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The Effect of Density on Growth and Survival of the Goldfish (*Carassius auratus*, Bloch, 1783)

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Abstract: The Agricultural Education Centre of Ahwaz goldfish fish density per unit volume of the effect on weight gain and feed conversion ratio were measured. For this aim, three different concentrations: 0.25, 0.4, 0.55 L 12 pieces of fish in the aquarium, for 90 days were used. This test has been de-chlorinated water for urban and aeration was used in the aquarium. I have a weighted average equal to 1.1 grams of fish were tested. Experimental treatments at the end of SAS statistical software to weight gain and survival were analyzed. Results showed that the density of 0.25 L with a mean of 9.1 g per piece, maximum weight gain has created and has had significant differences with the other densities. Results on growth and survival of fish goldfish recommended in conditions similar to those of the tenth week of rearing, fish density to be reduced to a level of 0.25 fish per liter. To prevent congestion caused by stress and better use of space can be farmed.

Key words: Goldfish % *Carassius auratus* % Density % Survival % Growth

INTRODUCTION

Without a doubt, the most popular fish, pet fish, gold fish and human communities in the world that dates back to 1600 years [1]. Each year millions of fish, gold fish, as in zoos and pet stores to be sold to the public [2]. Different is types of gold fish tail tent, Pearl, head of dairy, red hat and etc. . Golden Fish (Figure 1) is done very easy to reproduce and the eggs of high resistance are minimal. Tenacity and beauty of this fish have led to more fans every day. One of the things that helps the product marketing observe proper storage density in the farm environment [2]. Reports on the density of fish in the system Goldfish cage culture [3]. Pools and a few cubic meters [2] is therefore, the study was designed to evaluate the effect of different densities in the aquarium.

MATERIALS AND METHODS

The experiment in integrated Aquaculture Education Center of Ahwaz was done in the summer of 2008. Three different concentrations for 0.25, 0.4, 0.55 Goldfish piece of fish in four replicate 12 liter 80 liter aquarium was studied. According to studies made densities commonly



Fig. 1: Goldfish (*Carassius auratus*, Bloch, 1783)

used 0.2; 0.25 device exceeds is. First treated with a density of 0.25 L fragments were considered as controls. Second and third treatments, respectively, with 0.4, 0.55 in a weighted average 1.1 grams per liter for 90 days were tested. Aeration of the aquarium to aquarium plastic hoses and air stones were used. To determine the Biomass and calculate the aquarium feeding, every two weeks during the whole weight of fish per aquarium were measured. Food intake was calculated on the amount of biomass in each aquarium. During the breeding period of feeding rate of 1.5 to 5 percent and frequency of feeding three times a day at 8, 14 and 18 were performed. Food prepared in the common market (Biomar) was used

as the feed used in the experiment. Dissolved oxygen, temperature, PH and ammonia water, respectively, by oxygen meters, digital thermometers, PH meters and digital kit to measure ammonia in the test period (90 days) to squeeze out every day and when chlorine was measured and recorded.

RESULTS AND DISCUSSION

Weight Gain: ANOVA results showed that weight gain results, the highest weight gain associated with treatment 0.25 with a weight of 8 grams per liter is a piece of fish. The other significant difference density is shown ($p \# 0.05$). Weight less than 5.8 grams per piece of fish that are related to the treatment Goldfish 0.55 device is given in meters, liters. It is noted that despite the equal and uniform way of aeration and oxygen supply to all treatments, increasing the density per unit volume is reduced by the amount of weight (Figure 2 and 3).

Length Gain: Increase the maximum length of treatment 0.25 fish per liter of 29.6 mm, with the density difference is significant ($p \# 0.05$). Weight less than 7.24 mm to about 55 parts per liter has been treated (Figure 4).

Survival: Opening retained: ANOVA results showed that survival of the fish tested showed no significant difference in density.

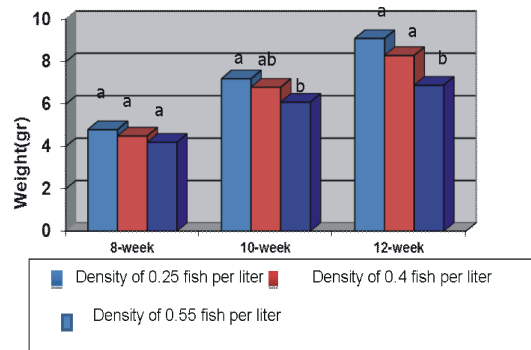


Fig. 2: Comparison of weight

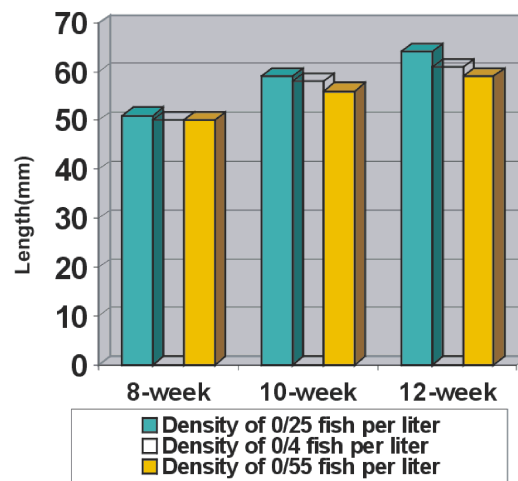


Fig. 3: Comparison of Length

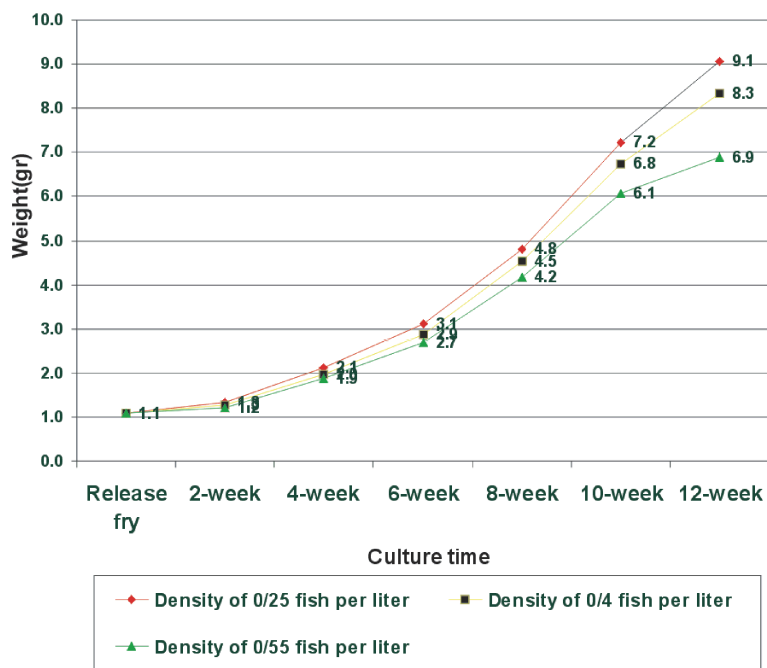


Fig. 4: The density of fish weight growth chart Goldfish

CONCLUSION

The results were, in effect, on the survival of fish density treatments had no significant difference ($p > 0.05$). The results [4] on the sword-tailed fish (*Xiphophorus helleri*, Heckel) in the aquarium husbandry system was consistent. If the result goldfish on fish in the tanks did not meet 5.9 square meters [2]. And other research [3] on fish reared in cages floating in the system was Goldfish. This difference is probably due to better control the education system is in the tank. The final weight of fish, almost all studies reviewed indicate a high density of negative effects on fish growth in different species are. In a similar study, the effect of stocking density on children by common carp [5]. The greatest density of 0.2 fish per liter had been reported, with higher densities, there was a significant difference ($p > 0.05$). Sehgal H.S. and Toorh S., (1995) also in another research on the effects of different concentrations of maturation in common carp was the best piece of densities per hectare in 2500 to 5000 it was reported that high density was more significant ($p > 0.05$). Research showed a significant effect on the growth of storage density, sword tail fish (*Xiphophorus helleri*, Heckel) is ($p > 0.05$) [4].

In this study, as in other studies with increased density of terminal growth rate has declined. Density of fish in the goldfish (*Caracius auratus*) in reserves and 5.9 square meter's study showed that fish growth is reduced with increasing density ($p > 0.05$) [2]. The effect of density on fish growth Goldfish (*Caracius auratus*) reared in cages floating in the systems studied and the results were similar ($p > 0.05$) (Figure3) [4, 5].

As you can see the results of this study is consistent with the findings of most researchers. Noteworthy that significant difference in incidence between the treatment time is different. Growers in this area of low density of farmed fish can be better used. The apparent weight of the fish breeding occurs in the second week and continues until the end of the weight difference. Most of the base density and paltry 0.25 L/fish growth to high density (0.55) is. Although significant differences between the various treatments of the tenth week of development

between treatments (0.25 L / fish) and (0.55 L / month) seen ($p > 0.05$) [6]. The difference with grow fish per week is the twelfth the most significant difference between the densities (0.4 L / fish) and (0.55 L / month) is observed.

Results on growth and survival of fish goldfish recommended in conditions similar to those of the tenth week of rearing, fish density to be reduced to a level of 0.25 fish per liter. To prevent congestion caused by stress and better use of space can be farmed. Obviously, compliance with the appropriate density of development at the right time helps to explain the economic development of aquatic animals.

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