

ORGANOLEPTIC CHARACTERISTICS, LENGTH-WEIGHT RELATIONSHIP AND CONDITION FACTOR OF *Oreochromis niloticus* IN EGAH RIVER AT IDAH L.G.A OF KOGI STATE, NIGERIA.

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ABSTRACT: Organoleptic characteristics of smoked Tilapia (*Oreochromis niloticus*) from Egah River in Idah Local Government Area of Kogi State, Nigeria were carried out. A drum - type smoking kiln was used for the fish smoking. Sixty (60) samples of *Oreochromis niloticus* used for the smoking experiment were obtained from Egah fish landing site. The samples were divided into two equal parts as samples "A" and "B". Sample "A" was processed traditionally and "B" was processed under laboratory method. The traditionally processed sample "A" was generally poor in quality compared with the laboratory processed sample "B". The taste panel rated product "B" processed under laboratory method better at ($p < 0.05$) than product "A" owing to its better palatability and extended shelf-life.

The length-weight relationship and condition factor conformed to the allometric growth formula $W = al^b$ with the value $W = 0.03L^{3.0412}$ for the pooled data (male and female combined). Condition factors between both sexes were not significantly different at ($p > 0.05$)

Key words: Organoleptic characteristics, Length-weight, Condition factor, *Oreochromis niloticus*, Egah River.

Introduction

Fish is a key ingredient on the global menu, a vital factor in the global environment and an important basis for livelihood worldwide (Bene and Heck, 2005). Fish is also widely acceptable because of its high palatability, low cholesterol and tender flesh (Eyo, 2001). (Anon, 2000) emphasised that fresh, but more often smoked-dried or oven powdered fish is a critical source of dietary protein and micronutrients for many isolated communities in rural areas. Fish is one of the most perishable staples; it spoils very quickly because of intrinsic and extrinsic factors. The high ambient temperature in the tropics hastens fish spoilage by accelerating the activities of bacteria, enzymes and chemical oxidation of fat in fresh fish (Eyo, 2001). The demand for fish in Nigeria at present is about 756,000 tons out of which about 373,044 tons, 49.5% is imported (Okorie, 2003). Unfortunately, post harvest losses have been estimated at 20-50% in the tropical countries (Eyo, 2001). This level of post harvest losses could be very significant especially in this period of fish scarcity and escalating prices and could have negative impact on the national food security.

In view of the fact that post harvest spoilage has contributed immensely to the poor supply of fish protein to the Nigerian populace, the need to preserve fish for better shelf-life, good flavour as well as creation of employment opportunities becomes imperative.

Organoleptic assessment for smoked fish (Tilapia) utilizes the sense of sight, smell, taste and mouth feel, (Eyo, 2001).

Sensory assessment of samples was carried out in the testing room using a 9-point hedonic

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scale rating. A drafted questionnaire as in Eyo, (1985) was given to a seven panel members to fill.

The use of salt for fish curing to improve fish preservation has never been the practice by artisanal fish processors at Egah market; this prompted the research work to introduce this method to them in order to have better smoked fish products in terms of palatability and extended shelf-life thus the objective of this

MATERIALS AND METHODS

The study area for this research work was Egah fish landing site in Idah Local Government Area of Kogi State, Nigeria.

Idah town is located at latitude 7° 04'N and longitude 6° 50'E of the equator Aloko, (2006). Egah River is located at about 58km from Anyigba where Kogi State University is

located. The river forms a boundary between Kogi State and Edo State at Aganebode and serves as a source of fishing ground for both states. The market (Egah market) is located beside the river which enables the populace of Idah and its environs obtain fresh fish readily on a daily basis. Fig. 1 shows the map of Idah and the sample site.

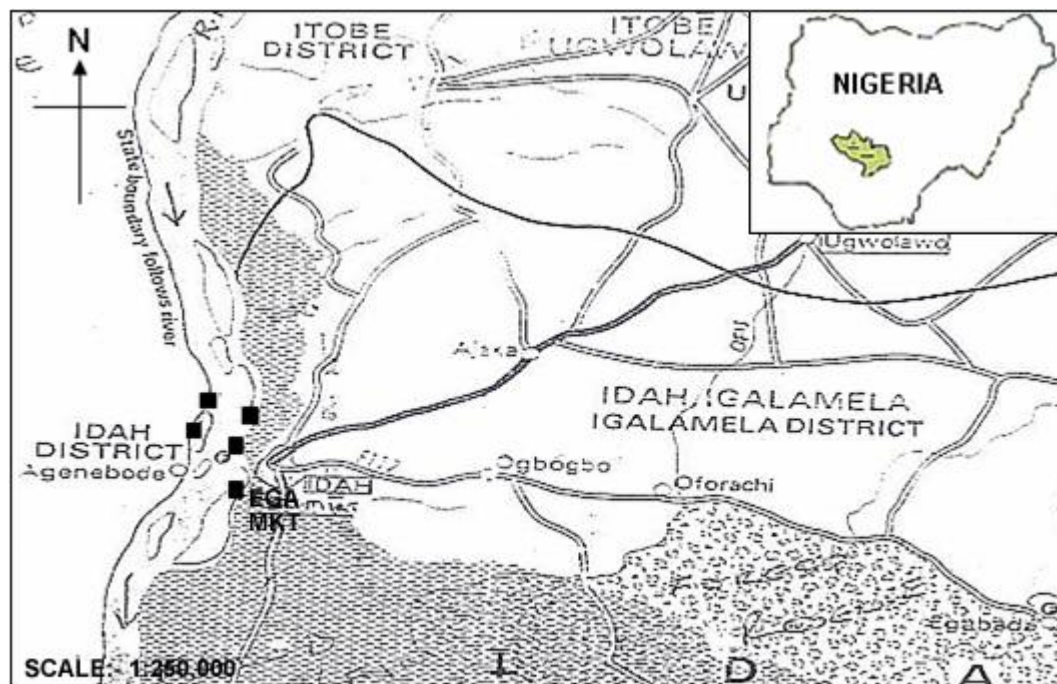


FIG 1:- MAP OF IDAH SHOWING SAMPLE SITES

COLLECTION OF SAMPLES

The traditionally smoked-dried tilapia fish samples used in this study were obtained from Egah market after strict monitoring of the traditional method of fish smoking.

Fresh tilapia fish *Oreochromis niloticus* was also obtained from the same fish-landing site at Idah and processed under controlled condition.

These fishes were processed as shown in fig. 3a (Eyo, 2001). The fishes were washed and manually eviscerated and then washed thoroughly. They were then cured using 50% salt and smoked under controlled condition using the drum-type-smoking kiln (Eyo, 2001). After proper smoking, the fishes were allowed to return to room temperature before packaging was done in polythene bags. The packaged

fishes were stored at ambient temperature and shelf life studies carried out for four weeks.

The total length (cm) and their corresponding standard length (cm) of each fish sample was taken from the tip of the snout to (mouth closed) the extended tip of the caudal fin respectively using a measuring board.

Their corresponding body weight was also measured for each fish to the nearest gram using a metallic loading balance after draining water from the bucal cavity and blotting out excess water on the fish body (King, 1996). The length-weight relationship for males, females and pooled were estimated using the equation $W = aL^b$ (Rickter, 1973).

Where:-

W = body weight of fish (g)

L = total body length of fish

(cm)

a = proportionality constant
or intercept

b = exponent

The corresponding log transformation values of length and weight gives the linear expression $\text{Log}W = \text{Log} a + b \text{Log}L$ via least square linear equation (Zar, 1984).

Condition factor (CF) were also calculated for the males, females and pooled sexes using the formulae

$$CF = \frac{100W}{L^3}$$

Where:-

W = weight of fish

L = Length of fish

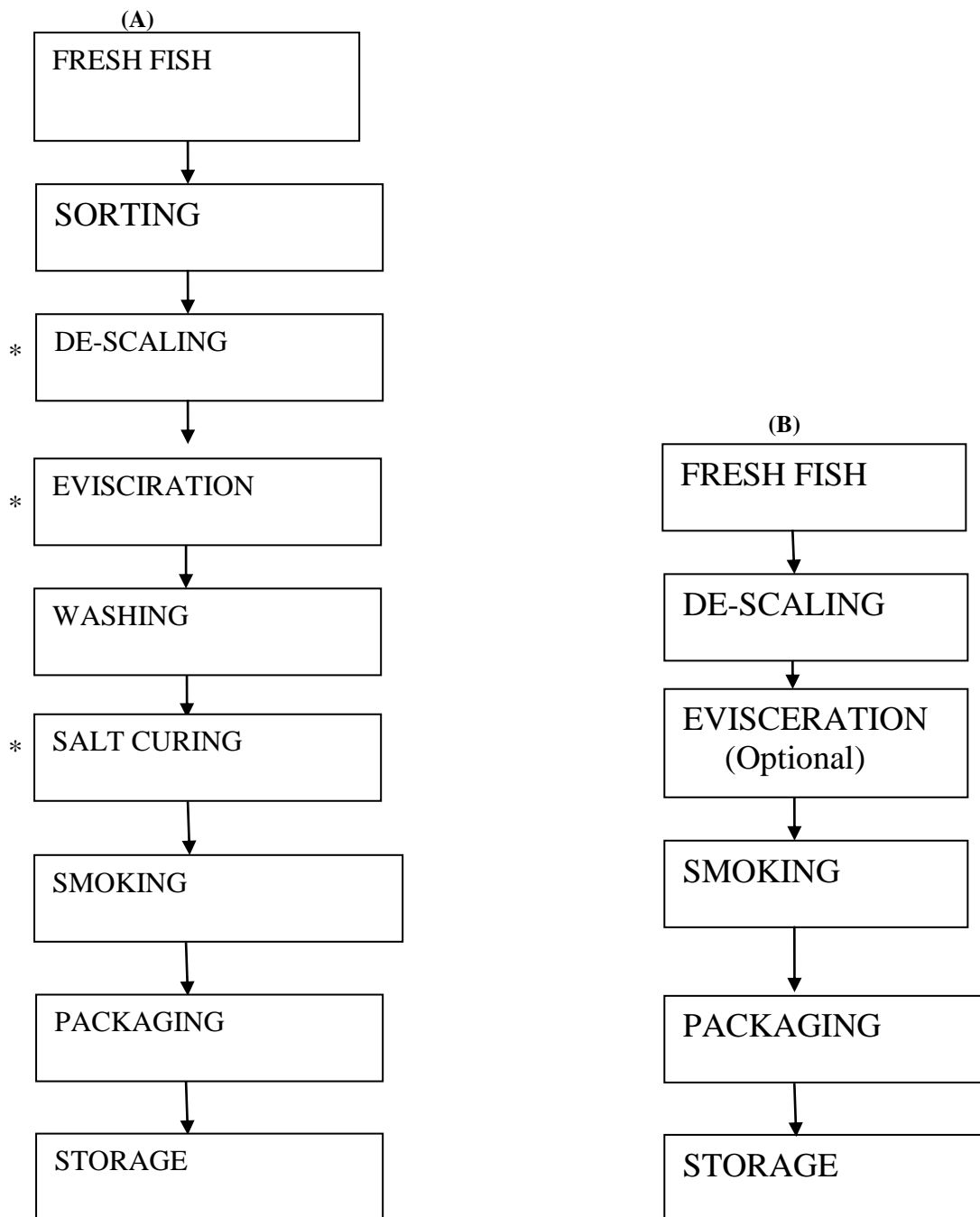


Fig 3: Flow chart for the laboratory processed and traditionally processed tilapia fish.
 * Critical control point

Results

The standard method of steaming recommended by Eyo, (2001) was adopted as such, extraneous flavour were not added to it. A total of 60 fishes were used for the organoleptic characteristic property of smoked *Oreochromis niloticus* samples. Table 1 shows the average weekly evaluation of sample (A) while Table 2 shows the average

weekly evaluation of sample (B). Results shows that sample (B) processed under controlled method was significantly preferred to sample (A) processed traditionally ($P < 0.05$). Table 3 shows the analysed result between sample (A) and sample (B) which also shows significant difference between the two at ($P < 0.05$).

Males' weight ranged between 19.3g – 60.0g, while the females weighed between 14.9g – 117.3g (Table 4). The values obtained shows that females were significantly larger than males ($P < 0.05$). The b values for males and female fishes recorded during the study were 3.36 and 3.03 respectively as represented in (Table 5). This indicates that males show positive allometric growth, females also exhibited positive allometric growth based on Bagenal and Tesch (1978) criteria of 3. Similarly, Pauly (1984) did report that a slope value greater than 3 denotes allometric growth. This is also similar to the findings of Entsua – Mensah *et al.*, (1995) that recorded b values of 2.919 for males while Ofori – Danson *et al.*, (2002) too reported b values of 3.010 for females which is very similar to the findings of this study.

The exponent b value of 3.04 recorded for pooled data also showed positive allometric growth (Table 5). This finding is closely similar to the findings of Fafioye and Oluajo (2005) which reported b values of 3.04. Pauly and Gayannilo (1997) reported that b values may range from 2.5 to 3.5 which support the result of this study.

Condition factors (CF) obtain for both males and females *Oreochromis niloticus* was within the range of 2.95 - 4.91 with a mean of 3.41 and 2.91 – 3.63 with mean value of 3.28 respectively (Table 5). While that for both males and females combined ranged between 2.91 - 4.19 with mean value 3.32 (Table 5). The values obtained are very similar to the values (2.9 – 4.8) documented by Bagenal and Tesch (1978) for matured fresh water fish fresh body weight.

TABLE 1: AVERAGE WEEKLY EVALUATION FOR SAMPLE “A”

Samples	Parameters	24 hours	1 st week	2 nd week	3 rd week	4 th week	Average Mean Score
A	Taste	6	6	6	5.5	5.5	5.8
	Physical Damage	7	7	7	7	7	7
	Colour	6	6	6	6	5.5	5.9
	Texture	5	6	7	7	7	6.4
	Insect Infestation	7	5	4	4	3	4.5

TABLE 2: AVERAGE WEEKLY EVALUATION FOR SAMPLE “B”

Samples	Parameters	24 hours	1 st week	2 nd week	3 rd week	4 th week	Average Mean Score
B	Taste	9	9	9	9	9	9.0
	Physical Damage	8	8	8	8	8	8.0
	Colour	9	9	9	8.5	8.5	8.8
	Texture	5	6	7	7	7	6.4

	Insect infestation	9	7.5	6.3	6.0	6.0	6.9
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KEY:

A = Sample processed under traditional method

B = Sample processed under controlled laboratory method

TABLE 3: SUMMARY OF ANALYSIS

PARAMETERS	SAMPLE A	SAMPLE B
Taste	5.8 ± 0.12	9.0 ± 0.00
Physical damage	7.0 ± 0.00	8.0 ± 0.00
Colour	5.9 ± 0.10	8.8 ± 0.12
Texture	6.4 ± 0.40	6.4 ± 0.40
Insect infestation	4.6 ± 0.68	6.9 ± 0.58

Data “A” shows the summary of results for fish processed traditionally and “B” processed under laboratory method, with significant difference in the analysis at (P < 0.05).

TABLE 4: SIZE RANGES OF *Oreochromis niloticus* FROM EGAH RIVER

Sex	No	Length (cm)		Wet Weight (cm)	
		Min	Max	Min	Max
Males	9	8.5	12.0	19.3	60.0
Females	21	7.8	15.5	14.9	117.3
Pooled	30	8.5	15.5	14.9	117.3

TABLE 5: LENGTH-WEIGHT RELATIONSHIP PARAMETERS OF *Oreochromis niloticus* FROM EGAH RIVER.

Sex	a	b	r	Mean S.L (Range, cm)	Mean Wt (Range, g)	(CF)
Male	0.0149	3.3632	0.9759	9.74 ± 0.43	33.50 ± 5.19	3.41 ± 0.37
Female	0.0302	3.033	0.9956	11.25 ± 0.61	55.21 ± 8.21	3.28 ± 0.23
Pooled	0.03	3.0412	0.9928	10.8 ± 0.46	48.69 ± 6.14	3.32 ± 0.28

Where (CF) = Condition factor.

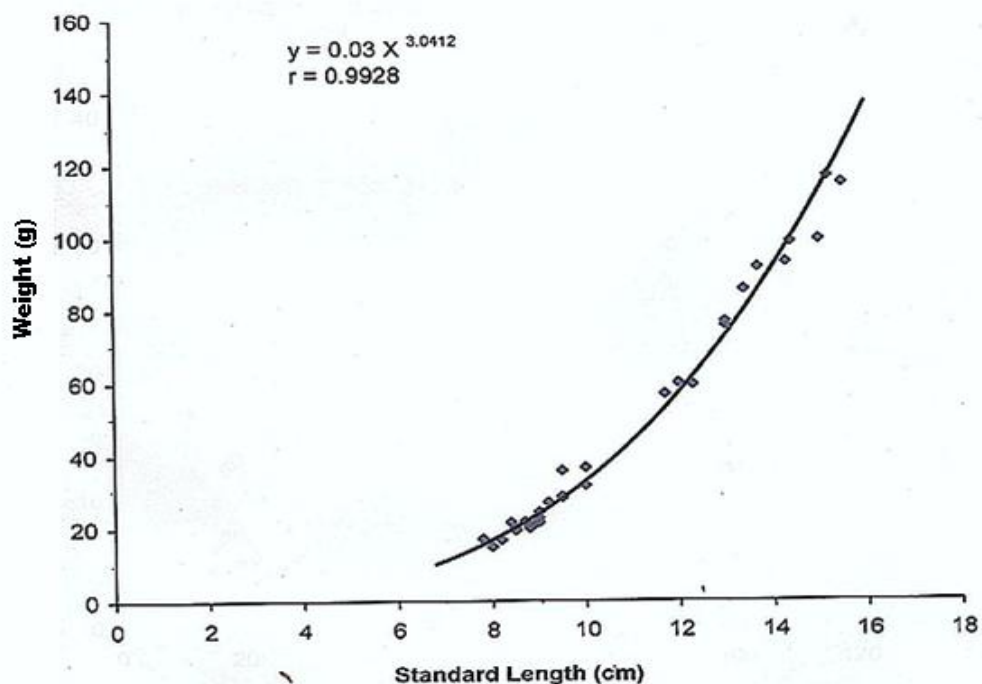


Fig 4: Length weight relationship of *Oreochromis niloticus* from Egah River

DISCUSSION

Organoleptic results shows high level of acceptability in the laboratory processed product and this was attributed to its salt curing and strict sanitary condition under which the product was handled at all stages. On the other hand, there was low acceptability of the traditionally processed products and this may be due to poor taste and dark smoky colour. Furthermore, the most critical control points, Simonsen *et al.*, (1987) in the preparation of smoked *Oreochromis niloticus* (Fig. 2b) were omitted. The traditional processors do not salt cure their tilapia fishes before smoking and evisceration is even optional. These critical points further contributed to the disadvantages of products processed under traditional methods by artisanal fish processors. Also product quality is likely to be variable with part of the batch being over smoked and part being under smoked with probable contamination by dust and infestation from insect. There were significant difference at ($P < 0.05$) in the level of infestation for physical damage, taste and colour between the traditionally processed samples (A) and the laboratory processed samples (B). It can be concluded that the organoleptic characteristics of smoked *Oreochromis niloticus* (Tilapia) processed under laboratory method have proved to be a more efficient form of preservation as taste, colour, physical damage, and insect infestation were the parameters used by the panellist in their choices of processed smoked fish.

The length-weight relationship obtained for this fish species compare favourably with those obtained elsewhere. In this study, *Oreochromis niloticus* compares favourably with Bongoyinge (1984) $\text{Log}W = -4.4654 + 3.21\text{Log}L$ recorded for *Tilapia mariae* in Port Harcourt. It is also similar to $\text{Log} W = -1.5273 + 3.1014 \text{Log}L$, ($r = 0.9923$) obtained in Bankole (1989) for *Oreochromis niloticus* on Tiga lake. This finding is also closely similar to the findings of Fafioye and Oluajo, (2005) with b value of 3.04.

Males have better condition factor than females during the period of study. This may be due to some females being gravid and as a result, decrease in food intake. This is in line with the findings of Wilson and Pitcher (1983) that there is often a rapid fall in fish condition factors as they spawn. In conclusion, the length-weight relationship result revealed that *Oreochromis niloticus* obtained from Idah for both sexes pooled together exhibited allometric growth also, the results of the condition factors revealed that the males were heavier than the

females. While females become more slender, males were stout. This shows the suitability of Egah River in Idah L.G.A to the growth and survival of *Oreochromis niloticus*.

Further research work is necessary to determine the comparative importance of length-dry weight relationship and wet weight-dry weight relationships.

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