

Length-Weight Relationship and Relative Condition Factor of a Carp, *Cirrhinus reba* (Hamilton) from Manchar Lake, Distt. Dadu, Sindh, Pakistan

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Abstract.- The length- weight relationship and relative condition factor (Kn) of a carp, *Cirrhinus reba* (Hamilton) from Manchar Lake Distt. Dadu, Sindh, were studied by examining 265 specimens collected during October, 2003 to February, 2004. These fishes ranged from 1 0.0 - 22.5 cm in length (TL) and 7.6 - 102.5 g in weight. The relation between the total length and weight of male, female and sexes combined of *C. reba* is described as Log W= - 2.53 + 3.40 x Log L for males, Log W= -2.91 + 3.74 x Log L for females and Log W= - 2.43 + 3.32 x Log L for sexes combined. The mean relative condition factor (Kn) values ranged from 0.96 to 1.10 (Mean 1.02 ±0.20) for males, 0.99 to 1.07 (Mean 1.03±0.18) for females and 0.96 to 1.05 (Mean 1.04 ±0.20) for combined sexes. The length-weight relationship and relative condition factor show that the growth of *C. reba* from Manchar Lake District Dadu, Sindh was found to be isometric.

Key words: *Cirrhinus reba*, length-weight relationship, condition factor.

INTRODUCTION

Cirrhinus reba (Hamilton) is locally known as Suhnee or Sunee and is easily recognised by its scales, darkest at their upper and lower edges forming bluish longitudinal lines above and for two or three rows below the lateral line. It is commonly found in clean waters of rivers, canals, streams and other flood plains of Pakistan India and Bangladesh (Hossain, 2001).

In future *C. reba* can be a potential candidate for artificial culture in ponds, so it is important to study its length-weight relationship and condition factor. At present no published information is available on any biological aspect of this important food fish (*C. reba*) from Pakistan. Elsewhere, various researchers such as Rao *et al.* (1972) studied its spawning behaviour in the Cauvery and Bhavani rivers. Verghese (1975) worked on internal rhythm of sexual cycle under artificial conditions of darkness. Gupta (1975) made some observations on its biology from India. Dewan *et al.* (1985) reported diel patterns and amount of food taken. Khan (1986) published information on its fecundity from Baigul reservoir. Bhuiyan (1989) studied effect of living space on growth. Hossain (2001) worked on induced

breeding by pituitary gland extract from Bangladesh. The present investigations were carried out to ascertain length-weight relationship and condition factor of *C. reba* from Manchar lake.

MATERIALS AND METHODS

Fish samples were obtained monthly during October, 2003 to February, 2004 from the catch of fishermen of the Manchar Lake (Distt. Dadu). A total of 265 specimens of *C. reba* (123 males and 142 females), ranging from 10.0 to 22.5 cm in total length (TL) and 7.6 to 102.5g in weight were used for the length-weight analysis.

Length of fish was measured to the nearest mm and weight up to 0.1 g. The fishes were then sexed by observing the gonads after dissecting the abdomen. The length-weight relationship of the fish has been calculated from the logarithmic formula:

$$\text{Log W} = \text{Log a} + b \times \text{Log L.}$$

The smoothed mean weights W, for each length group have been computed from this Log formula. LeCren's (1951) modified formula: $\text{Kn} = \text{W}/\text{aL}^n$ has been adapted for the calculation of the relative condition factor. This can be expressed as $\text{Kn} = \text{W}/\hat{\text{W}}$, where W is observed weight and $\hat{\text{W}}$ is calculated weight as determined from the length-weight equations. The relative condition factor (Kn)

has been calculated separately for males, females and sexes combined for each 2 cm length interval.

RESULTS

Length-weight relationship

Length-weight equations were calculated separately for males and females and sexes combined. The fish samples were divided into 2 cm length groups (Table I). When empirical values of lengths were plotted against their respective weight on an arithmetic scale, smooth curves were obtained (Fig. 1). A plot of weight against length on double logarithmic paper however, yielded a straight line (Fig. 2) as expected. The regression coefficients, when calculated using the methods of least squares for male, female and sexes combined *C. reba* in the size range 10.0 to 22.5 cm, gave the following equations:

Log $w = -2.53 + 3.40 \times \text{Log } L$ (for males) ($r = 0.99$, $t = 62.86$)

Log $W = -2.91 + 3.74 \times \text{Log } L$ (for female) ($r = 0.99$, $t = 61.73$)

Log $W = -2.43 + 3.32 \times \text{Log } L$ (sexes combined) ($r = 0.99$, $t = 61.89$)

As may be noted from the equations, the exponential values for males, females and sexes combined were practically identical. The coefficient of correlation 'r' for males, females and sexes combined for the regression of total length and body weight were estimated to be 0.99, which is highly significant at 0.1 % level. The agreement between the empirical weight and computed weight from regressions can be termed as satisfactory.

Relative condition factor

The values of Kn showed fluctuation in all size groups of males, females and sexes combined. When t- test was applied on data of Kn for males, females and sexes combined ($P > 0.05$), it was found that the values are statistically non-significant.

The Kn values of males, females and sexes combined were calculated for various length groups. Table II shows values of Kn at different sizes ranged from 0.96-1.10 ($SD \pm 0.20$ mean Kn 1.02) in males, 0.99-1.07 ($SD \pm 0.18$ mean 1.03) in females

and 0.96-1.05 ($SD \pm 0.20$ mean 1.01) in sexes combined respectively. On average, the females were in a slightly better condition (*i.e.* mean Kn= 1.03) than males (mean Kn= 1.02).

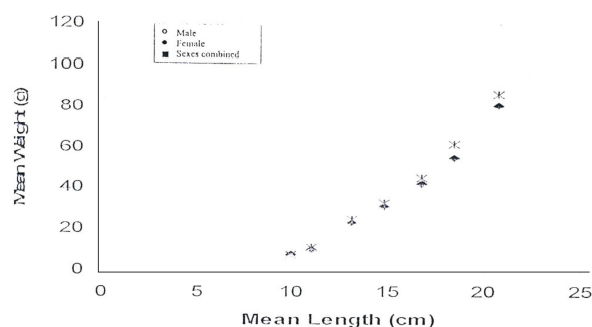


Fig. 1. Plot of length-weight relationship of male, female and sexes combined of *Cirrhinus reba* from Manchar Lake, district Dadu, Sindh (empirical values).



Fig. 2. Plot of values of logarithmic length-weight relationship of male, female and sexes combined of *Cirrhinus reba* from Manchar Lake, district Dadu, Sindh.

DISCUSSION

The values of length-weight regression coefficient "b" for males (3.40), females (3.74) and sexes combined (3.32) were significantly different from the cube law. Hile (1936) and Martin (1949) observed that the value of regression co-efficient (b) usually lies between 2.5 and 4.0. Tesch (1968) reported that value of 'b' might be in between 2.0 and 4.0. However, a variation in 'b' value may occur due to different environmental factors. Various workers have calculated values of regression co-efficient (b) in different fish species and found

Table I.- Data on length and weight of *Cirrhinus reba* from Manchar Lake, District Dadu, Sindh.

Length group (cm)	Males			Females			Sexes combined		
	No. of males	Length (cm) Mean±SD	Mean weight (g)	No. of females	Length (cm) Mean±SD	Mean weight (g)	No. of specimens	Length (cm) Mean±SD	Mean weight (g)
8.1-10.0	1	10.0±0.00	7.6	-*	-	-	1	10.0±0.00	7.6
10.1-12.0	6	11.0±1.75	10.0	4	11.3±1.25	12.7	10	11.1±1.75	11.1
12.1-14.0	20	13.2±1.64	22.9	18	13.4±1.55	26.2	38	13.3±1.50	24.5
14.1-16.0	57	14.8±1.55	30.8	52	15.0±1.75	34.4	109	14.9±1.66	32.5
16.1-18.0	24	16.8±1.35	42.0	22	17.1±1.25	48.2	46	17.0±1.32	44.9
18.1-20.0	10	18.5±1.12	54.4	23	19.1±1.62	65.0	33	18.9±1.45	61.7
20.1-22.0	5	20.8±0.55	80.6	8	21.3±0.85	90.1	13	21.1±1.10	86.4
22.1-24.0	-*	-	-	7	22.2±1.12	96.2	7	22.2±0.85	96.2
Total	123			142			265		

*No fish.

Table II.- Relative condition factor (Kn) values for male, female and sexes combined of *Cirrhinus reba* at different size groups.

Length groups (cm)	Mals			Females			Sexes combined		
	Observed weight (g)	Calculated weight (g)	Kn	Observed weight (g)	Calculated weight (g)	Kn	Observed weight (g)	Calculated weight (g)	Kn
8.1-10.0	7.6	7.07	0.92	-	-	-	7.6	7.07	0.9
10.1-12.0	10.0	1.05	1.05	12.7	13.18	1.03	11.1	11.22	1.0
12.1-14.0	22.9	25.11	1.09	26.2	28.18	1.07	24.5	25.11	1.0
14.1-16.0	30.8	32.30	1.04	34.4	37.15	1.04	32.5	33.10	1.0
16.1-18.0	42.0	46.77	1.11	48.2	50.01	1.03	44.9	50.11	1.1
18.1-20.0	54.4	56.23	1.03	65.0	69.18	1.06	61.7	63.09	1.0
20.1-22.0	80.6	75.85	0.94	90.1	91.20	1.01	86.4	89.12	1.0
22.1-24.0	-	-	-	96.2	95.49	0.99	96.2	95.49	0.9
		Mean Kn =	1.02		Mean Kn =	1.03		Mean Kn =	1.0

the value of $b > 3$, Narejo *et al.* (1999) from Pakistan and Al-Baz and Grove (1995) from Kuwait have reported value of regression in *Tenualosa ilisha* (3.02 for males and 3.03 for females) and (2.98 for males and 3.16 for females), respectively. Azadi and Naseer (1996) calculated b values of 3.16 for males and 3.20 for females in *Labeo bata*. Quddus (1993) worked out values of regression co-efficient b , 3.40 in *Gudusia chapra* and Narejo *et al.* (2002) reported b values 3.13 for males, 3.30 for females and 3.13 for sexes combined in fresh water mud eel, *Monopterus albus*. These values are in agreement to those obtained for *C. reba* in the present study, and also within the range as reported by Hile (1936), Martin (1949) and Tesch (1968).

The values of relative condition factor Kn show fluctuations in all size groups of males and

females. The highest Kn values were found in small length groups of fishes in the present study, which agreed with Shafi and Quddus (1974) for *Catla calla* and *Cirrhinus mrigala*.

The present investigation on length-weight relationship and relative condition factor of the carp, *C. reba* from Manchar Lake, District Dadu, Sindh indicate that the growth rate is quite satisfactory and found to be isometric type.

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