

Length-Weight relationship and Condition factor of the African Catfish (*Clarias gariepinus*, BURCHELL 1822)

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The African catfish (*Clarias gariepinus* Burchell 1822) of the family *Clariidae* (Figure 1) is a highly economic freshwater species found in the tropical and subtropical regions of the world. However, information on its growth pattern, robustness and survival in aquaponics systems is scanty.



Figure 1. African sharp-toothed catfish *Clarias gariepinus*. Source: By Unknown author - Illustrations of the Zoology of South Africa, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=18918273>.

Consequently, the Living Lab of Njala University studied the growth performance and well-being of the fish using the length-weight relationship (LWR) and condition factor (CF) in an aquaponics setup. The setup consisted of 700 litres water capacity IBC tank stocked with 52 juveniles of *Clarias gariepinus* (mean weight 15.2 g) and 5.5 m NFT plastic pipes on which 75 stands of Okra (*Abelmoschus esculentus*) were planted. Fish length and weight as well as water quality parameters (dissolved oxygen, pH, temperature, NO_3 , NH_4 , NO_2) were monitored in the aquaponics system bi-weekly.



Figure 2. Length measurement needs to be performed quickly.

Equation 1 was used to estimate the growth performance:

$$W = a * L^b \quad (\text{Equation 1})$$

Where

W = Observed total weight of the fishes in grams.

L = Observed standard lengths of the fish in centimetres.

a and b are constants.

The equation was transformed using logarithm to obtain a straight-line relationship:

$$\log W = \log a + b * \log L \quad (\text{Equation 2})$$

The regression coefficient 'b' of the unsexed fish that is greater than (> 1) or less than (< 1) demonstrates either positive or negative allometric growth respectively. Positive allometric growth indicates that their weight increases at a faster rate than their length, while negative allometric growth means that their weight increases at a slower rate than their length.

The value of b=3 shows isometric growth (desired growth pattern).

The Condition factor (K) is another important factor that can indicate the well-being of fish. Higher condition factors suggest better health and growth, while lower condition factors may indicate poorer health or environmental stress.

Condition factor is expressed as the Fulton's condition factor (K) using the equation

$$K = 100 * \frac{W}{L^3} \quad (\text{Equation 3})$$

Where

K = Condition factor

W = Fish weight in grams, and

L = Fish total length in centimeters

Condition factor values of 1 or above represent good growth in the given environment, while a score of < 0.5 represents poor health condition. Poor growth and low K values could be attributed to poor water condition, and or poor nutrition or reduced feed intake caused by poor water quality of the aquaponics setup.

Overall, the LWR and condition factor are valuable tools for assessing fish growth, health, and the ecological condition of aquatic ecosystems.