Note

Length-weight relationship of Asian seabass, *Lates calcarifer* (Bloch) reared in open sea floating cages

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ABSTRACT

The paper presents the length-weight relationship (LWR) parameters of *Lates calcarifer* reared in open sea floating cages off Karwar along the south-west coast of India. The relationship obtained in the present study was $W = 0.000008299L^{3.088}$ which indicates that seabass reared in open sea floating cages in semi-intensive condition does not differ significantly in body appearance from their counterparts found in natural conditions. The growth of the fishes was found to be positively allometric.

Keywords: Allometry, Growth, *Lates calcarifer*, Length-weight relationship, Open sea floating cage, Semi-intensive

Length and weight data based statistics are the cornerstones in the foundation of fishery research and management. The relationship between total length (L) and total weight (W) for nearly all species of fish is expressed by the equation: $W = aL^b$. The exact relationship between length and weight differs among species of fish according to their inherited body shape and, within a species according to the robustness of individual fish. The relationship between the length and weight of a fish is used by fisheries researchers and managers for two main purposes (Le Cren, 1951). First, the relationship is used to predict the weight from the length of a fish. This is particularly useful for computing the biomass of a sample population of fish from the length-frequency of that sample. Second purpose is usually generically referred to as describing the condition of the species.

The Central Marine Fishereis Research Insitute (CMFRI) is instrumental in the successful development of open sea floating cage culture for various finfish and shellfish species along the east and west coasts of India. The Asian seabass *Lates calcarifer*, is one among the promising candidate species for mariculture ventures in India, because of its fast growth rate, tolerance to wide environmental conditions and its sustained demand in both domestic and export markets. Open sea cage culture has been expanding in recent years on a global basis and it is viewed by many stakeholders in the industry as "the aquaculture system of the millennium". Cage culture has made possible, the large-scale production of commercial finfish in many parts of the world and can be considered as the most efficient and economical way of rearing high valued fish.

In the present study, length-weight relationship was estimated for *L. calcarifer* cultured in open sea floating cages in the coastal waters of the Arabian Sea off Karwar along the south-west coast of India.

Hatchery produced seabass seeds, by induced spawning, were used for the present study. Uniform sized fingerlings were stocked in circular open sea cages of 6 m diameter. The stocking density used for growout culture in open sea cages were 2000 nos. per cage. The growth data were collected during monthly samplings, between December 2009 and July 2010. Water samples were collected from the open sea cage culture site during the morning hours at daily intervals to monitor parameters such as temperature, pH, dissolved oxygen, salinity and ammonia (APHA, 2005).

The fishes were fed with fresh chopped oilsardine @10% of the total biomass initially for a month and later @2% of the total biomass. A total of 450 fishes were randomly collected for measurements during different periods of the experiment. Total length (TL) and body weight (W) of the sampled fishes were measured to the nearest 1 mm and 0.01 g, respectively. The length-weight relationships were derived from the formula, $W = a L^b$, where W is total body weight (g), L the total length (mm), *a* and *b* are the coefficients of the functional regression between W and L (Ricker, 1973). The association degree between length and weight variables was calculated by the determination coefficient (R^2). In order to confirm whether

b values obtained in the linear regressions were significantly different from the isometric value (b=3), students't-test (Teissier, 1948) with appropriate degrees of freedom were used (Santos *et al.,* 2002).

The water quality parameters recorded at the cage sites were within the optimum range for seabass sulture. Salinity ranged between 14 to 33.50 ‰ (mean 27.59 ‰), temperature between 33.3 to 27.6 °C (mean 30.9 °C), dissolved oxygen level varied between 4.56 and 2.83 mg l^{-1} (mean 3.85 mg l^{-1}) and ammonia level ranged between 0.0011 and 0.0083 mg l^{-1} (mean 0.0044 mg l^{-1}).

The total length of the individual fishes sampled during the study period varied between 46 and 490 mm and the weight between 1.100 to 1.744 g, respectively (Fig. 1) The length-weight relationship (LWR) derived for *L. Calcarifer,* cultured in open sea floating net cages, was W = 0.000008299L$^{3.088}$ (Log W = -5.081+3.088 Log L), R^2 = 0.998. This is in agreement with the studies of Ganguly *et al*. (1959), where they studied a natural population of seabass and derived the relationship between length and weight as Log W = -5.0188+3.034 Log L, R^2 = 0.998. This implies that seabass cultured in open sea floating cages in semi-intensive manner do not differ in their morphometric characteristics from their counterparts thriving in natural open water conditions. The high statistical significance of the determination coefficient R^2 = 0.998 (p<0.05), attested to the existence of a strong correlation between length and weight.
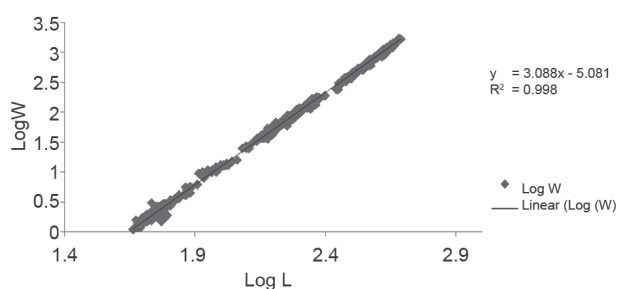

Fig. 1. Length-weight relationship of Asian seabass *L. calcarifer* cultured in open sea cages

Enin (1994) opined that when the parameter '*b*' is equal to 3, growth is isometric where the length and weight of the fishes increases proportionately. When '*b*' is less than or greater than 3, growth is said to be allometric. According to Wootton (1992), growth is positively allometric when weight increases more than length (b>3) and negative allometric when length increases more than weight (b<3). The results of the present study implies that the growth obtained for *L. calcarifer* in open sea floating cage systems were positively allometric, since *b* is greater than 3. The parameters described in this study can be of use for assessing the growth and population parameters of Asian seabass in open sea culture systems.

Acknowledgements

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