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LENGTH – WEIGHT RELATIONSHIP IN COMMON SEABREAM *ACANTHOPAGRUS BERDA* (FORSSKAL, 1775) FROM KARACHI, PAKISTAN

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ABSTRACT

To describe length-weight relationship in *Acanthopagrus berda* (Forsskal, 1775), its 1687 specimens (male, female and unsexed) were examined during the period from January 2005 to December 2006. The samples were obtained from three main landing centers of Karachi (Pakistan). The Fish Harbour, Ibrahim Haidary and 100 Quarters Korangi Karachi. Because most of the marine fish catch from Sindh and Balochistan provinces of Pakistan were brought to these centers for auction. The maximum size of male was 33.8 cm and the maximum size of female was 34.7 cm. The body weight ranged from 77.0 to 900g in case of male and 128 – 932.38g in female samples. The fork length (cm) and weight (g) relationship was described statistically using SPSS ver. 14. The values of "a" and "b" were determined by log10 transformed length and weight values. The relationship of length and weight was subjected to t- test analysis at $p < 0.001$. The magnitude of correlation coefficient (r^2) for male specimens was 0.879, for female specimens 0.882 and overall (males, females and unsexed) 0.979. The magnitude of 'b' was near theoretical value of 3 in overall cases (isometry) and significantly different in male and female samples (negative allometry).

Key-words: *Acanthopagrus berda*, length-weight relationship, Karachi, Pakistan.

INTRODUCTION

There are a number of important marine and freshwater fish species that are found in Pakistan, seabreams (porgies) are the one of them belongs to the family Sparidae. The family Sparidae belongs to the one of the largest vertebrates order Perciformes, contains 148 families and about 9,300 species. This order consists of spiny-rayed fishes that live commonly in tropical and sub tropical waters of the world. Family Sparidae is consisted of a number of species with excellent taste and thus is of high commercial value (Nelson, 1994; Franch, *et al*,, 2006). On the bases of molecular studies, the family Sparidae had been divided in to two large groups (Orrell and Carpenter, 2004; Franch, *et al.*, 2006). Similarly the cytogenetic studies of different species of this family show higher karyotypic diversification (Cataudela *et al*., 1980; Vitturi *et al*., 1992). Family Sparidae consist of 37 genera and 125 species: of which about twenty seven (27) species are karyotyped (Froese and Pauly, 2007). The *Acanthopagrus* is very important genus of Family Sparidae. This genus was established by Peters (1855) separating it as a subgenus of the genus *Chrysophrys* . Now *Acanthopagurus* is considered as an independent genus of family Sparidae (Carpenter 2001; Iwatsuki *et al.*, 2006).Genus *Acanthopagurus* has about ten (10) species but recently two new species *Acanthopugurus randalli* and *A. omanensis* have recently been described by Iwatsuki and Heemtra (2010).

The sparids are widespread in Indian, Atlantic and Mediterranean Seas. , Seabreams are the important elements of the coastal ecosystem (Bauchot and Hurea ,1986). Because of their good taste and soft flesh, many sea breams are cultured in different part of the world. In Japan, China, Australia and Brazil *A. schlegeli* (black seabream), *Pagurus major* (red seabream), *A. latus* (yellowfin seabream) and *Rhabdosargus sarba* (silver bream) are successfully being cultured and their artificial mass seed production techniques are fully developed (Liu and Hu, 1980; Lin *et al*., 1987; Jean *et al*., 1992; Franch *at al*., 2006).

Mostly species of family Sparidae are found in marine or estuarine waters but few species penetrates in deeper oceanic waters as well as freshwaters. (Munro, 1955; Smith 1986; Nelson, 1994). Fishes of the family Sparidae are opportunistic feeders and their diet depends on their size and habitat.

The object of the study was to provide basic knowledge about this species from Pakistan. The results will helpful in future management of this species.

MATERIALS AND METHODS

Sample collection

Each month 35-45 specimens of *Acanthopagrus berda* were randomly selected from the fish lot at three different landing centers (Karachi Fish Harbour, Ibrahim Hyderi and 100 Quarters Korangi) during the period from January 2005 to December 2006. A total of 1687 specimens (male, female and unsexed) of *Acanthopagrus berda were* examined during the study period.

The length- weight relationship analysis of both species is estimated using formula given by Ricker (1975).

$W = aL^b$

Log transformed equation by Zar (1996) is given below.

$\text{Log10 } W = a + b \log 10 L$

Where

W = weight (g) independent variable.

L = length (cm) dependent variable

and

a is an intercept;

b is power function of the length – weight relationship.

Log Fork length in cm and log weight in (g) were employed for estimation of length – weight relationship of males, females and combined males, females and unsexed, separately. The t-test was used to verify the significance of variation of b values from the theoretical normal of 3.

RESULTS

The maximum size of male was 33.8 cm and the maximum size of female was 34.7 cm. The body weight ranged from 77.0 to 900g in case of male and 128 – 932.38g in female samples. The length - weight relation of *A. berda* was determined by the logarithmic transformation of data pooled from 2005 to 2006 samplings. The statistics of regression is shown in Table 1 and 2. The relationships of log length and log weight are shown in Fig.1. The relationship equations of males, females and combined $\log_{10}$ length and log weight were calculated separately. All three equations showed no significant differences and the values of coefficient of correlation (r^2) were highly significant.

The equations of linear regression obtained from two (2005 – 2006) years' data are as follow.

$\text{Log}_{10} W_{(\text{Overall})} = -1.609 + 2.980 \text{ Log}_{10} L \quad r^2 = 0.979$ ---------- N= 1074

The log linear regression analysis for males individuals are as:

$\text{Log10 } W_{(\text{Male})} = -1.133 + 2.638 \text{ Log}_{10} L \quad r^2 = 0.879$ ---------- N= 333

The log linear regression analysis for females individuals are as:

$\text{Log10 } W_{(\text{Female})} = -1.125 + 2.636 \text{ Log}_{10} L \quad r^2 = 0.882$ ---------- N= 280

Table 1. Fork Length – Weight relationship parameters for *A. berda* collected from three diffetrent landing centers of Karachi the period January 2005 to December 2006.Where fish length was an independent and fish otolith weight a dependent variable.

	Fork Length				Fork Length - Weight Relationship			
	N	Min.	Max.	Mean	SD	a	b	R^2	MS Residual
Overall (Male, Female and Unsexed)	1074	2.00	34.80	18.58	8.13	–1.609	2.980	0.979	12.173
Male	333	16.00	34.00	22.48	4.64	–1.133	2.638	0.879	2.337
Female	280	17.00	34.80	26.65	4.48	–1.125	2.636	0.882	1.542

N, number of fish; a, intercept; b, slope; r^2, determination coefficient

Table 2. Values for t-test for the slopes of regression equation (data of table 1).

Sex	Slope (b)	Standard Error of Slope	Theoretical Slope	t- test	Probability
Overall (Male, Female and Unsexed)	2.980	0.013	3.0	1.538	NS
Males	2.638	0.054	3.0	6.740	0.001
Females	2.636	0.058	3.0	6.270	0.001

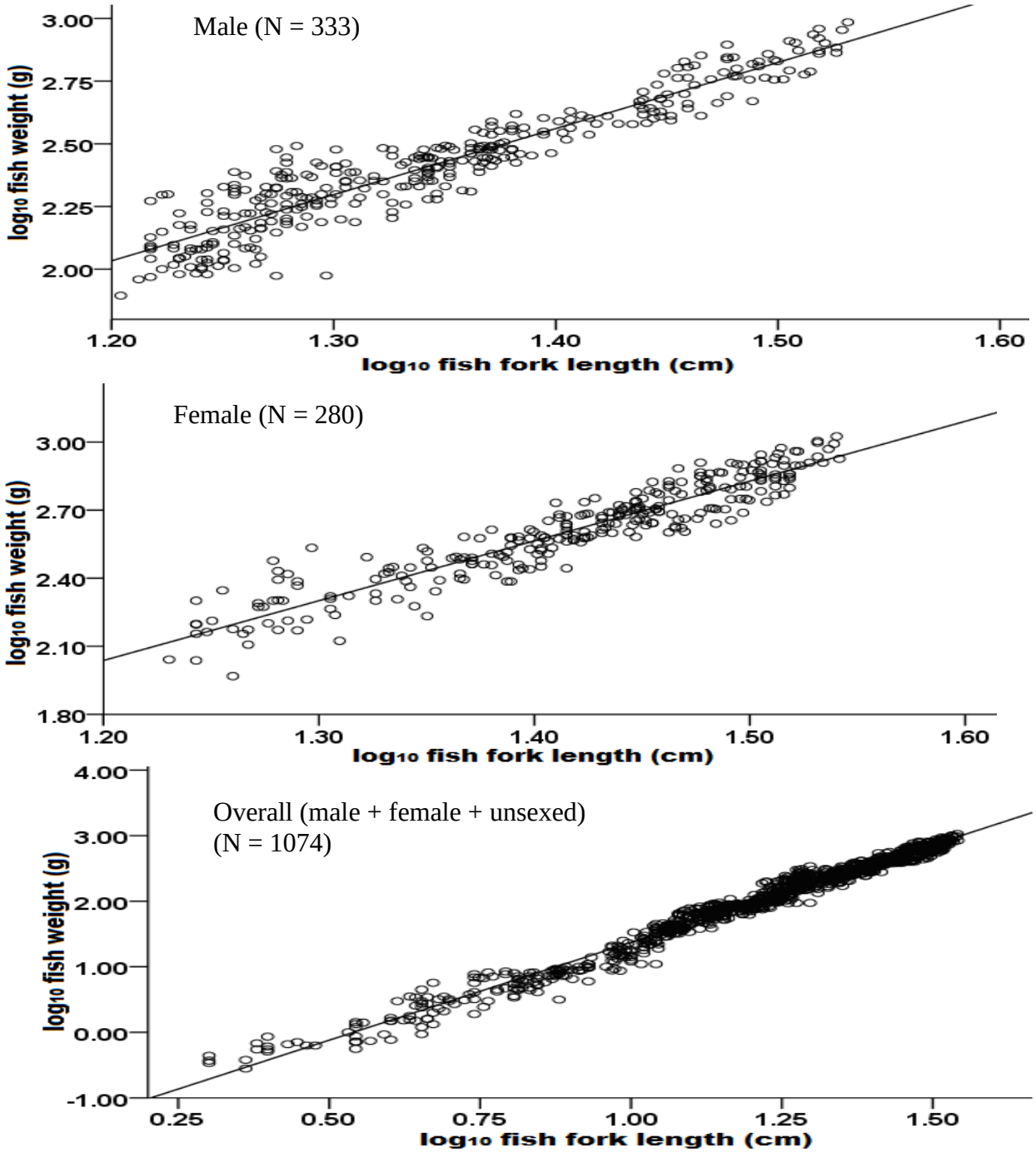

Fig. 1. Length weight relationship of males, females and overall (males + females + unsexed) for specimens of *Acanthopagrus berda.*

In present study the determining values of slopes by regression of males, females and overall showed their was no significant difference between theoretical slope of 3. The values of b for males 2.638, females 2.636 and combined 2.98. According to Gayanilo and Puly (1997) the value of b may be range 2.5 – 3.5. The magnitude of 'b' was very close to 3 in overall samples but magnitude of 'b' was significantly lower than 3 in male and female specimens. The result indicated an isometric growth in overall (male, females and unsexed) specimens. Males and females however showed negative allometry.

DISCUSSION

In present study the maximum fork length for males were 34 cm observed and females were 34.7 cm, it is larger than previous reported length. Tobin (1998) has reported the maximum fork length for males were 31 cm while females were 32 cm. The Cherif *et al*., (2008) from Gulf of Tunis reported the value of length - weight parameter 'b' for *Sparus aurata* (Linnaeus, 1758) was 2.67 (for both male and females) and *Diplodus annularis* (Linnaeus, 1758) was 2.9, both are belong to family Sparidae. *Sparus aurata* showed negative allometry while *Diplodus annularis* showed positive allometry growth. The value of 'b' is very much similar to our results. The length - weight parameter (b) of *A. latus* close native of *Acanthopagrus berda* from Australia reported by Hesp *et al*., (2004), to be 2.997 which is also very close to our results.

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