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RESEARCH PAPER

Comparison of body heights and length-weight relationships of Çoruh trout *Salmo coruhensis* and rainbow trout *Oncorhynchus mykiss* larvae under rearing condition

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Abstract

The comparison of body height in Çoruh trout (*Salmo coruhensis*) and rainbow trout (*Oncorhynchus mykiss*) larvae under culture conditions is reported for the first time. In this study, the assessment of some biometric characteristics was aimed in *S. coruhensis* and *O. mykiss* larvae under the culture conditions. Length (mm), weight (mm) and body height (mm) of two species were measured after three months. Mean length, weight and body height of *Salmo coruhensis* and *Oncorhynchus mykiss* larvae were determined as 24.42±1.48 mm and 26.73±1.71; 0.08±0.01 g and 0.12±0.02 g; 3.23±0.44 mm and 3.82±0.43 mm, respectively. The body height in *O. mykiss* larvae was higher than *S. coruhensis larvae* under culture conditions.

Introduction

Determination of morphometric and meristic characteristics of fish in different water systems within the biological characteristics is important for ichthyofauna. In order to reveal the ichthyofauna in a wetland, it is necessary to know the biological characteristics of all fish species and to carry out periodic monitoring studies. Studies on fish populations should be evaluated from a variety of perspectives, including evolution, ecology, behavior, conservation, water resource management and stock assessment (Vatandoust et al., 2014). Morphometric and meristic measurements in fish are important in determining the fauna and biological diversity of a wetland and reveal whether there is morphological differentiation in fish populations. These measurements also form the basis for explaining the evolutionary relationships and taxonomy of fish. Determining the length-weight relationship

helps to make comparisons between the populations of the species in different localities and to obtain information about the biology of the species (Oscoz et al., 2005). In addition, length-weight relationships are important for the determination of growth under culture conditions. In this context, we compared the body height of Çoruh trout *Salmo coruhensis* and rainbow trout *Oncorhynchus mykiss* larvae under rearing culture condition.

Materials and Methods

This research was carried on Altuntaş Fish Culture Station (Trabzon, Turkey). The experiments were approved by the Institutional Animal Care and Use Committee at Karadeniz Technical University in Turkey. The fish were fed to apparent satiation with a commercial food (Skretting, Muğla) during the feeding days (3 months). Larvae were kept in a fiberglass tank with a volume of 30 L. A total of 60 fish were stocked in each tank. The water was exchange at 4-6 L/min. The water in the tanks was aerated by air motor and air stone. In order to prevent the fish from jumping out, nets with a mesh size of 4 mm were covered over the tank. A digital caliper with a scale of 20 and 30±0.001 cm was used to measure the length (mm) and body height (mm) of the larvae. Larvae were weighed with the help of Diamond digital scales (Mettler Toledo, Tamil Nadu, India) with a precision of 20±0.001 g. *Salmo coruhensis* (n: 45) and *Oncorhynchus mykiss* (n: 34) larvae were stunned for height and weight measurements. 50 mg/L benzocaine solution was used for anesthesia (Kocabas et al., 2012). YSI 556 model oxygen meter (Colorado, USA) was used to measure water temperature, oxygen, pH, electrical conductivity and salinity. Daily water temperatures were measured with a 0.1°C precision digital thermometer. From the hatching of the eggs to the free-swimming stage, the average temperature of the spring water is 10.3±0.7 (8.1–12.2)°C, the average dissolved oxygen values was calculated as 8.20±1.65 (7.75–10.76) mg/l, and mean pH was determined as 8.02±0.54 (7.65–8.83). $W=a*L^b$ (W: Weight of fish, L: Total length of the fish, a: Constant. b: coefficient of allometry) formula and the logarithmic transformation of this formula [log(W)=a+b*log(L)] were used to calculate the length-weight relationships. Regression analysis was used to determine the relationships between biometric parameters and Microsoft Excel® was used for data analysis and processing.

Results and Discussion

Establishing morphometric relationships allows obtaining transformation equations for different morphometric variables, which are very useful for application in mathematical models used in fisheries biology and ecology, population dynamics, fisheries assessment and management (Vasconcelos et al., 2016). Particularly, weight-length relationships have a variety of uses, i.e. estimation of weight from individual length and length classes, conversion of growth equations in height to growth in weight for estimation of weight-for-age and use in subsequent stock assessment models, calculation of population production and biomass and status indices, and from different habitats and regions. making life history and morphological comparisons between species or populations (Ricker, 1973; Anderson and Gutreuter, 1983; Beyer., 1991; Pauly, 1993; Richter et al., 2000). The mean length, weight and body height of *S. coruhensis* and *O. mykiss* larvae were determined as 24.42±1.48 mm and 26.73±1.71; 0.08±0.01 g and 0.12±0.02 g; 3.23±0.44 mm and 3.82±0.43 mm, respectively (Table 1).

Length-weight relationships determined by linear regression analysis of *S. coruhensis* and *O. mykiss* larvae are given in Figures 1 and 2. Our data indicated that there was a linear relationship between the length and weight of the individuals obtained [$W= 0.01xL^{0.,0857}$ and $W= 0.0134xL^{0.0831}$ correlation coefficient ($R_{S.\ coruhensis}$=0.7516 and $R_{O.\ mykiss}$= 0.770]. In addition, a linear correlation was found between length-body height ($R_{S.\ coruhensis}$=0.2966 and $R_{O.\ mykiss}$=

0.5722) and weight-body height ($R_{S. coruhensis}$=0.560 and $R_{O. mykiss}$= 0.705). The relationships between morphometric parameters may change depending on the habitat and physiological conditions during the growth, maturation and spawning processes and, cause variation in the morphometric characters. In addition, differences in egg diameters and genetic patterns can affect morphometric and meristic features (Kocabaş, 2009; Kocabaş et al., 2012, 2016). For these reasons, comparisons of morphometric relationships and growth types between species from different populations and/or geographic regions should take into account the analyzed size ranges and should be interpreted with caution (Vasconcelos et al., 2016).

Table 1. Biometric measurements of *Salmo coruhensis* and *Oncorhynchus mykiss* larvae under rearing conditions.

Species		N	Weight (g)	Length (mm)	Body height (mm)
Salmo coruhensis	**Min**	45	0.05	21.47	2.12
	Max	45	0.12	28.03	4.13
	Mean	45	0.08±0.01	24.42±1.48	3.23±0.44
Oncorhynchus mykiss	**Min**	34	0.07	21.90	3.05
	Max	34	0.17	29.49	4.52
	Mean	34	0.12±0.02	26.73±1.71	3.82±0.43

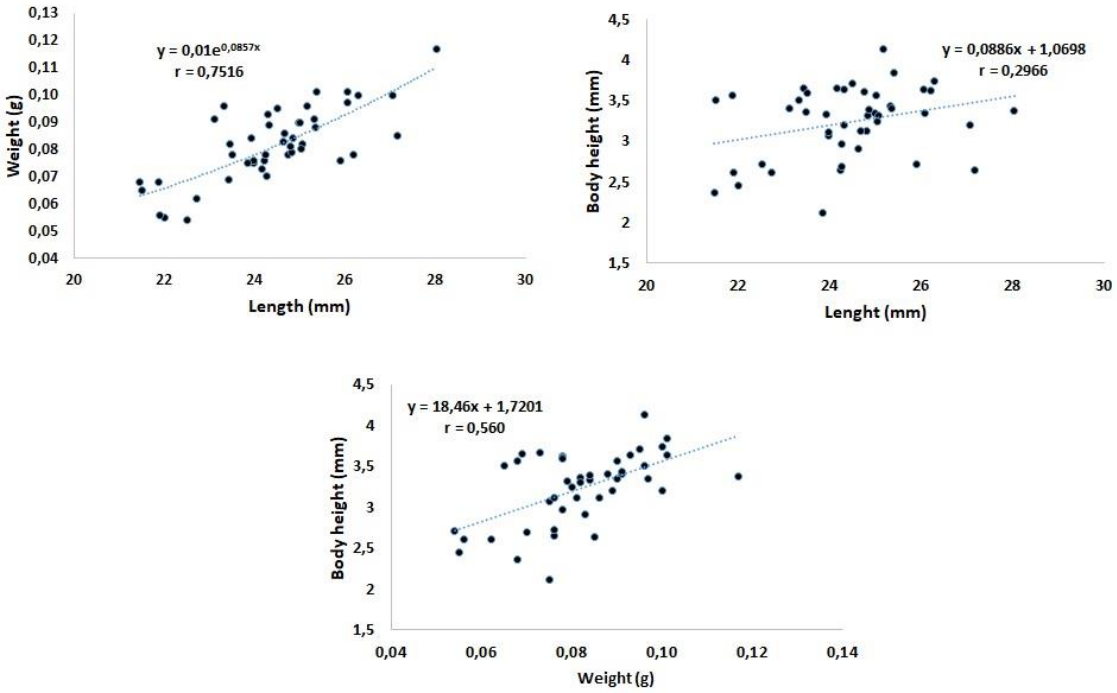

Figure 1. Correlation between biometric parameters of *Salmo coruhensis* larvae.

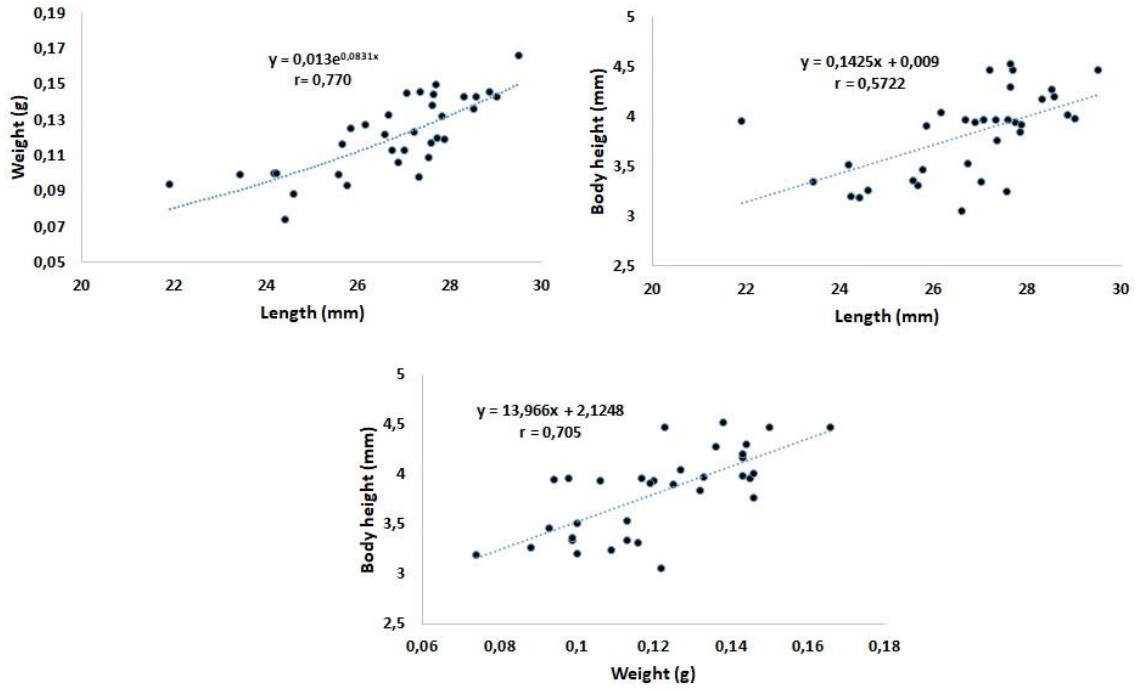

Figure 2. Correlation between biometric parameters of *Oncorhynchus mykiss* larvae.

Conclusions

In conclusion, length-weight relationship with morphometric characters were obtained from Çoruh trout (*S. coruhensis*) and rainbow trout (*O. mykiss*) larvae and the growth characteristics was determined at a normal level. After three months, the body height in *O. mykiss* larvae was higher than *S. coruhensis larvae* under culture conditions.

Data availability statement

The authors declare that data are available from authors upon reasonable request.

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