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# The Effect Of Adding Carrot Flour To The Feed On The Color Of Comet Fish Seeds (*Carassius auratus*)

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## Abstract

This study aims to determine the effect of deep carrot flour to increase color brightness and to determine the optimal concentration of carrot flour added to artificial feed to increase color brightness of Comet fish. This research was conducted at Hatchery Building 4, Faculty of Fisheries and Marine Sciences Padjadjaran University from May to June 2020. The research method used was complete randomized design consisting of four treatments and three replications. Treatments were added with carrot flour by 0%, 2.5%, 5%, and 7.5% of feed quantity. The observed parameter is the color value as the main data with the use of the Toca Color Finder tool while the survival rate and water quality as supporting data. The color observation data was analyzed using the Kruskal-Wallis analysis. If there is a significant difference, the test is performed Z. The results of the study concluded that the addition of carrot flour by as much 5% is the best treatment with an increase in the color brightness value amounted to 3.78.

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Keywords: comet fish, carrot flour, Toca Color Finder, color

## 1. Introduction

The world of ornamental fish trade has begun to receive serious attention from the public since the shift in fish consumption patterns. From meeting food needs, it has changed to spiritual fulfillment. Through this opportunity, the owners of capital as well as farmers in Indonesia take advantage of this opportunity to get the maximum profit. The ornamental fish business is also used as the main source of income and is no longer a source of additional income (Lesmana 2002).

Comet fish is one type of ornamental fish that has been widely cultivated because it has an attractive body shape and color. The high level of demand and marketing of comet fish must be balanced with cultivation under controlled conditions (Andalusia et al. 2008).

The consideration that makes ornamental fish demanded by the public is the color. The attractive color of the ornamental fish determines its commercial value. Pigmentation in the skin is responsible for coloring in fish. Carotenoids are the main source of pigmentation in fish skin. In natural waters with aquatic plants (containing carotenoids), these natural foods provide a source of carotenoids for fish. Coloring in fish plays an important role in disguise as well as in breeding. Pigment is a determining factor for the color quality of fish which provides a diverse color spectrum and is widely contained in natural feed carotenoids (aquatic plants, algae, microorganisms) (Davis 1985).

Fish with high levels of carotenoids have a good immune system. The immune system is the body's defense mechanism as protection from harm to the body, such as bacteria, viruses, fungi,

parasites and protozoa (Abbas *et. al* 2015). Carrots contain very high carotenoids level and provitamin A. The provitamin A can increase blood plasma in fish because beta carotene is high in carrot oil and fiber (Lietz *et. Al* 2001).

The color of the fish is due to the presence of chromatophorous cells found in the skin of the dermis. The effort made to get evenly bright colors in the fish is to add a source of pigments to the feed. Currently, many synthetic dyes have been made, for example Cantaxanthin Amazing Red, which can be added to feed, but the results are not as good as using natural pigment sources and also at a high price. Therefore, farmers prefer to use natural pigment sources to increase the color of ornamental fish. A source of natural pigments can be obtained from carrot flour (Lesmana and Satyani 2002).

The high content of carrots in carrots has the potential to be an additional ingredient as a source of natural coloring for ornamental fish. In addition, beta carotene in carrots also acts as a precursor for vitamin A (Ikawati 2005).

## 2. Materials and Methods

The research was conducted in May - June 2020 at Hatchery 4 Building, Faculty of Fisheries and Marine Sciences, Padjajaran University, Jatinangor. The tools used in this research are, 12 aquariums, stationery, blowers, hoses, plastic zipper locks, scales, Toca Color Finder (TCF), thermometer. DO-meter, pH meter and container. The materials used in this research are comet fish seeds, carrot flour, feed given to the test fish in the form of commercial pellets with the brand Matahari sakti measuring 0.5-0.7 mm and carboxymethyl cellulose (CMC).

### 2.2 Research method

The research method used was an experimental method using a completely randomized design (CRD) consisting of four treatments that were repeated three times. The treatments given in the experiment were as follows: where each treatment was filled with fish seeds measuring 3-5 cm as many as 10 fish in one pond. Checking the main parameters tested was increasing the comet fish's ability, then the statistical analysis for each treatment used the Kruskal-Wallis non-parameter statistics. The treatments consisted of 4 percentages of adding carrot flour, namely 0%, 2.5%; 5%; and 7.5%. The parameters observed were parametric and non-parametric. The Parametric parameters are survival (SR) and measurement of physico-chemical factors for water. The non-parametric parameter is the change in body color of comet fish.

### 2.3 Research Procedure

The preparation of the container is done by cleaning the container and cleaning the fiber tub first. The feed given was in the form of pellets with a feeding proportion of 3% of the body weight of the fish and added with carrot flour, respectively 2.5%, 5%, and 7%. The commercial feed is weighed according to need then mixed with carrot flour according to the treatment and stirred until homogeneous. Then added Carboxymethyl cellulose (CMC) which has been dissolved with hot water which functions as an adhesive. Next, stir until evenly distributed. Then the last stage is the drying process and stored in a container for further feed.

The purpose of acclimatization is to give the fish time to adapt to the environment that will be used to determine that the fish is healthy. Acclimatization is carried out for more than 7 days.
The research lasted for 35 days with the treatment of the frequency of feeding 2 times a day, namely morning and evening from 3% of the body weight of the fish. Color intensity measurements were carried out every 7 days.

### 2.4 Data Analysis

Data from the observation of comet fish color were analyzed using the Kruskal - Wallis test. Kruskal - Wallis is one of the nonparametric tests. This test is used when you want to compare two unequal variables, where the group being compared is more than two.

Data from the survival rate (SR) were analyzed using the F test with a confidence level of 95% to determine the effect of treatment on parameters. If the treatment has a significant effect (F count> F table) then proceed with Duncan's multiple distance test with a 95% confidence level to find out which treatment gives a significantly different effect. The data from the observation of water quality were analyzed descriptively and comparatively.

## 1. Results and Discussion

### 3.1 Color Change Rate

Color in fish is caused by the presence of pigment cells or chromatophores that are present in the dermis on the scales, outside or under the scales. Color in fish is caused by the presence of pigment cells or chromatophores that are present in the integument. The two classes of pigments in fish are carotenoids (usually yellow, orange or red) and melanins (brown, black, gray). Fish can only synthesize melanin pigment (black and white color) through Melanocyte-Stimulating Hormone (MSH)-induced stimulation of melanin granule dispersion in melanocytes (Price et al. 2008). Carotenoid pigments cannot be synthesized by the fish body so that the order of color in ornamental fish depends on the number of carotenoids in the feed (Solichin et al. 2012). The addition of carrot flour to the feed with different treatments gave an increase in the brightness of the comet fish. Color enhancement occurs due to feeding with the addition of carrot flour which contains carotenoids. Research on color enhancement in comet fish was carried out visually by comparing with the original color of the fish in the Toca Color Finder (TCF).

### 3.2 Color Changes in Comet Fish

Based on measurements carried out during the 35 days of the study with 4 treatments, the average value of color change in comet fish was obtained. The calculation results showed that all the test fish had an increase in color brightness. Data from the measurement of comet fish color was taken every 7 days. The more carrot flour that was added to the comet fish feed, the higher the increase in color brightness. However, in treatment D (7.5%), the color brightness decreased.

Based on the results of the research that has been carried out for 35 days, it can be seen that the addition of carrot flour gives color enhancement to comet fish (Figure 4). Observation on day 14 was seen to begin to experience an increase in the color value of comet fish in treatment B, C and D. Treatment B (5%) resulted in a score of 3.30 then increased in treatment C (5%) resulting in a score of 4.78 and treatment D (3.41). In the control treatment or without the addition of carrot flour, there was no visible increase in the color value and resulted in a score of 1 for 35 days. This is because the fish that are not fed with rubberenoid chromatophore cells will not spread throughout the skin and will cause the fish to have pale skin (Sari *et al.* 2012).

In treatment D (7.5), it decreased which caused the comet fish to turn orange but slightly pale. According to Amin et al. (2012), at higher doses, excess carotenoids will not be digested by the fish body but will be excreted through feces. Increasing the dosage of carrot flour which had an impact on increasing the carotenoid content in the feed caused a decrease in the brightness of the comet fish during the study.

The increase in color value in comet fish is still occurring, presumably because it still requires carotenoid material in its feed to be synthesized into orange to red color, besides that the absorption and metabolism of fish work optimally because the concentration given is in accordance with the ability of the fish to synthesize carotenoids contained in carrot flour. The same thing also happened in Maesaroh's research (2017), where the increase in the color value of oranda chef fish fed with the

addition of Spirulina platensis continued to increase until the 40th day and experienced stability on the 50th to the 60th day.

Based on the results of the kruskal-wallis test, it can be seen that there are significant differences in the treatment of adding carrot flour (Table 6). This shows that the highest increase in comet fish color occurred in the treatment of carrot flour in treatment C (5% carrot flour) and the lowest was in the treatment without the addition of carrot flour. The treatment without the addition of carrot flour did not increase because the fish body could not synthesize karetenoid without external additions.

The absorption process of carotenoids is much slower than other fish nutrients (Das et al. 2016). Based on this statement, it is suspected that a decrease in the color value at a dose of 7.5% was due to the slow absorption of many carotenoids so that they are excreted in the form of feces. Gupta et al. (2006) stated that goldfish do not have the ability to metabolize lutein and have a limited ability to convert β-carotene to astaxanthin.

Besides the need for carotenoids, therapists age by fish. Young fish / seeds will need carotenoids because of the somatic growth rather than color change. This is consistent with the statement of Utomo et al. (2006), the need for carotenoids in young fish is relatively less because the changes in body color have not been fixed. The presence of pigment factors in fish is based on age, environment, or habitat and the type of feed given (Dalie and Rahmadi, 2003). The intensity of the color intensity shows a brighter direction in the presence of chromatophores cells located in the epidermal layer (Wallin, 2002).

### 3.3 Survival Rate

Survival rate is the number of fish that live to the end of rearing. To find out, a simple formula is used, namely the number of live fish divided by the number of initial stocked fish multiplied by one hundred percent (Bachtiar 2006).

All treatments have a SR value of 100%. This is presumably because the carotene content in carrot flour, apart from being a source of color pigment, also does not endanger fish health. Satyani and Sugito (1997) stated that in addition to function as color pigments, carotene plays a role in protecting fish against light and can assist in the metabolism of the oxygen cycle. Carotene also naturally functions as a basic ingredient of vitamin A, supports thermoregulation or the process of regulating body temperature, helps the formation of egg yolks in the reproductive process, and affects fish health (Bachtiar 2002).

The high SR at the time of the study was also inseparable from the role of carotene, which is to increase immunity and naturally carotene to give a color appearance, so that fish are more attractive. However, another function that is no less important physiologically is as a precursor (basic ingredient) of vitamin A, the introduction of sexual types that support the formation of egg yolk. Besides that, carotene also affects the health of the fish itself (Lesmana 2002).

### 3.4 Water quality

The observation of water quality is one of the parameters that must be observed because water quality is one of the factors that influence cultivation. The need for water in cultivation activities must be maintained both in quality and quantity. Controlling water quality aims to ensure that water quality conditions remain in accordance with cultivation commodities (Sefriani *et al.* 2015). Parameters observed in the observations during the study:

a) Temperature

Water temperature is an important factor in supporting fish survival and fish appetite. Results averaged over the 35 days of the study temperature in the $25^0$C range. According to Prihatman (2000) in Lusianti (2013), the optimal temperature for freshwater fish ranges from 25-30$^o$C. Huet (1971) in Lusianti (2013) stated that temperature is an external factor that affects fish production and can affect important activities in fish such as respiration, growth, reproduction, and appetite.

b) Degree of acidity (pH)

The pH for 35 days of the study was quite good, ranging from 6.66-7.70. According to Samsundari and Wirawan (2013), the appropriate pH for living and growing well in cultured fish is 7-8. The pH value has a big influence on the life of aquatic organisms so that the pH of the waters is used as a component to indicate whether a water is good or bad. The measurement results at the beginning of the study, showed a pH level value of 6.66 (outside the optimum limit) and then increased. This is due to the high metabolism in fish during the study.

c) Dissolved Oxygen (DO)

Dissolved oxygen is the amount of oxygen in milligrams in one liter of water (ppm). Dissolved oxygen is a very important factor in aquatic ecosystems, especially needed for respiration for aquatic organisms. The results of DO observations during the study showed that the average DO for each treatment during the study ranged from 3.7-4.0 ppm. From the average results of each treatment for 35 days of this study, it can be said that dissolved oxygen is still within the tolerance limit for comet fish maintenance. According to Johnson and Basolo (2003), the optimal DO for the maintenance of swordfish is ranged > 2 ppm.

## 4. Conclusion

Based on the research results taken as follows:

1) The addition of carrot flour to commercial feed has an effect on increasing the color value of swordfish.
2) Provision of 5% carrot flour for 35 days into the feed which is able to increase the best color value in comet fish by increasing the color value of 4.78 on the body of the comet fish.

## 5. Acknowledgement

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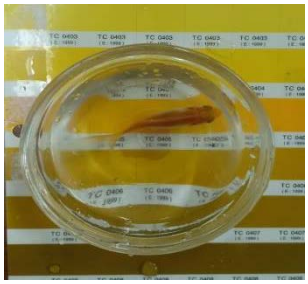
**Table 1. Color Comparison of Comet Fish at the Beginning and End of the Study**

| Treatment | The Beginning Of The Research | End Of Research |
|---|---|---|
| A (0%) |  |  |
| B (2,5%) |  |  |

| | | |
|---|---|---|
| C (5%) |  |  |

**Table 2. Average Color Value of Comet Fish**

| Treatment | *Survival Rate* (SR) |
|---|---|
| A (No carrot flour) | 100% |
| B (Add 2.5% carrot flour) | 100% |
| C (Add 2.5% carrot flour) | 100% |
| D (Add 2.5% carrot flour) | 100% |

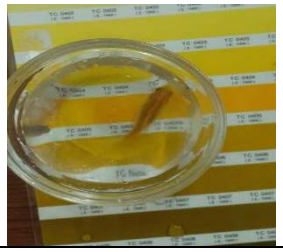
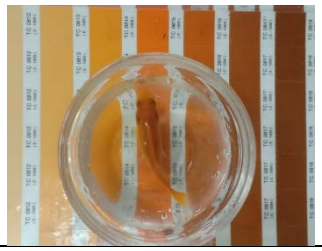
| | | |
|---|---|---|
| D (7,5%) |  |  |

**Table 3. Comet Fish Survival Rate**

| Treatment | Increased Color Brightness Value |
|---|---|
| A (No carrot flour) | $0^{a}$±0 |
| B (Add 2.5% carrot flour) | $1,81^{b}$ ±0,36 |
| C (Add 2.5% carrot flour) | $3,78^{c}$±0,70 |
| D (Add 2.5% carrot flour) | $2,07^{c}$ ±0,67 |

Note: Numbers followed by the same letter notation mean that there is no significant difference with a 95% confidence level.

**Table 4. Observation Results of Comet Fish Water Quality**

| No | Parameters observed | Results |
|---|---|---|
| 1 | Suhu (ºC) | 25 |
| 2 | Ph | 6,66-7,1 |
| 3 | DO (ppm) | 3,7-4,1 |

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