

WET WEIGHT-DRY WEIGHT RELATIONSHIP OF *Oreochromis niloticus* (Tilapia) IN EGAH RIVER AT IDAH L.G.A. OF KOGI STATE, NIGERIA.

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INTRODUCTION

Abstract: The relationships between wet weight-dry weights measurements of *Oreochromis niloticus* subjected to smoking at a temperature range of 75°C to 85°C with a time range of 4 to 5 hours using a drum-type smoking kiln were determined. Weight reductions for fish after smoking were >50%. The maximum dry weight losses ranged from 28.50g to 60.00g for males, 53.10g to 117.3g for females and 53.10g to 117.3g for the pooled sexes. Regression analyses were performed on the wet *Oreochromis niloticus* weight-wet body weight and smoked *Oreochromis niloticus* weight-smoked dry body weight. Significant relationships were found in all cases at ($p < 0.05$) with correlation coefficients for males, females and pooled sexes at 0.9241, 0.9632 and 0.9586 respectively.

Key words: Wet weight-dry weight, drum-type smoking kiln, *Oreochromis niloticus*, Egah River.

Oreochromis niloticus is a species native to Africa; it is tolerant of lower temperatures than many other species. As it is the major species used for Tilapia production around the world (Treswavas, 1983). *Oreochromis niloticus* is a fast growing species that can live in many different types of waters; from lakes and rivers to sewage and canals.

Pauly (1983) noted the importance of length –weight relationships (LWR) in the calculation of an equation of growth in length into an equation of growth in weight. Another researcher; Arslan *et al* (2004) stated that it is usually easier to measure length than weight, and weight can be predicted later on using the length –weight relationship which helps among other things predict the weight of a fish given its definite length but only little work has been done to determine the relationship between the wet weight and the dry weight of a giving fish that will help determine the weight of a giving dry(smoked) fish giving its wet (fresh) weight even though smoking time is highly dependent on weather, temperature, wind, humidity and length of storage. The smoking of fish at different standard temperatures and length of time to determine their dry weight if given a definite wet weight have not been thoroughly researched into; this prompted the research work to dry (smoke) *Oreochromis niloticus* (Tilapia) fish at a temperature range of 75°C to 85°C with a time range of 4 to 5 hours, thus the objective of this research is to determine the dry (smoked) weight of *Oreochromis niloticus* given a definite wet weight.

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MATERIALS AND METHOD

Idah L.G.A is located at latitude $7^{\circ} 04'N$ and longitude $6^{\circ} 50'E$ of the equator (Aloko, 2006). The river serves as a rich source of fishing ground for Kogi State and its environs.

A total number of 60 fresh tilapia fishes with standard length ranging from 7.8cm to 15.5cm were purchased from Egah fish landing site. The fishes were serially numbered; the total length (TL) and standard length (SL) were taken from the tip of the head to the tip of the tail respectively using a measuring board.

Their corresponding body weights were also measured for each fish before and after smoking to the nearest gram (g) using a sensitive weighing

balance after draining water from the bucal cavity and blotting out excess water on the fish body (King, 1996). In this research work the drum type smoking kiln was used for the fish smoking as seen in fig (1). The drum-type-smoking kiln with a double smoking rack was fabricated from a 44-gallon drum by simply opening the top end of the drum completely and passing iron rods at about 20cm below the top. Smoking racks of wire mesh were placed on the iron rods. At the opposite end of the drum, a 30cm square opening was created to form the smoke hole. Fishes were are placed on the smoking racks and fired from below as the fish is covered with iron sheet to conserve the smoke in the drum (Eyo, 2001).

The drum-type-smoking kiln is relatively cheap to construct, potable, mobile and can be used practically any where as seen bellow.



Plate (1) THE DRUM-TYPE-SMOKING KILN

COLLECTION AND PROCESSING OF SAMPLES

These fishes were then processed as shown in fig.1 (Eyo, 2001). The fishes were washed and manually eviscerated and then washed through. They were cured using 10% salt and smoked for about 4 – 5

hours at 75°C - 85°C using the drum-type-smoking kiln (Eyo, 2001).

After proper smoking the fishes were allowed to return to room temperature before new measurements were taken to determine their dry body weight.

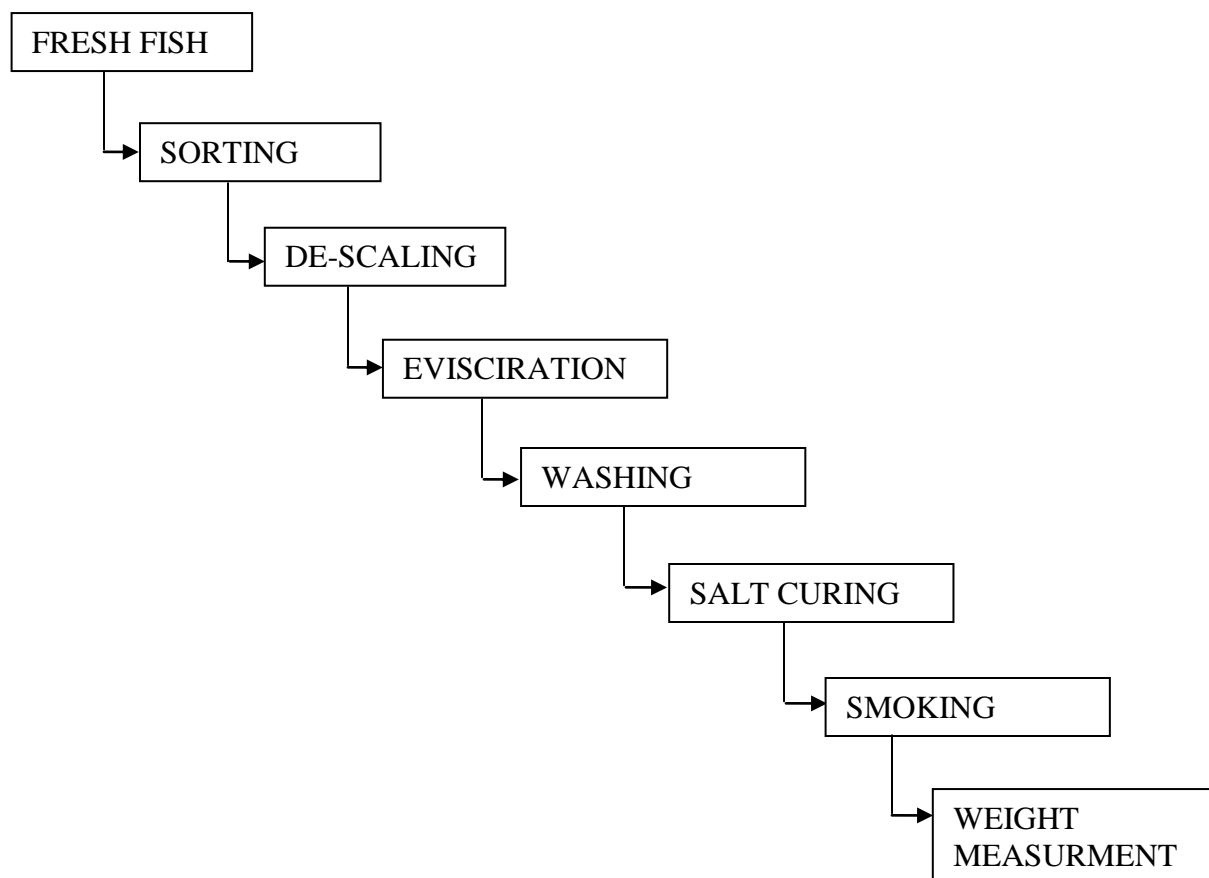


Fig 1: Flow chart for processed *Oreochromis niloticus* (Tilapia) fish.

The wet weight-dry weight relationship for males, females and pooled sexes were estimated by exponential curve fitting as per the formula $W = aL^b$ (Ricker, 1973).

Where,

W = total weight (g), L = total length (cm), a = intercept (initial growth coefficient), b = slope

(growth coefficient). The parameters “a” and “b” of wet weight-dry weight relationships were estimated by linear regression analysis (least square method). The corresponding log transformation values of wet weight-dry weight gives the linear expression $\text{Log}W = \text{Log} a + b \text{Log}L$ via least square linear equation (Zar, 1984).

RESULTS

Sixty (60) *Oreochromis niloticus* (Tilapia) fishes were used for the wet weight-dry weight relationships. A summary of the results is given in Table (1) which shows the size ranges of fish samples before and after smoking while Table (2) reveals the analyzed result of wet weight-dry weight relationships haven subjected the results through exponential curve fitting using the; $W = aL^b$ (Ricker, 1973).

Males, females and pooled sexes weight before smoking ranged between 19.3g – 60.0g, 14.9g –

117.3g and 14.9g - 117.3g respectively while 5.2g – 28.5g, 4.4g – 53.1g and 4.4g – 53.1g were obtained for males, females and pooled sexes after smoking respectively. The values obtained showed significant difference at ($P < 0.05$). The b values for males, females and pooled sexes showed a linear regression of, -4.0684, -0.5632 and -0.4602 respectively. There is also a linear relationship between the wet weight and dry weight of *O. niloticus* as indicated by the high “r” value of 0.958.

Table (1): SIZE RANGES OF *Oreochromis niloticus* FROM EGAH RIVER BEFORE AND AFTER SMOKING

Sex	No	Length (cm)		Wet Weight (g)		Dry Weight (g)	
		Min	Max	Min	Max	Min	Max
Males	18	8.5	12.0	19.3	60.0	5.2	28.5
Females	42	7.8	15.5	14.9	117.3	4.4	53.1
Pooled	60	8.5	15.5	14.9	117.3	4.4	53.1

Table (2): WET WEIGHT – DRY WEIGHT RELATIONSHIP PARAMETERS OF *Oreochromis niloticus* FROM EGAH RIVER

Sex	a	b	r
Male	0.5596	-4.0684	0.9241
Female	0.4276	-0.5632	0.9632
Pooled	0.4317	-0.4602	0.9586

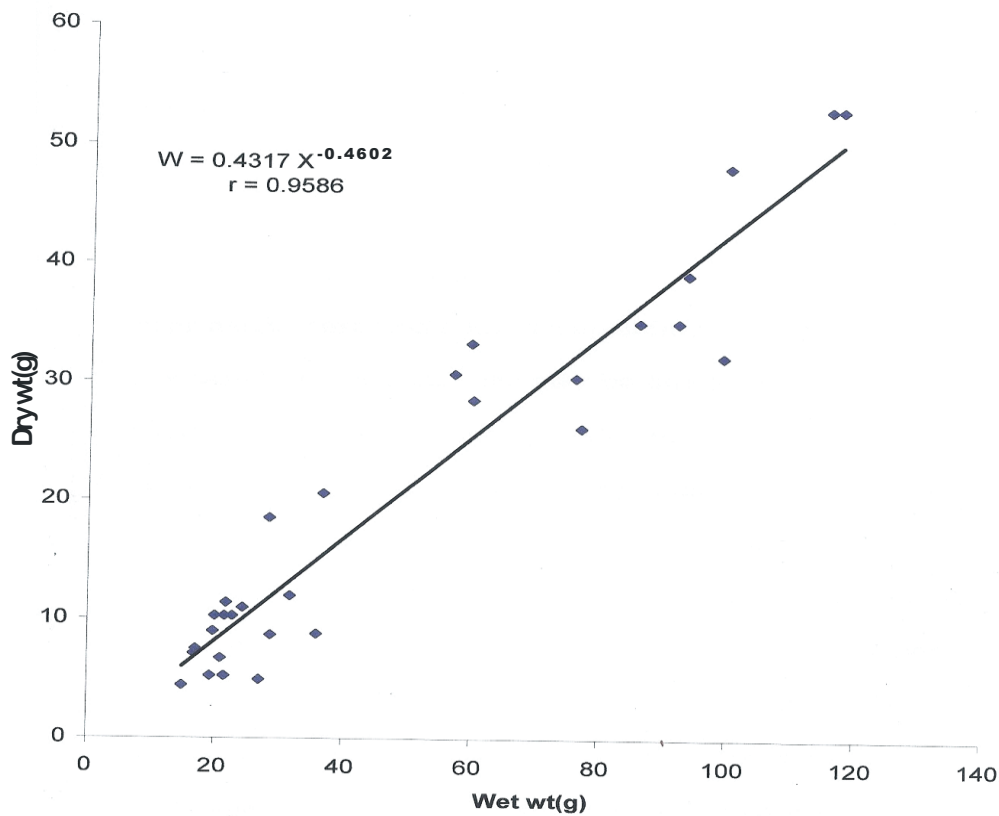


Fig 1: Wet weight-dry weight relationship of *Oreochromis niloticus* from Egah River.

DISCUSSION

An examination of the relationship that exists between the wet weight and dry weight was undertaken. The Rickter, (1973) equation was adopted by substituting the length (L) with dry weight (D). Correlation analyses using weight loss values in this research revealed an “r” value of 0.9586 which is closely similar to the findings of Kings, (1996) who worked on “Length-weight relationship of Nigerian coastal water fishes” with “r” value of 0.949 and Olatunde (1983) who worked on the “Length – weight relationship and the diets of *Clarias lazera* in Zaria Nigeria and obtained an “r” value of 0.974. “r” value indicates a close

relationship between certain parameters Abowei (2009). The value of b was determined by plotting the logarithm of wet weight against the logarithm of dry weight. The results of this research reveal a linear relationship between the wet weight and dry weight which shows an even distribution of weight loss after smoking relative to the wet weight obtained before smoking. This means that for a definite weight of fish; smoke dried under the conditions adopted in this research, its definite wet weight can be determined. In view of this, it has become imperative to research further in other to dry fishes at different standard temperature and time so that in each case their respective fresh weight can be determined given the dry weight.

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