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LENGHT-WEIGHT RELASTIONSHIP AND CONDITION FACTOR OF Brachirus Orientalis (Bloch &Schneider, 1801) IN IRAQ MARINE WATER

[1]Layla A. Aufi

Department of Vertebrates, Marine Science Center, University of Basrah, Iraq

Email: layla.awfi@uobasrah.edu.iq

Abstract:

Length-weight relationships of *Brachirus Orientalis*, in coastal areas of Faw, south of Iraq was carried out on January to December 2019. Total length were ranged from 15.3 to 42 cm for 193 collected specimens, weight ranging from 59.60 to 1123.65g. According to the length-weight correlations the b value was 3.021. This demonstrated that positive allometric growth for both sexes. Calculated values of condition factor were 1.02and 1.12 for male, female respectively that showed healthy condition of fish.

Key words: Brachirus Orientalis, Length-weight relationships, condition factor, Iraq marine water.

I. INTRODUCTION

Studies on length-weight relationships have important implications for fisheries science and are necessary for stock assessment models (Mendes et al. 2004). They are commonly used in the ecosystem modeling (Christensen and Walters 2004) to calculate the production over biomass ratio (P/B) of different functional groups used for more precise weight estimates. Length-weight relationships help in estimating the weight of a fish at a given length and can be used in studies of gonad development, the rate of feeding, metamorphosis, maturity and condition (Richter et al., 2000). This relationship is also important in estimating the average weight at a given length group and in assessing the relative well-being of a fish population (Oscoz et al., 2005; Abowei et al., 2009). The study of length-weight relationships and condition indices in fish provide indirect information on growth, maturity, reproduction, nutrition and hence the health status of the populations. This allows inter-population comparative studies (Lyons, et al 2010) that can then be used in predictive models of behavior or dynamics, both of the population and the community (Al-Dubakel, 2011). Length-weight relationships give information on the condition and growth patterns of fish (Bagenal, 1978). Fishes are said to exhibit isometric growth when length increases in equal proportions with body weight for constant specific gravity. Condition factor studies take into consideration the health and general well-being of fish as related to their environment (Reynold, 1968). length-weight relationships has found its purpose for the estimation of the condition factor of fishes (Le Cren 1951; Froese 2006). The importance of these variable cannot be over emphasized because they reflect

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the physiological state of the fish as they are affected by intrinsic (gonadal development, organic reserves, presence or absence of food in the gut) and extrinsic (food availability, environmental variability) factors (Nikolsky, 1969), hence, could be used to access the general wellbeing (Gaspar *et al*., 2012). The condition factor which show the degree of well-being of the fish in their habitat is expressed by 'coefficient of condition' also known as length–weight factor. This factor is a measure of various ecological and biological factors such as degree of fitness, gonad development and the suitability of the environment with regard to the feeding condition (Mac Gregoer, 1959). some aspects of the biology of the *B. Orientalis*, including data on length, weight relationships, and condition factors, from samples taken from the Iraqi marine water.

II. MATERIALS AND METHODS

Study area & Sample Collection

B. Orientalis samples were obtained on a regular basis from fishermen in the coastal areas of Faw, Iraq (Fig.1). The specimens were collected throughout the year from January to December 2019. During the study period, a total of 193 samples were collected. The samples were taken to the laboratory and kept in a deep freezer until they were examined and analyzed. The taxonomic identification of the species was followed by Lucena and Menezes, (2003). Total length and weight were measured to the nearest 0.1 cm, and 0.01 g, respectively for each fish.Fish total length (cm) was measured with a measuring board, while the weight was determined with a weighing balance.

Froese, (2006) equation was used to express the relationship between fish length (L) and weight (W) :

$W = aL^b$

W = the fish weight (g). L = the fish total length (cm).

a = the intercepted. b = the regression line's slope

Relative condition factor (K_n) in terms of sex and months was calculated using LeCren's (1951) equation:

$$k_n = w\text{-}/w$$

Where, w- = actual weight and w = computed weight.

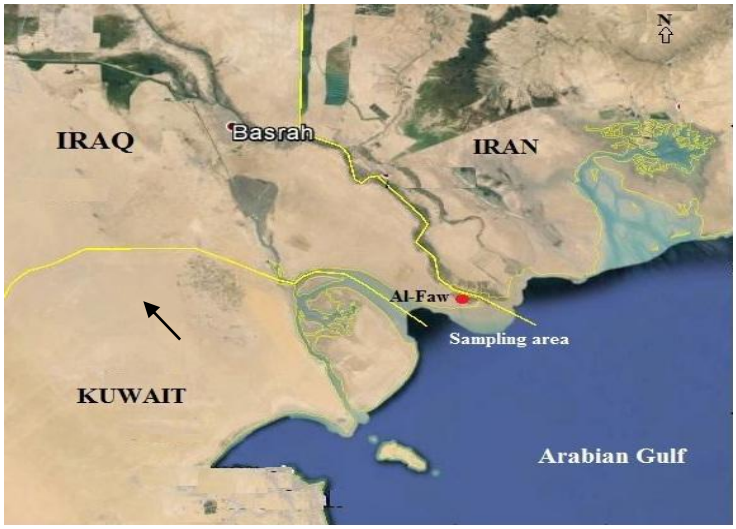

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Fig. 1. The location of sampling area, in Iraqi marine water northwest of Persian Gulf .

III. RESULTS

Length-weight relationship

The comparison of regressions revealed no statistically significant difference between sexes (t = 0.315, p 0.05). therefore the relationship between total length and body weight for *B. Orientalis* was calculated on the entire sample (193 specimen), range from 15.3 to 42 cm in total length and in weight from 59.60 to 1123.65g. Body weight exponentially increased with total length by the following relationship (Fig.2): $W= 0.018\ L^{3.021}$, ($r^2= 0.913$). The regression coefficient (b) of the relationship proved to be statistically significantly different from the value 3 in the t-test (t= 3.070, P > 0.05), demonstrate positive allometric growth. The corresponding considerable correlation coefficient (r^2) also indicates a significantly linear length-weight relationship in log scale.

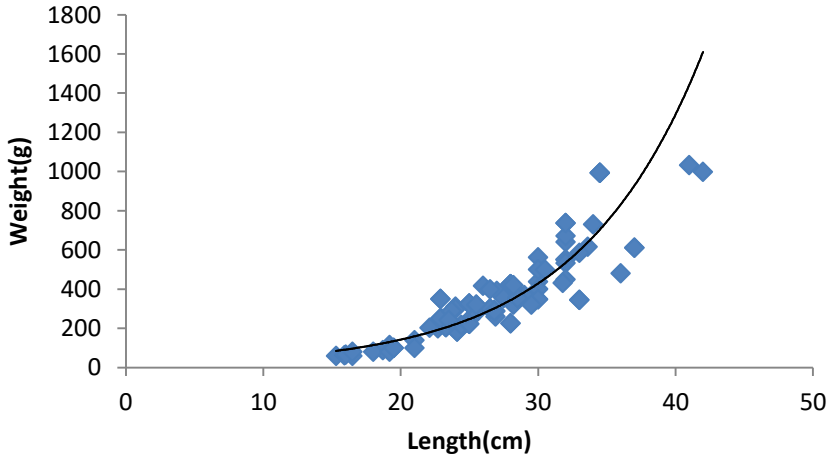

Fig. 2. Length-weight relationship of *B. Orientalis*

Relative condition factor

The relative condition (k_n) factor showed similar trends in both sexes (Fig. 3). Relative condition factor in males and females specimens was ranging between 0.64 - 1.07 and 0.59 - 1.18, respectively. Both sexes revealed nearly identical patterns in the relative condition factor(k_n), with no significant differences between them.

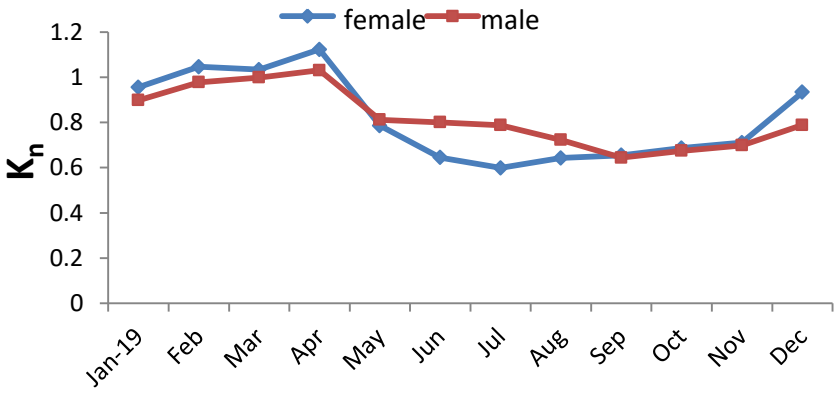

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Fig. 3. The relative condition factor (K_n) of *B. Orientalis* in Iraqi marine water

IV. DISCUSSION

In general, *B.Orientalis* show a slow-growing species with a long lifespan comparing with other species (Keivany et al. 2020). In the present study, the lengths of individuals of *B.Orientalis* ranged from 15.3 to 42 cm; in this study the largest specimen recorded was a female measuring 42 cm total length and 1123 g weight however, this size is almost similar to those reported from some other waters, such as Alghada et al. (2020) found the largest female of this species at 38.5 cm total length and 757g weight in Bushehr coast, while Mohammadi and Khodadadi (2008) recorded the largest female specimen with an overall length of 40 cm. On the other hand, Yasemi et al. (2007) recorded the longest specimen at 27.6 cm total length and weighting 696 g at the same area. In the present study, the length-weight relationship value for the exponent (b) demonstrated that the growth of *B. Orientalis* was positive allometrically. This means that as the fish gets longer, it becomes stouter and has a deeper body. (Riedel et al., 2007). According to Sharma and Bhat (2015) "in the relation length-weight, *b* is related to the type of growth taking into account that the size of a fish increases in one dimension, while its weight does in three, For this reason, when it has a value of 3.0, growth is considered isometric, characterizing a fish whose body proportions do not vary much during its life cycle; but when it is greater or less than 3.0, growth is considered positive or negative allometric". the value of (b) of *B. Orientalis* in the present study for length weight was 3.021 here length-weight showed a positive isometric growth for this species. This result is different from the result which reported by Keivany et al., (2020) in Bushehr area in the Persian Gulf on the same species, the value of *b* was reported to be 2.964. Several factors like sex, gonad maturity, the health of the fish, environmental seasonality, the abundance of food, the level of stomach fullness, fishing pressure and the size of fish may influence this relationship (Bagenal and Tesch, 1978; Gokce *et al*., 2007; Mir *et al*., 2012; Mili *et al*., 2017). Monthly variation in the relative condition factor of *B. Orientalis* showed the same pattern in both sexes, there is no significant differences, that indicating continual feeding during the year and throughout the reproductive season.For both sexes, the maximum values of relative condition factor were reported in April, while the low values were recorded in September. This variation might be attributed to gonads maturation in addition to feeding chances. *B. Orientalis* population in the sample region tended to have lower relative condition (k_n) variables than those in the Bushehr area of the Persian Gulf (K= 2.07 in females, 2.22 in males) (Keivany *et al*. 2020).Gonads development, feeding behavior and several other factors are influence the seasonal variation of condition factor (FAO. 2018; Hassan, *et al*. 2013; Hynes,1950; Hyslop,1980).The male and female relative condition factors (k_n) in this analysis were found to be 1.02 and 1.12, respectively, which is extremely similar to unity and indicates that the fish are in good health. Relative condition factor (K_n) reflects information about the fish's physiological condition in relation to its welfare. There is fat accumulation and gonad maturation from a dietary standpoint (Angelescu, et al.1958).

V. CONCLUSION

Positive allometric growth is shown by the length-weight parameter and condition factor values of *B. Orientalis*, these species was healthy and found to be stable and suitable for commercial processing.

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