

Feed Enriched with Marigold Flower Meal to the Intensity of the Color of Guppies (*Poecilia Reticulata*)

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Abstract: Guppy fish (*Poecilia reticulata*) is a type of freshwater ornamental fish that is widely known and is an export commodity. The advantages of guppy fish include having interesting color variations and various fin patterns, easy to maintain and easy to breed. Male guppies have a higher economic value than female guppies. Because male fish have a more attractive shape and color than female fish. In order to increase the economic value of guppy fish, it is necessary to make efforts to increase the color intensity of guppy fish. This study aims to determine the color intensity of guppy fish (*Poecilia reticulata*) enriched with marigold flower flour. The experimental design used in the study was 2 treatments and 2 replications. Treatment A = Without marigold flower flour and Treatment B = Using marigold flower flour. Parameters observed were fish color measurement, weight growth, survival. The results showed that the addition of marigold flour had a significant effect on color intensity ($p < 0.05$).

Abstrak: Ikan guppy (*Poecilia reticulata*) merupakan salah satu jenis ikan hias air tawar yang sudah dikenal luas dan termasuk komoditas ekspor. Kelebihan ikan guppy diantaranya adalah memiliki variasi dan mudah dipijahkan. Ikan guppy jantan memiliki nilai ekonomis yang lebih tinggi daripada guppy betina. Karena ikan jantan memiliki bentuk dan warna yang lebih menarik dibandingkan dengan ikan betina. Dalam rangka meningkatkan nilai ekonomis ikan guppy, maka perlu dilakukan upaya untuk meningkatkan intensitas warna ikan guppy. Penelitian ini bertujuan untuk mengetahui pakan yang di per kaya dengan tepung bunga marigold terhadap intensitas warna ikan guppy (*Poecilia Reticulata*). Rancangan percobaan yang digunakan dalam penelitian adalah dengan 2 perlakuan dan 2 ulangan. Perlakuan A= Tanpa tepung bunga marigold dan Perlakuan B=Menggunakan tepung bunga marigold. Parameter yang diamati Pengukuran Warna Ikan, pertumbuhan berat, kelangsungan hidup. Hasil penelitian menunjukkan bahwa penambahan tepung marigold berpengaruh nyata terhadap intensitas warna ($p < 0,05$).

INTRODUCTION

Guppies (*Poecilia reticulata*) are one of the types of ornamental freshwater fish that are widely known to the public. The advantages of guppies are an interesting variety of colors and diverse shades of fins, easy to maintain and spawn. Male guppies are of higher economic value than females Because male fish have a more interesting shape and color compared to female fish. The better the intensity of the color and shape of the fins, the higher the economic value. In order to increase the economic value of guppies, it is necessary to make efforts to improve



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the color intertnity of guppies.

The brightness of the color of Guppies is one of the important factors that guppies farmers should pay attention to. This is because the brighter the color of guppies, the higher the selling price of these fish, which affects income. The beautiful color in guppies is due to the chromatophore (pigment cells) located in the layers of the epidermis. Chromatophores affect the level of color brightness in fish. The addition of pigment-carrying feed ingredients in the feed can increase the concentration and distribution of chromatophores in the skin tissue which will ultimately increase the brightness of the color (Andarwulan and Faradilla, 2012).

An attempt to increase the brightness of the color of the fish by adding carotenoids that are more attractive color-forming components. Guppy fish farmers the color in fish is caused by the presence of pigment cells or chromatophores contained in the dermis on the scales, outside or under the scales. The main components that form black color in fish are carotenoids (Subamia, *et al.*, 2010). The addition of pigment-carrying feed ingredients in the feed can increase the concentration and distribution of chromatophores in the skin tissue which will ultimately increase the brightness of the color (Dahlia, 2014).

The addition of marigold flower meal in artificial feed given to guppies (*Poecilia reticulata*), can improve the quality of their color because the fish are not able to merisynthetic carotenoids so it needs to be supplemented in the feed. One of the ingredients that contain carotenoids is marigold flowers (*Tagetes erecta*) this flower is widely used as a source of carotenoids in poultry but is still rarely used in fish feed, especially in Indonesia (Sukarman and Chumaidi, 2010).

The type of carotenoid that most marigold flowers have is from the xanthophile group, which is the pigment lutein which contributes almost 90% which causes a yellow color. Lutein is the main source of pigmentation in fish which in the body of fish will be converted in the form of canthaxantin and astaxantin (Sukarman and Chumaidi, 2010).

Marigold flowers that have been made into flour can be added to fish feed (*feed additives*) that serve to improve the color quality of ornamental fish. Meanwhile, the addition of marigold flower flour to ornamental fish feed has been carried out previously by Kusuma (2012) to brighten the color of the chef's carp, and was also carried out by Ramadan (2014) in an effort to brighten koi carps. As for the results of the study, it had a significant impact on the brightness of the test fish. However, the use of marigold flower meal added to the feed to brighten guppies (*Poecilia reticulata*) has never been done.

Based on the description above, it is necessary to conduct research on feed enriched with marigold flower meal to the intensity of the color of guppy fish fry (*Poecilia reticulata*).

RESEARCH METHODS

This research was carried out in the wet laboratory of Abulyatama University Jln. Blang Bintang Lama, Lampoh Keude. Kab, Aceh Besar from October to December 2020. The tools used at the time of the study were in, among others, 9 aquariums, blenders, cameras, scrapers, buckets, water quality measuring devices (thermometers and pH paper), buckets, spoons, knives and stationery. The ingredients used in this study were 180 guppies, marigold flower flour, guppies that are approximately 3 months old with a length ranging from 2-3 cm, fresh water, and pellets.

Research Procedure

The stages in the preparation of research are: (1) Preparing research equipment Before the study is carried out, all equipment that will be used is sterilized using Potassium Permanganat at a dose of 0.1 %, for 24 hours, after which it is rinsed with fresh water and dried. Then an adaptation is carried out to the container to be used, adaptation is carried out for 5 days. (2) Marigold Flower meal making. The stage to make marigold flowers into flour is Preparing 500 g of fresh marigold flowers to produce 80 g of marigold flower flour. Separating the petals from the peduncle by means of scissors. Drying of marigold petals. Mashing dried petals using a blender. (3) Zipper Procedure. Preparing commercial pellets and marigold flower flour according to each treatment

for example a dose of 0.9% of the amount of feed. Considering commercial pellets and marigold flower meal. The commercial pellets that will be used as test feed are crushed first and then mix the marigold flower flour according to the dosage. Add a little water to the dough to make it paste-shaped. The feed has been re-zippered or mixed with the prepared feed ingredients, then ready to be applied to the test animal. (4) Test fish are entered with a density of 10 heads per wardah. Adaptation of test fish is carried out for one week. During the adaptation period the fish are given feed in the form of prepared control feed. Feeding with a frequency of feeding 2 times a day, namely at 08.00 and 17.00 WIB with the amount of feeding 5% of the body weight of the fish per day. (5) Sampling was carried out during the study as follows; a) heavy observations once a week; b) Observation of the color of the fish, and survival at the end research; c) Water quality measurement pH, DO, and Temperature water quality measurement done weekly.

Research Design Trial Design

This study used the Nonfactorial Complete Randomized Rancangan (RAL) Method with 2 treatments and 2 tests.

Treatment Design

The treatment design used in this study was:

Treatment A= Treatment Without marigolds

Treatment B= Using marigolds

Observation Parameters

Fish Color Measurement

Color measurement is carried out using a color measuring tool, namely the modified Toca Color Finder (TCF) (Figure 1.). The observation method is focused on two colors that are close to the body color of the test fish. The color measurement of the test fish was observed by 5 panelists who did not have vision disorders (color blindness and myopic). Observations are made visually by comparing the original color of the fish on a weighted color measuring paper. Observation of the change in the color of Guppies is carried out by assigning values or weighting on color measuring paper. The scoring starts from the

smallest 1,2,3 to the largest score of 30 with color gradations from light orange to dark red.

Color brightness was calculated using M-TCF (Indarti *et al.*, 2012) color intensity was calculated at the end of the study by taking an average on the M-TCF test results.

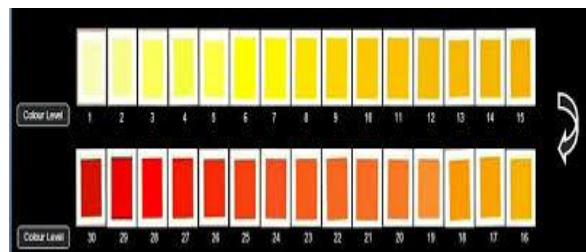


Figure 1. Modified Color Gauges

Water quality parameters

Observation of water quality parameters during water is presented in table 1 below

Table 1. Water Quality Parameters

No.	Parameters	Unit	Tool
1	Temperature	°C	Thermometer
2	Ph	-	pH meter

Data analysis, to analyze the different tests on the addition of marigold flower flour in the feed against the color intent of guppies fry (*Poecilia reticulata*) using the Average Difference Test (*Compare Means*). The type of average differential test used is the *Independent Sample T-test*, which is used to test two unrelated/paired samples (Soepono, 2002). To find out if there is an average difference between two samples without marigold flower meal with marigold flower meal.

RESULTS AND DISCUSSION

The results of a 2 month study showed that the addition of marigold flower meal in the feed to the color intent of guppies fry (*Poecilia reticulata*) differed markedly from the change in the color of guppy fish ($p < 0.05$).

Fish Color Measurement

Based on the results of observations made during the 2 months the rate of change in guppies can be seen in the figure below:

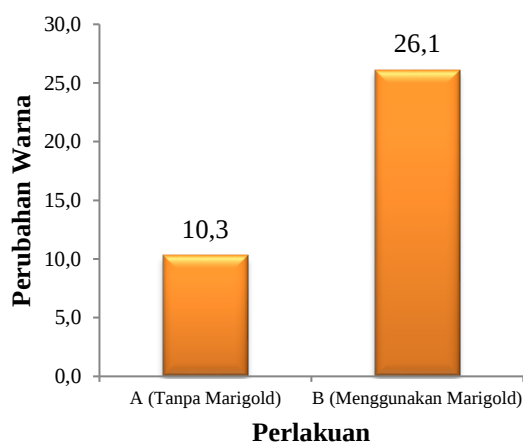


Figure 2. The degree of discoloration of guppies

Based on the results of observations for 2 months on the degree of discoloration of guppies using a color measuring device that has been modified using a scale system. The results of the observations showed that the addition of carotenoids from those contained in marigold flower meal can affect the brightness of the color of guppies. The highest rate of discoloration of guppies was found in treatment B by 26.1% and treatment A by 10.3%. Based on the *Independent Samples Test*, it was shown that the addition of marigold flower meal in the feed to the color intent of guppies fry (*Poecilia reticulata*) differed markedly from the brightness of the color of guppies statistically ($p < 0.05$).

The high level of color brightness in treatment B is suspected that marigold flowers contain carotene so as to increase the brightness of the color in guppies. With the addition of marigold flour the color of guppies undergoes fluctuating changes. Similarly, the statement of Bachtiar (2002) said that feed containing certain pigments or dyestuffs such as carotene, if given together with artificial feed will be able to increase the amount of pigment in the fish, so that the color of the fish will be more pronounced or bright.

Water Quality

Water quality parameters during the maintenance of guppy fish for 2 months can be seen in table 2.

Table 2. The range of water quality parameters during the observation of 2 months

No.	Parameters	Value	Feasibility
1	Temperature	28 – 29 °C	20-30°C (Panjaitan, 2004)
2	Ph	7	6–7 (Eka, 2001)

Water temperature is one of the factors affecting the appetite and growth of guppies. The temperature during the study was around 28-29 °C. According to Panjaitan (2004), ornamental fish can live at an optimal temperature with a range of 22-27 °C depending on the type of ornamental fish, but guppies live in nature with a temperature range of 26-30 °C, meaning that the temperature in the research media is almost the same as the temperature when guppies live in nature, so that the temperature at the time of the study is the optimum temperature and supports the life of guppies during the study.

The pH value during the study ranged from 7. This range belongs to the normal range for the life of guppies. The pH parameters of the water are neither acidic nor alkaline but in a neutral state. According to Eka (2001), states that guppies larvae tolerate water that has a pH of 6.8–7. So it can be said that the quality of the water used during the study is in good condition, thereby allowing guppies to stay alive. The pH parameter of water affects growth and survival if the pH of the water below 4.5 causes stunted growth because water is categorized as toxic to fish (SITH-ITB, 2009).

CONCLUSIONS

The conclusions of the study are; 1) the addition of margold flour in the feed affects the intensity of the color of guppies; 2) the optimal dose of marigold flour in the feed dose of 0.9% is able to brighten the color intensity by 26.1%

SUGGESTION

The research advice on the use of adding marigold flour in the future needs to be tested

at different doses against the addition of marigold flower flour in the feed against the color intent of guppy fish fry (*Poecilia reticulata*).

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