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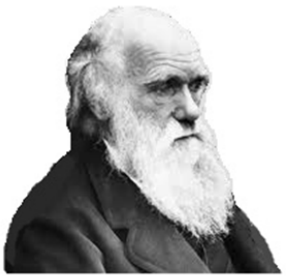

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Effects of Astaxanthin and Canthaxanthin Addition to Ranchu Goldfish (*Carassius auratus*) Diet Related to Rate of Color Quality Enhancement

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ABSTRACT

The Purpose of this Study is to comprehend and compare the quickness of astaxanthin and canthaxanthin in improving ranchu goldfish color. The ability of carotenoids to be digested and absorbed depends on the structure. Carotenoids that quickly improve color quality are desirable. In this work, goldfish were fed one to three diets for 30 days to determine the effects of astaxanthin and canthaxanthin on color enhancing, growth and survival rate. The experiment consisted of (A) an unsupplemented control, (B) astaxanthin (carophyll pink 100 mg / kg), and (C) canthaxanthin (carophyll red at 100 mg/kg). Samples of dorsal skin were observed and measured via TOCA Color Finder (TCF) each day. The best colour result was obtained by canthaxanthin, but our work revealed that growth and survival rates are not significantly different among the groups.

***Keywords*:** astaxanthin, canthaxanthin, ranchu goldfish, color quality enhancement, growth rate, survival rate, *Carassius auratus*

1. INTRODUCTION

The quality of ornamental fish is determined by various factors, one of which is the quality of color. Color as the aesthetic value of ornamental fish will affect its economic value. Ranchu Goldfish is one type of ornamental fish that is often contested in the championship. The rate of increasing the quality of color in Ranchu Goldfish is an important factor because it can determine the value and performance in the championship arena. Constraints that are often

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experienced by farmers and Ranchu Goldfish hobbyists are the dull colors caused by lack of color-forming nutrients. The addition of color enhancing sources in fish feed will result in an increase in color pigments in the body of the fish.

Increasing the quality of colors needs to be done, by giving supplements that can increase the brightness of the color. Local goldfish usually has a cheaper price than imported goldfish because of its fading color performance. Imported goldfish tend to be brighter and more fancy due to the administration of carotenoid substances and the suitability of water in the applied media. Ranchu Goldfish farmers and hobbyists need a simple, fast, and economical method to improve color quality to create high quality fish in a short time.

Carotenoids found in goldfish include astaxanthin, lutein, zeaxantin, beta-carotene, and canthaxanthin. Astaxanthin and canthaxanthin have the best absorption compared to lutein, zeaxanthin, isozeaxanthin, and beta-carotene. Synthetic canthaxanthin and astaxanthin are types of synthetic carotenoids commonly used in the field of aquaculture. According to the study, feeding containing astaxanthin and canthaxanthin proved to be effective in improving the quality of the color of goldfish, it is necessary to conduct research on the speed of improving the quality of the color of Ranchu Goldfish with the addition of astaxanthin and canthaxanthin to feed.

2. MATERIAL AND METHOD

This study used an experimental method with Completely Randomized Design (CRD) conducted with three treatments and four replications. Each aquarium contains 5 Ranchu Goldfish, 1 month old, with 10 grams weight average and 3 cm average body length. The density of fish tested is 5 fish / 45 liters. The treatment used was the maintenance of Ranchu goldfish given different feeds, feed without adding any ingredients as a control, feed with additional astaxanthin 100 mg / kg of feed, and feed with additional canthaxanthin 100 mg / kg of feed. The color enhancement data obtained were analyzed using the Kruskal-Wallis test.

2. 1. Acclimatization

The test fish used was Ranchu Goldfish from Ranchu CSK Bandung farmers. Previously the fish was acclimatized for 7 days and fed as much as 5% of body weight. Fish are fasted for 24 hours with the aim of eliminating the effect of remaining food in the fish body.

2. 2. Research Implementation

The container used is 12 pieces aquariums (60×30×36) cm^3 with 45 liters volume. The aquarium is washed using detergent and dried. After that, the aquarium is disinfected using 20 ppm chlorine. Disinfection is carried out for 24 hours with aeration, then given sodium thiosulfate as much as 10 ppm.

The study was carried out for 30 days by feeding Ranchu Goldfish three times a day at 08.00, 12.00 and 16.00 WIB as much as 5% of body weight with feed according to each treatment. Fish color observation is done through sampling fish every day. To determine the color quality, color measurements were carried out using standard color tools, namely TCF (Toca Color Finder) and to determine the daily growth rate, weights were measured for each treatment. The water control system is carried out by applying a daily water change system of

50% and siphoning. Measuring water quality parameters is also done to determine the condition of the water. Water quality measured is temperature, pH, and dissolved oxygen. Temperature measurement is carried out every day, while pH and oxygen dissolved on days 1, 15 and 30.

The survival rate of the Ranchu Goldfish was observed by counting the number of fish that lived at the beginning and end of the study.

$$SR = \frac{Nt}{No} \times 100\%$$

Information:

SR : Survival Rate (%)
Nt : Number of live test fish at the end of the observation
No : Number of test fish at the beginning of the observation

Absolute biomass growth, calculation of absolute biomass growth using the Effendie (1997) formula:

$$W = Wt - Wo$$

Information:

W = absolute growth (gram)
Wt = biomass weight at the end of the study (gram)
Wo = biomass weight at the beginning of the study (gram)

2. 3. Data analysis

Survival and growth data were analyzed by analysis of variance (ANOVA) F test with a confidence level of 95%, then if there were differences between treatments followed by Duncan's multiple distance test. Color enhancement data were analyzed using Kruskal-Wallis analysis. Water quality data were analyzed descriptively.

3. RESULT AND DISCUSSION

Based on the results of the study, it was found that Ranchu Goldfish which was kept for 30 days had a survival rate of 100%, so that the astaxantin and canthaxanthin substances in feed with a concentration of 100 mg / kg were not in accordance with Ranchu Goldfish survival rate.

Water quality during the maintenance period is in the optimal range and meets the standards. Average value of pH 7.1-7.3, DO 5.9-6.3 and temperature 24 ºC.

The color of Ranchu Goldfish at the beginning of the study period was light yellow and tended to be pale before being treated. The addition of canthaxanthin substances in feeds with a concentration of 100 mg / kg can improve the quality of Ranchu Goldfish color in 9 days, faster than astaxanthin rate in color encanching with the same concentration that within 17 days. Significant color quality improvement is caused by astaxanthin and canthaxanthin substances that have been absorbed and resent in pigment cells so that they can improve the quality of the color on the surface of the fish body. Treatment A (control) showed that the color of the fish

body also increased during the study. Color enhancement in group A is caused by increasing age of fish. Increasing age and body size of fish, the color of the body will increase and be clearly visible. Several factors that affect pigmentation include size, age of fish, sexual development and genetic factors. The color quality improvement for each treatment continued until the 30th day.

Fig. 1. Ranchu Goldfish - *Carassius auratus* (Linnaeus, 1758)

4. CONCLUSION

Based on the results of the study, it can be concluded that the addition of canthaxanthin substances in feeds with concentration of 100 mg / kg can improve the quality of Ranchu chef's carp color in 9 days, faster than the giving of astaxanthin in feed with the same concentration, namely within 17 days.

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