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EFFECTS OF LIGHT ON GROWTH OF CARP (*CYPRINUS CARPIO*).

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Light is an important factor for fish, since it affects their activity and enables them to see colors, which is important for feeding. Until the middle of the 19th century, it was taught that fish do not distinquish between colors. After an experiment with the gudgeon (*Gobio gobio*), it was proved that fish not only distinquish between colors, but also notice the difference in some shades. Carp, a fish that lives in semi-deep water, does not recognize shades, but can clearly distinguish colors. Earlier studies have shown that the carp prefers places illuminated with light of intensity lower than 100 lux (M a r t i n, 1998). The amount of light that breaks through aquatic ecosystems, water transparency in other words, depends on the amount of suspended and dissolved substances in the water. The optimal transparency on carp fish farms is from 20 to 40 cm. Reduced transparency usually is an effect of higher algal production and occurrence of water bloom, while increased transparency indicates low primary and secondary production as well as inactivity of fish (M a r k o v i ć and M i t r o v i ć - T u t u n d ž i ć, 2003).

In the laboratory of Fish Nutrition of the Faculty of Agriculture in Zemun an experiment was carried out whose aim was to learn whether and how light affects the growth rate of carp. The experiment lasted 40 days (from February 11 to March 22, 2006) and was performed in three experimental tanks. Each tank contained 30, 21-month old fish of the same origin (from the Mošorin Fish Farm, Serbia) that were all given the same preparatory treatment for the experiment. Water quality, as well as all other conditions in tanks in which the experiment was performed, were identical for all three groups of fish, with the exception of light, which differed. In the first tank, the fish were constantly in the dark; in the second, the fish were in the dark for 12 hours, but illuminated for the remaining 12 hours (which was regulated with a built-in timer); and in the third tank, the fish were illuminated 24 hours per day. Fluorescent light was used for illumination of the second and the third tanks.

Fish were fed during the experiment with UNIVERSAL 44/14 extruded food (44% proteins and 14% fat) produced by "Sojaprotein" of Bečej using a semi-automatic feeder. The daily amount of food put in the feeders was identical in all tanks and equal to 2% of initial ichthyomass. The food was measured with a CASBEE digital scale whose precision was 0.01 g. The formula for calculating the amount of food was: P = U - Z, where U stands for the initial quantity of food and Z represents food not eaten. In order to compare the results obtained, mass, length, and height of the fish ware measured at the beginning and end of the experiment.

Results of the study showed that fish of all three groups had approximately the same measurements before and after the experiment (average length and height of the fish are given in Table 1), but their average mass differed (Fig. 1).

Table 1. Average length and height of fish in tanks at the beginning and end of the experiment.

Experimental tanks	**11.02.2006**		**22.03.2006**	
	length	height	length	height
Tank I	23.47	7.17	26.35	8.22
Tank II	23.27	7.16	25.97	8.10
Tank III	23.46	7.06	26.07	8.22

The judge from the preliminary results (Fig. 1), it can be concluded that light has an inhibiting effect on the growth of carp. In other words, the greatest weight gain was in fish bred in the dark. Light conditions in the first tank were the most similar to conditions in carp's natural habitat, as well as on fish farms (low transparency). In total darkness, average consumption of food was 118.65 g per day. In this group, the greatest increase of average fish mass was noticed. The average mass of fish in the first tank was 210±7.77 g, at the beginning of the experiment and 328±12 g at its end. It was noticed that the average ichthiomass increased by 118 g (Fig. 1). In comparison to the second group, the average weight (mass) was greater by 27 g, white in comparison to the third group the difference was 16 g. The coefficient of conversion (feed ratio) (kilograms of food used per kilogram of growth) in this group was 1.34.

The least progress was made by fish the second tank, in which light lasted for 12 h, while darkness lasted for another 12 h. This can be attributed to the stress fish suffered as a consequence of the change of light regime. Daily food consumption was 118.92 g on average. The average fish mass increased during the experiment by 92 g, from 209±7.48 to 301±11 (Fig. 1). The coefficient of conversion (feed ratio) in this group was

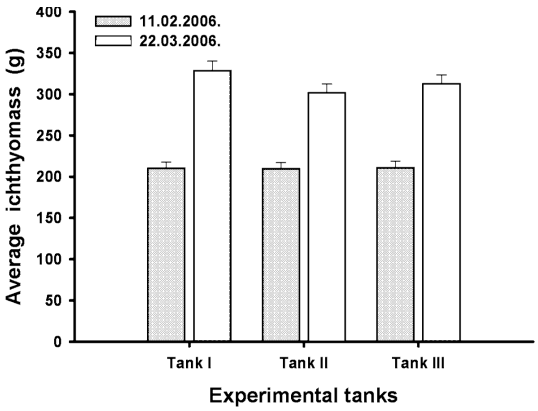

Fig. 1. Average values of ichthyomass of fish in tanks at the beginning and end of the experiment.

1.72, which is even 0.28 superior to fish from the first tank. In the third tank (which was illuminated 24 hours), the daily consumption of food was 117.35 g. The average weight of fish was 210±8.00 g at the beginning of the experiment and 312±11 at its end. In other words, the average weight increased by 102 g. The average weight of fish in the third group was higher by 11.11 g in comparison to the average weight of fish belonging to the second group. The coefficient of conversion of fish exposed to light for 24 hours was 1.53, which means that the coefficient was 14% higher than in the first tank.

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