



## The effect of various vitamin C levels on growth and survival of whitefish Juveniles

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### ABSTRACT

This study was carried out to determine the effect of various vitamin C levels on growth parameters (percentage of body weight increase, specific growth rate and survival) of whitefish Juveniles (*Rutilus kutum*). Four treatment groups including one control and three vitamin C doses (300, 900, and 1700) were studied in three replications for eight weeks. Biological assay of fishes was done every two weeks. At the end of experiment, growth and survival rates were calculated. Statistical analysis was done using one way anova and means were compared using Duncan and Tuckey testes. According to results, there was no significant difference between treatment ( $p>0.05$ ), therefore vitamin C could not affect fishes or the differences were not significant.

**Key words:** whitefish Juveniles, vitamin C, growth parameters, survival

### INTRODUCTION

More than 50% of Fish Farming costs are food costs. Providing appropriate food causes economical farming and plus improving growth indices, increases Nutrition Efficiency. Vitamins are one of the food components which are very important in diet in spite of their low amounts. Vitamins are divided into two groups: water-soluble vitamins and fat-soluble vitamins [1].

Information about vitamin requirements especially necessary vitamins like vitamin C is really important for better management of growth process, metabolism, reproduction and hematopoiesis. Vitamin C or ascorbic acid (AA) is a water-soluble vitamin which plays many metabolic roles including effects on growth, survival, and wound healing, reducing the effects of stress, resistance to pathogens and improving reproduction process [2].

Previous studies have shown that most of bony fishes are not able to synthesize vitamin C from D-glucose due to lack of L-gulonolactone oxidase enzyme (GLO), therefore, it is necessary to get this vitamin from food [3].

Whitefish of Caspian Sea (*Rutilus kutum*) is one of the most valuable fishery species which has been considered recently for fish farming. Nutritional requirements of fish must be identified to improve diet formulation and more advantages. Current study was carried out to investigate the effects of various vitamin C levels on growth (percentage of weight increasing, specific growth rate, food conversion ratio and survival).

### EXPERIMENTAL SECTION

1200 fish Juveniles with average weight of one gram were used in this study. Fishes were fed with basal diet (isocaloric and isonitrogenous diet) in adaptation period (14 days). Four diet treatments were used in three replications.

- Control group : (without vitamin C)

- Treatment (1) : 300 mg of vitamin per every Kg of food
- Treatment (2) : 900 mg of vitamin per every Kg of food
- Treatment (3) : 1700 mg of vitamin per every Kg of food

The study last eight weeks and fishes were fed three times a day. Biological assay was done every two weeks. To this, lengths and weights of 10 fishes from each aquarium were recorded. Percent of weight gain, specific growth rate, and food conversion ratio were calculated according to references. For survival percentage (SP), the whole number of dead fishes was recorded [4].

The study was carried out as completely randomized design. Statistical analysis was done using SPSS 16. Data were normalized using Kolmogorov-Smirnov test at first. Mean comparisons were done using Duncan multiple ranges test at 5% probability level.

## RESULTS AND DISCUSSION

According to results, increase in vitamin C amount did not affect specific growth rate (SGR), food conversion ratio (FCR), percent of body weight increase (PBWI) significantly ( $p>0.05$ ), but the highest specific growth rate was belonging to control.

Among treatments, control treatment showed better results, however, differences were not significant. The least food conversion ratio was observed in control treatment and the highest food conversion ratio was observed in 900mg treatment. Percent of body weight increase showed a sinusoidal trend which control treatment and 900mg treatment showed equal results (Figure1).

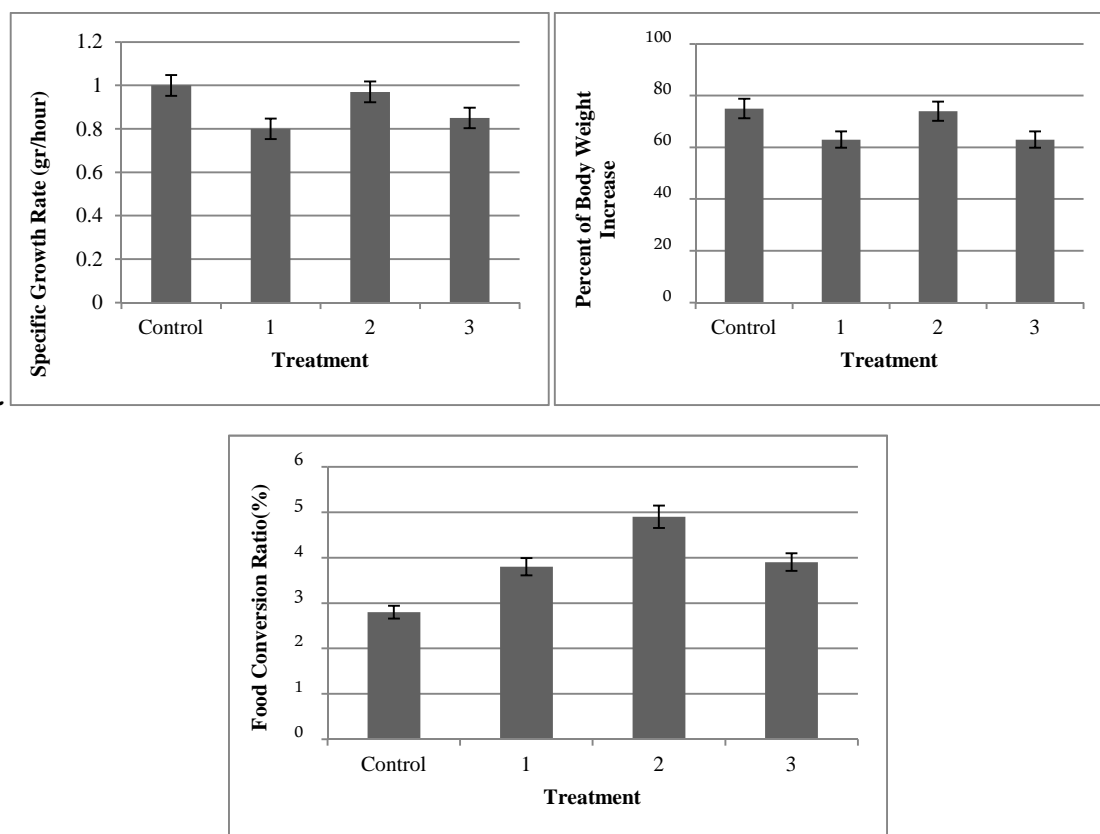


Figure 1- SGR, PBWI and FCR in studied groups

Results showed that there were no significant difference between food conversion ratio, specific growth rate and survival percentage of treatments but control shoed the least food conversion ratio. These show that used vitamin levels didn't affect food conversion ratio, specific growth rate, percent of body weight increase and daily growth percentage [5]. These results are different from previous studies about effects of vitamin C and folic acid on rainbow trout. In that study, higher levels of vitamin C and folic acid showed better results of weight increase, food conversion ratio, specific growth rate, and protein efficiency. Moreau studied effect of zero, 300mg AP/kg, and

300mg SC/kg on Siberian sturgeon for 16 weeks ( $25.5 \pm 0.5$  g average weight at  $22^\circ\text{C}$ ) and did not observe any difference in final weight, PER, FCR, and SGR [6]. Popp studied effect of various levels of vitamin C (0, 100, 1000, and 2000 mg/kg) on hybrid sturgeon (*Acipenser ruthenus* & *A.baeri*) with average weight of  $11.9 \pm 2.1$ g for eight weeks ( $22\text{-}32^\circ\text{C}$ ) [7]. After reaching to 45-54g weight, no significant difference was observed but adding vitamin C showed a little positive effect. Also the same study for 16 weeks didn't have significant difference in growth. Even fishes which fed with no vitamin C diet didn't show signs of vitamin lack. They proposed that vitamin C can be useful only in lower ages. Reasons of different results in current study may be difference in fish species, used concentration of vitamin, farming situation, and age of samples. Therefore, we can conclude that in concrete pools or fiberglass tubs which diet is the only source of micro elements using vitamins is unavoidable.

### CONCLUSION

On the whole, by comparing growth parameters and survival, mentioned percentages did not affect whitefish Juveniles and ascorbic acid could not have considerable effects on growth trend and economical profit.

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