



**LENGTH- WEIGHT AND CONDITION FACTOR RELATIONSHIP OF FARMED HYBRID  
(*Catla catla* ♂ X *Labeo rohita* ♀) FROM MULTAN, PAKISTAN**

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**Abstract**

In the present study, 49 Hybrid (*Catla catla* ♂ x *Labeo rohita* ♀) of variable sizes ranging from 4.4 – 27.0 cm total length and 0.52 – 258.35 gm body weight were sampled from Al-Raheem Fish Hatchery, Village Ali pure shamali, Jhang road 18 Km from Muzaffar Garh to investigate the parameters of weight-length and condition factor. Log transformed regressions were used to test the allometric growth. Each fish was measured and weighed. It was observed that growth in weight is almost proportional to the cube of its length. The value of the slope  $b = 3.17$  which coincides with the slope of that of an ideal fish. Condition factor (K) has positive influence with increasing length or weight. Regression parameters were found to be highly significant.

**Keywords:** Hybrid (*Catla catla* ♂ x *Labeo rohita* ♀), Length-weight relationship, Condition factor, Predictive equations.

**1. Introduction**

The term “hybrid” applies when a male from one species mates with a female from another species to produce fry or vice versa sometimes the term “crossbreed” is also used to denote hybrids. The two terms are interchangeable and mean pretty much the same thing. The hybrid generally performs better than either parent species for several important production traits including survival, growth, disease resistance, and carcass yield (Chatakondi *et al.*, 2000, Bosworth *et al.*, 2004, Li *et al.*, 2004). Several interspecific and intergeneric hybrids of Indian major carps : *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala* and *Labeo calbasu* (Chaudhuri, 1959 and 1973, Naseem and Alikunhi, 1971) and those of Indian major carps with exotic carps viz. common carp (Alikunhi and Chaudhuri, 1959, Kowtal and Gupta, 1985) and silver carp (Ibrahim *et al.*, 1980) have been artificially produced through hypophysation.

Phenotypically the hybrid exhibits intermediate traits to that of the parents, but tending more towards the maternal parent (*Labeo rohita*) with regard to body proportions and fin ray counts. Coloration of the body of the hybrid was near to *Catla catla* while the shape of the mouth was like *Labeo rohita*. However, its position with infringed lips was terminal and devoid of barbells. The hybrid possessing a

smaller head than that of *Catla catla* and wider body than *Labeo rohita* shows improved traits over the parents.

The study of weight-length has its applied value in fish biology. These studies are also widely used for conversion of the growth-in-length equation to growth-in-weight for use in stock assessment models and estimation of biomass from length observations (Weatherley and Gill, 1987, Wootton, 1990, Moutopoulos and Stergiou, 2002). In addition, the data on length and weight can also be used to compare fish life history between regions in species and populations (Weatherley and Gill, 1987, Gonçalves *et al.*, 1997, Bayhan, 2008).

The relationship between weight (W) and length (L) typically takes the allometric form:  $W = aL^b$ , or in the linear form:  $\text{Log } W = \text{Log } a + b \text{ Log } L$ , where a and b are constants estimated by regression analysis. If fish retains the same shape, it grows isometrically and the length exponent “b” has the value  $b=3.0$  (Wootton, 1990), a value significantly larger or smaller than  $b=3.0$  shows allometric growth (Chaudhuri, 1973, Ricker, 1975). A value less than  $b = 3.0$  shows that the fish becomes lighter for its length and if greater than  $b = 3.0$ , indicates that the fish becomes heavier for its length as it grows. The length-weight relationship provides an opportunity to calculate an

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index commonly used by fisheries biologists to compare the “condition factor” or “well being” of a fish (Ibrahim *et al.*; 1980). This index is condition factor, “K” ( $K = 100 \times W/L^3$ ). Fish with a high value of K are heavy for its length, while fish with a low “K” value are lighter (Ibrahim *et al.*, 1980)

Several studies on length-weight relationship have been carried out in other parts of the world on various fish species (Kowtal and Gupta, 1985, Naseem and Alikunhi, 1971, Talwar and Jhingran, 1991). The present topic has been given due attention a few studies have been reported (Weatherly, 1972, Bagenal, and Tesch, 1978, Wootton, 1990, Naeem *et al.*, 1992, Salam *et al.*, 1993, Salam and Naeem, 2004, Yousaf *et al.*, Naeem *et al.*, 2010). The present study is the first attempt of length-weight, condition factor and allometry of this Hybrid (*Catla catla* ♂ x *Labeo rohita* ♀), one of the important hybrid fish used in fisheries.

## 2. Material and Methods

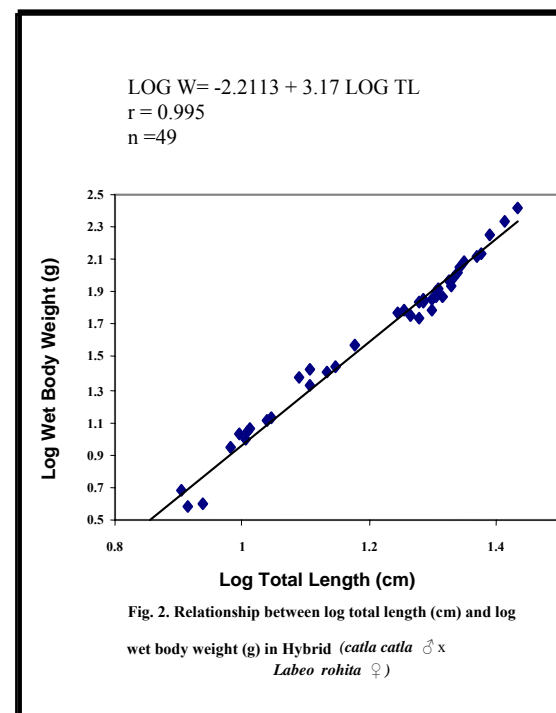
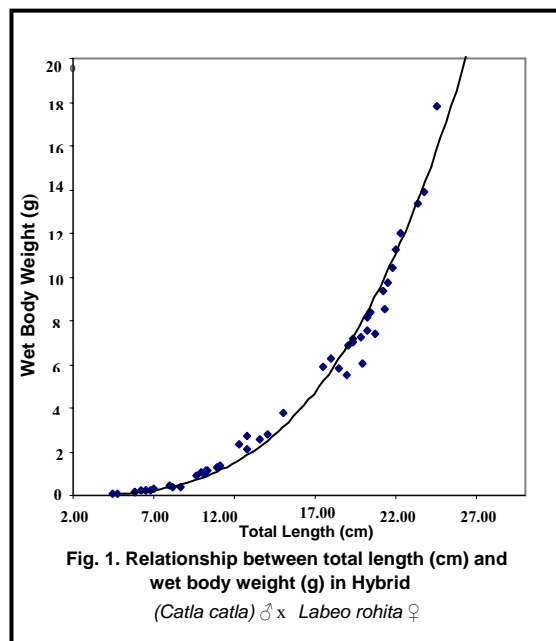
In the present study, 49 Hybrid (*Catla catla* ♂ x *Labeo rohita* ♀) of variable sizes ranging from 4.4 – 27.0 cm total length and 0.52 – 258.35 gm body weight were sampled from Al-Raheem Fish Hatchery, Village Alipure Shamali, Jhang road 18 Km from Muzaffar Garh during the month of February, 2006. Fish were selected at random and caught using a cast net and Live fishes were transported in plastic container to the Applied Fisheries Research Laboratory, Institute of Pure and Applied Biology (Zoology Division) Bahauddin Zakariya University, Multan. They were removed from plastic containers and were killed, blotted dry with a paper towel and weighted to nearest 0.01 g on an electronic digital balance (Chyo-MP-3000) and their length measured to nearest 0.1 cm on wooden measuring tray. Condition factor was calculated by using a formula  $K = 100 \times W/L^3$  following the method of Weatherly A. H. and Gill H.S. (1987) and Wootton (1998).

Statistical analysis, including regression analysis and calculation of correlation was carried out by using a computer package Lotus 1-2-3.

## 3. Results and Discussion

The relationship between wet body weight (W) and total length (L) is exponential having the general form  $Y = aX^b$ , (Fig 1), or

$W = aL^b$ . Whereas Y is independent and X is dependent variable, “a” is intercept and “b” is power. When the data is transformed in logarithmic form (Fig 2) a linear relationship is obtained with a high correlation coefficient ( $r = 0.995$ ;  $P < 0.001$ ), having the general form.



The regression coefficient “b” has a value almost equal to  $b = 3.0$ . The regression equation of body weight (W) on total length (TL) is presented below

$$\text{Log } W = -1.617 + 3.17 \log \text{ TL } (r = 0.995)$$

According to Pauly and Gayanilo (1997),  $b$  values may range from 2.5 to 3.5 suggesting that result of this study is valid.

Condition factor “k” when plotted against total length and wet body weight, it was found to remain constant with increasing length or weight. The regression parameters of condition factor (k) on wet body weight (w) and total length (TL) are presented below

$$K = 0.8068 + 0.011 \text{ TL } (r = 0.462)$$

$$K = 0.8975 + 0.013 \text{ W } (r = 0.513)$$

Research on different fish species collected from commercial as well as from natural waters show that there is a tendency for their regression coefficient (b) in the relation  $W = aL^b$  to be close to or greater than  $b = 3.0$ . Thus growth in many cases tends to be isometric (Naeem and Salam, 2005) since  $b = 3.0$  for isometric growth (Chaudhuri, 1973). In the present study value of  $b = 3.17$  which is not significantly different than  $b = 3.0$ , showing that fish is growing isometrically in relation to length. Regression parameters were found to be highly significant.

Condition factor (K) appears to increase with increasing length and weight in the present study. The condition factor may vary with increasing length when average weight of fish does not increase in direct proportion to the cube of its length (Naeem and Salam, 2004). Therefore when  $b = 3.0$ , K remains constant, if however the weight increase more rapidly than cube of length, the K would increase with increase in length. When weight increases less than the cube of length, K would tend to decrease with the growth of the fish (Naeem *et al.*, 2000, Naeem and Salam, 2004).

The species under study, Hybrid (*Catla catla* ♂ x *Labeo rohita* ♀), nearly resembles the ideal symmetrical fish because the value of slopes (b) of weight-length relationship is not significantly different from  $b=3$  therefore K also showed increasing trend despite growth in this fish.

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