) than weeks 2 and 3 which were also higher than control, but for Shiroro, only week 6 was higher other weeks. The ash content for Tagwai has no significant difference but for Shiroro control is significantly lower than other weeks ($p<0.05$). The percentage crude protein of both Tagwai and Shiroro, control was significantly higher than week 2 which is also higher than weeks 3, 5 and 6. Lipid contents also show variation, where for Tagwai control is significantly higher than week 2 which is also higher than weeks 3, 5 and 6 for Shiroro control and week 2 were higher than the other weeks.

3.3 Mineral Composition of Tagwai and Shiroro *Clariasgariepinus*

The mineral composition of *Clarias gariepinus* are shown in tables 3. Tagwai sodium ranges from 36.41 to 46.11mg/100g for Shiroro was from 38.37 to 46.41mg/100g, Tagwai magnesium ranges from 25.84 to 40.21mg/100g and for Shiroro was from 28.22 to 338.34mg/100g, Tagwai calcium ranges from 14.25 to 20.65mg/100g and for Shiroro was from 14.57 to 24.60mg/100g, and Tagwai potassium ranges from 10.07 to 13.66mg/100g and for Shiroro was from 10.15 to 13.11mg/100g.

Table 2: Proximate Composition Tagwai and Shiroro Tilapia and Clarias, Homogeneous Subsets after Post Hoc Tests and ANOVA analyses

Duncan		Crude Protein (%)				Lipid (%)			
		Tilapia		Clarias		Tilapia		Clarias	
		Tagwai	Shiroro	Tagwai	Shiroro	Tagwai	Shiroro	Tagwai	Shiroro
Period	N							Subset for alpha = 0.05	
Control	3	20.42a	22.75a	18.54a	17.40a	6.25a	5.20a	6.54a	5.70a
Week 2	3	17.75b	16.21b	18.24ab	17.40a	4.18b	4.83a	5.24b	5.55a
Week 3	3	16.58c	15.21c	17.81bc	17.35a	3.67bc	3.47b	5.24b	5.53a
Week 5	3	16.46c	15.17c	17.80bc	17.17a	3.64bc	3.33b	4.80b	5.39a
Week 6	3	16.28c	14.87c	17.43c	16.95a	3.44c	2.80b	4.11c	5.31a
Sig.		a=1.00	a=1.00	a=1.00	a=0.66	a=0.37	a=0.09	a=1.00	a=0.13
		b=1.00	b=1.00	b=1.00		b=0.05	b=0.31	b=0.19	
		c=0.20	c=0.89	c=0.09		c=1.00		c=1.00	

Means for groups in homogeneous subsets are labeled with same letter

Table 2: Proximate Composition Tagwai and Shiroro Tilapia and Clarias, Homogeneous Subsets after Post Hoc Tests and ANOVA analyses

Duncan		Ash (%)				Moisture (%)			
		Tilapia		Clarias		Tilapia		Clarias	
		Tagwai	Shiroro	Tagwai	Shiroro	Tagwai	Shiroro	Tagwai	Shiroro
Period	N				Subset for alpha = 0.05				
Control	3	1.67a	1.42a	1.82a	1.50a	74.35a	76.35a	74.40a	74.64a
Week 2	3	1.74a	1.79ab	1.82a	1.84a	76.19b	76.53a	75.19b	76.95b
Week 3	3	1.76a	1.85ab	1.86a	1.88a	76.21b	76.69a	75.33b	77.63b
Week 5	3	1.84a	1.87ab	1.86a	1.90a	77.23c	76.82a	76.41c	78.06b
Week 6	3	1.85a	1.88b	2.31b	2.37b	77.26c	77.45b	76.87c	78.77b
Sig.		a=0.38	a=0.051	a=0.77	a=0.09	a=1.00	a=0.15	a=1.00	a=0.06
			b=0.67	b=1.00	b=1.00	b=0.90	b=1.00	b=0.53	b=1.00
						c=0.91		c=0.06	c=0.08

From the results presented, it shows that the concentration of sodium was significantly throughout the weeks for both tagwai and Shiroro. Potassium concentration changes begin at week 3. For calcium, Tagwai Clarias varies from week 3 while there is variation through the weeks for Shiroro. Tagwai magnesium varies through all weeks while for Shiroro variation started at week 3 ($p<0.05$).

3.4 Mineral Composition of Tagwai and Shiroro *Tilapiazillii*

The mineral compositions of Shiroro *Tilapia zilli* are shown in table 3, where amount of sodium ranges from 34.10 to 43.24mg/100g, fot Tagwai and 35.97 to 441.33mg/100g, magnesium ranges from 26.36 to 44.19mg/100g for Tagwai and 30.20 to 41.21mg/100g for Shiroro. Calcium concentration ranges from 13.89 to 20.57mg/100g for Tagwai and 13.45 to 22.14mg/100g for Shiroro, and potassium ranges from 8.33 to 11.45mg/100g for Tagwai and 5.57 to 15.119mg/100g.

From the results presented in table 3, there is significant variation in the concentration of sodium throughout the weeks starting from week 3 for both Tagwai and Shiroro, while for magnesium, the concentrations shows significantly difference throughout the weeks for both Tagwai and Shiroro. The significant difference in the calcium concentration throughout the weeks for Tagwai and for the Shiroro the differences started from week 3. potassium concentration of Tagwai show difference from week 5 and that of but for Shiroro the differences shows throughout the weeks ($p<0.5$).

3.5 Sensory Evaluation of Tagwai and Shiroro *Tilapiazillii*

The sensory evaluation results of Taagwai and Shiroro of *Clarias gariepinus*, and *Tilapia zilli* graded between minimum grade 0 and maximum grade 4 are presented in Table 4. For skin Shiroro and Tagwai *Clarias gariepinus*, and *Tilapia zilli* ranged from 0.13 to 3.00, gill evaluation ranges from 0.13 to 2.60, body flesh ranges from 0.16 to 2.60, flesh from abdomen ranges from 0.15 to 2.80 and eye colour values ranges from 0.19 to 3.00.

From the results presented, it shows that there is no significant difference in the acceptance of quality of skin, gill and flesh from abdomen of both *Clarias*, and *Tilapia* from the two stations throughout the weeks of preservation ($p>0.05$). For eye colour and body flesh, Tagwai *Clarias gariepinus* and *Tilapi zillii* and Shiroro Tilapia were better accepted than the Clarias from Shiroro ($p>0.05$).

Table 3 : Mineral composition of Tagwai and Shiroro *Tilapiazillii* and *Clariasgariepinus*Homogeneous Subsets after Post Hoc Tests and ANOVA

Duncan		Calcium (mg/100g)				Magnesium (mg/100g)			
		Tilapia		Clarias		Tilapia		Clarias	
		Tagwai	Shiroro	Tagwai	Shiroro	Tagwai	Shiroro	Tagwai	Shiroro
Period	N	Subset for alpha = 0.05							
Control	3	20.57a	22.14a	20.65a	24.60a	44.19a	41.50a	40.21a	38.34a
Week 2	3	19.74b	22.80a	20.15a	21.38b	37.30b	37.07b	40.17b	38.30a
Week 3	3	19.25c	18.49b	17.50b	19.35c	31.36c	32.41b	30.47c	34.58b
Week 5	3	19.17c	15.97c	16.82b	16.44d	30.17d	32.33c	29.55c	34.23b
Week 6	3	13.89d	13.45d	14.25c	14.57e	26.36e	30.20d	25.84d	28.22c
Sig.		a=1.00 b=1.00 c=0.71 d=1.00	a=0.06 b=1.00 c=1.00 d=1.00	a=0.17 b=0.72 c=1.00	a=1.00 b=1.00 c=1.00 d=1.00 e=1.00	a=1.00 b=1.00 c=1.00 d=1.00 e=1.00	a=1.00 b=0.72 c=1.00 d=1.00	a=0.84 b=1.00 c=1.00 d=1.00	a=0.85 b=0.10 c=1.00

Means for groups in homogeneous subsets labeled with same letter

Table 3 : Mineral composition of Tagwai and Shiroro *Tilapiazillii* and *Clariasgariepinus*Homogeneous Subsets after Post Hoc Tests and ANOVA

Duncan		Sodium (mg/100g)				Potassium (mg/100g)			
		Tilapia		Clarias		Tilapia		Clarias	
		Tagwai	Shiroro	Tagwai	Shiroro	Tagwai	Shiroro	Tagwai	Shiroro
Period	N	Subset for alpha = 0.05							
Control	3	43.24a	44.33a	46.11a	46.41a	11.45a	15.11a	13.66a	13.11a
Week 2	3	43.19a	44.33a	41.39b	45.22b	11.31a	13.29b	13.27a	12.73ab
Week 3	3	37.81b	40.53b	41.33b	40.44c	11.20a	12.17c	12.34b	12.50b
Week 5	3	36.17c	40.31b	39.94c	38.60d	10.44b	10.34d	12.07b	12.36b
Week 6	3	34.10d	35.97c	38.37d	36.41e	8.33c	5.57e	10.07c	10.15c
Sig.		a=0.80 b=1.00 c=1.00 d=1.00	a=1.00 b=0.38 c=1.00	a=1.00 b=0.75 c=1.00 d=1.00	a=1.00 b=1.00 c=1.00 d=1.00 e=1.00	a=0.36 b=1.00 c=1.00	a=1.00 b=1.00 c=1.00 d=1.00 e=1.00	a=0.09 b=0.23 c=1.00	a=0.07 b=0.08 c=1.00

Means for groups in homogeneous subsets labeled with same letter

Table 4: Sensory Evaluation of Tagwai and Shiroro *Clariasgariepinus* and *Tilapiazillii*Homogeneous Subsets after Post Hoc Tests and ANOVA analyses

Duncan		Eye Colour	Flesh From Abdomen	Body Flesh	Gill	Skin
Period	N	Subset for alpha = 0.05				
Tagwai Clarias	5	3.00a	2.80a	2.60ab	2.60a	3.00a
Tagwai Tilapia	5	2.20ab	2.60a	2.80a	2.60a	2.60a
Shiroro Tilapia	5	2.00ab	2.40a	2.20ab	2.40a	2.40a
Shiroro Clarias	5	1.80b	2.20a	1.80b	2.00a	2.20a
Sig.		a=0.07 b=0.45	a=0.23	a=0.21 b=0.10	a=0.16	a=0.06

Means for groups in homogeneous subsets labeled with same letter

4. DISCUSSION

4.1 Quality Assessment of *Clarias gariepinus* and *Tilapia zillii* from River Tagwai and Shiroro dam.

The Significant difference (P<0.05) obtained on the proximate and mineral composition of the two species of fish from the two water sources was an indication that there were loss in quality of the stored fish during the 6 weeks storage period. The high percentage of total moisture and protein contents may be due to decrease in ash and lipid content throughout the 6 weeks for both fishes from the two water bodies. This assertion is also exhibited by the significant difference (P<0.05) in the mineral content (calcium, magnesium, sodium and potassium). The result of sensory (oganoleptic) analyse also conform with that of proximate and mineral analyses, indicating that *Clariasgariepinus* from Tagwai is more accepted by people and Clarias gariepinus from Shiroro is less accepted among the four groups of fish. Among the parameters tested for the oganoleptic analyses, only the eye colour show significant differences (p<0.05) where acceptance of Clarias from Tagwai dan was significantly higher than Tilapia from the two source and the Clarias from Shiroro recorded even lower.

4.2 Proximate compositions

4.2.1 Crude Protein

The proximate composition of both fish species (*Clarias gariepinus* and *Tilapia zillii*) from Shiroro dam and River Tagwai examined belong to the high proteinous food consumed by the populace. This finding is similar to that reported by Ayeloja *etal*. (2011), who studied on quality of raw catfish (*Clarias gariepinus*). The percentage protein (17.25%) contents of the two species from the two water bodies show significantly variation ($p<0.05$) with increase in interval of weeks, this could be due to loss of moisture (Omojowo, 2008). These results also agreed with the work of Omotosho (1999) and that reported by Osibona, *et al*. (2010).

The relatively high to moderate percentage crude protein could be attributed to the fact that fishes are good source of pure protein, but differences observed in the obtained values may also be attributed to fish food or absorption capability and conversion potential of essential nutrient from their diet or their local environment, into such biochemical attributed needed by the organism body, (Burgress, 1975 and Adewoye and Omotosho, 1997).

4.2.2 Moisture Content

The moisture content of both (*Clarias gariepenus* and *Tilapia zulli*) species in both water bodies (Shiroro dam and river Tagwai) were high similar to the report of Ayeloja *etal*. (2011) on *Clarias gariepinus*, Abdullahi, (2000a) on *Alestes nursesA. macrolepidotus*. *Hydrocynus brevis*, and *Hepsetus odoe*, Abdullahi, (2000b) on *Labeo coubieL*. *Senegalensis* and *BarbusOccidentalis*. And that reported by Adewoye and Omotosho (1997), but different from the low moisture content recorded by Stephen *etal*. (2007), where juvenile *Oreochromisniloticus* had 8.3 – 13.03%.

4.2.3 Crude Lipid

The crude lipid in both fish species in the two water bodies (Shororo dam and river Tagwai) were low similar to the result obtained by Gallagher *etal*. (1991), Abdullahi *etal*. (2011) and Ayeloja *etal*. (2011) (0.21 – 1.44%), but Abolude *etal*. (2006) recorded high content of lipid in the head of *B. filamentus* and *H.brevis*.. Usually, moisture and contents in fish fillets are inversely related and their sum is approximately 80% (FAO, 1999). The low concentration of lipid in this fish species could be due to poor storage mechanism, and the use of fat reserve during spawning activities.

4.2.4 Ash Content

The ash content in both fish species from the two water bodies (river Tagwai and Shiroro dam) were low similar to the report of Adewoye and Omotosho (1997) in *D.marginata*, *T. zilli* and *C.gariepinus*, and the work of Stephen *etal*. (2007) these may be due to the high moisture content. Though, this view was not seen in the work of Sutharshiny and Sivashanthini (2011)

4.2.5 Mineral Content

On the aspects of the mineral content in both fish species (*Clarias gariepinus* and *Tilapiazilli*), in both water bodies, magnesium, sodium were significantly high in both species, follow by the calcium and lastly potassium. This is as seen by Topping and Gigenberg (1986) who attributed that marine fish species show preferential bio-accumulation of metal especially in the bony structures, depending on their physiology needs. Similar trends were also reported by Abolude *etal*. 2006). Abdulkarim and Abdullahi, (2009) reported that sodium and magnesium contents were found to be high in the fresh fish of all the three fish species (*Synodontus clarias*, *Schilbe mystus* and *Mornyrus macrophthalmus*), which differ from the work of Abolude *etal*. (2006).

The high concentration on sodium and magnesium in this experiment was indicated that water body from which the fishes were collected by fishermen is very rich in sodium and potassium, and that which have allowed an active movement of this iron across the gill structure. Generally, the minerals content were high in both fish species in both dams, but there were variations; the variations in the concentrations of elements from one sample of fish or dam to another was due to the chemical forms of the elements and their concentrations in the local environments.

4.2.6 Sensory Evaluation

On organoleptic (freshness) assessment aspect of both fish species (*Clarias gariepinus* and *Tilapia zilli*) in both dams (Shiroro and Tagwai), it was observed that both species in both dams retained most of their original freshness up to five (5) weeks of the study. The eyes were transparent, clear and protruding with a white cornea and dark pupil. The gill had bright red colour and fresh odour, while the skin was bright with shining slime and a firm belly (i.e. *Clariasgariepinus*), but in *Tilapia zilli*, the skin were rough with presence of scales and the flesh was still firm, flexible and elastic, while odour was fresh and sea weedy. This result agreed with similar findings of Ayeloja *etal*. (2011). The results also compared well with the work of Akande and Ola (1992), that African catfish, *Clarias gariepinus* retained most of its original freshness up to 3 hours while Arannilewa *etal*. (2006) observed fall in the quality of frozen Tilapia after ten days for protein, lipid, minerals and sensory evaluation and Ibrahim and El-Sherif (2008), Chukwu and Shaba (2009) and Sutharshiny and Sivashanthini (2011) recorded similar moisture, crude protien, lipid, and ash contents ranges comparable to this study. For the work of Ibrahim and El-Sherif (2008), there were differences in these compositions after 4 months of frozen storage.

5. CONCLUSION

In conclusion, *Clarias gariepinus* and *Tilapia zilli* are good source of food for consumers and the populace as a whole. And the level of protein, lipid and minerals observed in this study shows that both species could be of important use in industrial process. Protein, lipid, ash and moisture contents vary as the storage day of fresh fish increase in the freezer. Protein, lipid and ash decrease and moisture increase as the fresh fish loses quality in the freezer. While the moisture and ash content vary in opposite direction the mineral content shows a true reflection of the ash content in the study. Okaeme (1992) emphasizes the need for definite guide line for fish food inspection. Eye colour can be regarded as 'the on the site' quality assessment parameter that is easily feasible.

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