The Study of Effect on Different Feed of Growth and Behaviour of Guppy Fish (*Poecilia reticulata)*

By

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DECLARATION

I hereby declare that the work embodied in this report is the result of the original research and has not been submitted for a higher degree to any universities or institutions.

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I certify that the report of this final year project entitled “The study of Effect on Different Feed to the Growth of Guppy Fish and Observation Behaviour of Guppy Fish (*Poecilia reticulata)* by Nurul Amalina Binti Deraman, matric number F14A0291 has been examined and all the correction recommended by examiners have been done for the degree of Bachelor of Applied Science (Agriculture Technology) with Honours,

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The Study of Effect on Different Feed of Growth and Behaviour of Guppy Fish (*Poecilia reticulata)*

ABSTRACT

This thesis present effect on different feed to the growth of guppy fish because the growth of fish will effected by their diet of feeding. Three of different feed were carried out to know the growth by observation toward their body weight in every weeks for 110 days. A one-way analysis of variance showed there is significant differences between different feed to guppy fish. The different feed of guppy fish were mosquito larva, egg yolk and cucumber. Effectiveness of the feed based on body weight of guppy fish. The one-ways ANOVA result showed was significant, $F(1,45) = 422.37$, $p < 0.05$, $n=16$ that give maximum body weight of guppies 0.6219 ± 0.01336 g were observed by mosquito larvae as feed. Moderate body weight of guppies 0.5096 ± 0.01405 g were given egg yolk as feed. Low body weight of guppies 0.5360 ± 0.22058 g were given cucumber as feed. Test revealed significant pairwise differences between the mean score of body weight of guppy fish of mosquito larva as the guppy feed and body weight of egg yolk as the guppy feed, $p < .05$. Body weight of cucumber as feed of guppy fish do not significantly differ from other two treatment, $p > .05$. (224). Animals alter their behavior to avoid a variety of different types of predators. Trinidadian guppies (*Poecilia reticulata*) have become an important system to the evolution of antipredator behavior because the populations at different in geographically by the amounts of aquatic predation. This reseach demonstrated the importance of considering multiple selection of feed when trying to understand the evolutionary history of behavioral and morphological traits of guppies. The ability of the fish to consume the food by the fish probably led to the better growth results exhibited by given mosquito larvae.

Keywords: Guppy, growth, mosquito larva feed, weight.

Kajian Kesan ke atas Pertumbuhan dan Perilaku Guppy Ikan yang berbeza (*Poecilia reticulata)*

ABSTRAK

Di dalam tesis ini, diperkenalkan tentang kesan kepada makanan yang berbeza untuk pertumbuhan ikan gapi kerana pertumbuhan ikan gapi akan dipengaruhi oleh pemakanan mereka. Tiga bahan yang berbeza akan diberikan untuk mengetahui pertumbuhan dengan memerhatikan berat badan gapi setiap minggu selama 110 hari. Analisis satu arah varians menunjukkan terdapat perbezaan yang signifikan antara makanan yang berbeza dengan ikan gapi. Makanan yang berbeza adalah larva nyamuk, kuning telur dan timun. Keberkesanan makanan berasaskan berat badan ikan gapi. Keputusan ANOVA menunjukkan bahawa, $F(1,45) = 422.37$, $p < 0.05$, $n = 16$ yang memberikan berat badan maksimum gapi 0.6219 ± 0.01336 g oleh larva nyamuk sebagai makanan. Berat badan sederhana gapi 0.5096 ± 0.01405 g diberi kuning telur sebagai makanan. Berat badan rendah gapi 0.5360 ± 0.22058 g diberi timun sebagai makanan. ANOVA menunjukkan perbezaan yang signifikan antara skor purata berat badan ikan gapi dimana larva nyamuk sebagai makanan gapi dan berat badan kuning telur sebagai makanan gapi, $p < .05$. Berat badan timun sebagai ikan gapi tidak banyak berbeza berbanding yang lain, $p > .05$. Haiwan mengubah tingkah laku mereka untuk mengelakkan daripada pemangsa. Guppies Trinidad (*Poecilia reticulata*) telah menjadi sistem penting untuk evolusi tingkah laku antipredator kerana populasi yang berbeza secara geografi oleh jumlah predator akuatik. Kajian ini menunjukkan bahawa pentingnya mempertimbangkan pemilihan makanan apabila ingin memahami sejarah evolusi sifat perilaku dan morfologi gapi-gapi. Keupayaan ikan untuk makan mungkin menyebabkan hasil pertumbuhan yang lebih baik dipamerkan terutamanya oleh larva nyamuk sebagai makanan.

Kata kunci: Gapi, pertumbuhan, larva nyamuk, makanan, berat.

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LIST OF ABBREVIATION AND SYMBOLS

ABBREVIATION

g	Gram
kJ	Kilojoules
M	Mean
SD	Standard division.
F	Degree of freedom
p	Significant level

SYMBOLS

%	Percentage.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

According to Fernando and Phang (1985) that state Singapore is nation as referred to universally as a reproducing community for the guppy, *Poecilia reticulata*. Malaysia is the country that the nearest to the Singapore. The two country does not really have different weather or climate because of the near of location. Then, Singapore become the good example to breed the guppy fish. About 30 domesticated colour pattern and tail shape assortments are raised and it ordinarily for trade. Through this, we can also make Malaysia as the good place to breed the guppy because the study of guppy fish is not so widespread in the country compare to other country.

The activity of monoculture of guppies by using the resettled farms while for integrated farming by using the rural. Guppies are fundamentally raised in vast, shallow, open air, concrete tanks and nylon confine nets suspended in lakes. The saltiness of the water in lakes or aquaria are from 0.5% to 9.0% and at impartial or soluble pH of 7.0 to 8.3. The sizes and stocking densities of aquaria and nets are diverse inside and between ranches. In reproducing tanks, proportion of a male to female sex either 1:3, 1:4 or 1:10 is kept up.

The guppy (*Poecilia reticulata*) that likewise to be called as the million fish is one among the foremost freshwater aquarium fish species within the world. In past century, the favor guppy has been a standout amongst the most cherished fish species. Overall, guppies are extremely tolerant of a wide assortment of tank conditions, however the very ingrained, particular species can be more sensitive and require more consideration.

Achievement of big sizes of the fish in a brief period time under culture conditions the fish should be sufficiently given nutritious sustenance. The fish feed should be include the nutrient such as protein for weight training, fat for typical working of the body and for vitality, starches additionally for vitality, mineral salts for bone structure and body capacities and vitamins for good health. The development of the fish growth different from species to species but mostly dependent due to the temperature, size and genetic origin. The potential of the fish growth highly dependent on feed intake and how well the feed given the nutritional needs of the fish. Point of satiation will cause of maximum growth that usually obtained when feed the fish. Eventually fish that seen rising to the top and wheezing for air particularly around evening time and early morning, the fish under stress. Farmers should flush more water through the pond to weaken the impacts of contamination when these sign saw until the point when the green shade of the lake water is extraordinarily decreased reason by excess feed. Proper fish feeding same important as not to supply overabundance encourage and it is likewise critical not to starve the fish. Therefore, farmers should seek guidance on the right amount of feed to be fed to their fish daily depend on different fish species and age groups.

There are many research about guppy fish but the research still lacking in term of feeding guppy fish. Therefore, this study research will be more focus on the effect different feed to guppy fish. This experiment will conduct indoor with using guppy fish (*Poecilia reticulata*) will be given three different of feed to observe their growth and survival rate will tested. Both male and female fish was considerably enhanced when the diet was presented in the form of mosquito larva, smashed egg yolk form and solid cucumber form.

Trinidadian guppies are small yet they are the heroes of developmental science. They live in soak mountain streams that stream crosswise over numerous waterfalls previously achieve the sea. These waterfalls are vital hindrances that keeping predators out of parts of the stream. Guppies that live over the waterfalls got the chance to remain cautious with a specific end goal to survive and repeat. This implies guppies living in a similar stream can encounter altogether different difficulties for survival.

Endler (2014) state that the scientist has been noticed the guppies had a wide range of coloring while working along these streams. Some guppies had vivid colors and large spots, while others were relatively drab and colorless. The analysis begin with moved guppies from at a lower place waterfalls wherever there have been bunches of predators to the spots over the waterfalls wherever there have been no or few of predators, the investigation occur for a protracted time. After that, the observation resulted that the guppies in places while not predators had considerably additional color than the guppies below waterfalls wherever all the predators were. The result show that male guppy color patterns can act to do attracting females and also avoiding predators.

Poecilia reticulata is a small fish occupies a wide range of aquatic habitats, such as estuaries, lakes, ponds, weedy ditches and canals. The development of successful capture and culture fisheries, world-wide will be on the food and feeding habits of fish form the basis. The important information on the feeding ecology of the fish is requirement to correct the usage of fish species for fish culture, ornamental purpose and larval control. In the past *P. reticulate* was widely introduced for mosquito control, and it is also a popular ornamental fish because they come in diverse colours and very attractive in nature which make them a veritable export product and foreign exchange earner. (Lawal et all., 2012)

1.2 PROBLEM STATEMENT

In this study, there is lack of research about the feed of guppy fish and lack of published data that can be referred. Then, guppy fish will have good life if using water from natural sources likes rain water. Early of the experiment, guppy die because chlorine water used without knowing the fact that disturb a bit the research. The different of sex in guppy fish may give the different growth because the size of female guppy fish bigger than male guppy fish that may be out of control because the weight will be change among themselves.

1.3 HYPOTHESIS

1. Body weight.

H_O: There is no difference in the mean body weight of guppies when comparing with mosquito larva as feed with egg yolk and cucumber as feed (mean body weight on mosquito larva as feed = mean body weight on egg yolk and cucumber as feed).

H_1: The mean body weight of guppies should give greater difference on mosquito larva as feed when compare with on egg yolk and cucumber as feed (mean body weight on mosquito larva as feed > mean body weight on egg yolk and cucumber as feed).

2. Behaviour.

H_O: Guppy have mosquito larva as the feed have equal frequency of behaviour expression (feed taken and Quarrels behaviour) when comparing with guppy have egg yolk and cucumber as the feed.

H_1: Guppy have mosquito larva as the feed have different frequency of behaviour expression (feed taken and Quarrels behaviour) when comparing with guppy have egg yolk and cucumber as the feed.

1.4 OBJECTIVES

1. To determine the best ingredient to be feed of guppy.
2. To determine the behaviour of guppy fish by the feeding habits.

1.5 SCOPE OF STUDY

The study of the effect on growth by different ingredient as fish feed. The most significant factors to control in feeding storage to prevent excessive deterioration in quality and feed losses. Comparison occur when measure their body weight using digital scale in over eighteen weeks period. The observation of guppy fish behavior in feeding habits to study more about guppy and know the interesting fact about guppy.

1.6 SIGNIFICANCE OF STUDY

The need of this study to identify the best ingredient in feeding the guppy fish and give potential of growing. The potential application is improve aquaculture industry in making fish feed in variety of materials. The information obtained can be used as a further reference for future research. The utilization of this method will give more profit because the material used is cheap and not artificial. It is important to have more profit using good nutrient in feed but affordable. Moreover, the uses of the materials such as larvae and egg yolk as fish feed not wide in our country and the opportunity to extensive the uses the material as fish feed will be accomplished.

CHAPTER 2

LITERATURE REVIEW

2.1 Background of Guppy Fish

Guppies (*P. reticulata*) are a fish species with attractive colours, breed and exported to different countries by ornamental fish organizations. The species was found amidst the nineteenth century. The two main aspects that decide the exchange and success of the decorative fish industry are health and nutrition of fishes (Sahandi et all., 2013)

The guppy (*P. reticulata*), otherwise called as the million fish is a standout amongst the most prevalent freshwater aquarium fish species on the planet. It is a small individual from the Poecilidae family where the females have 4 to 6 cm in length and the males have 2.5 to 3.5 cm in length and like every single other individual from the family is live bearing (International et al., 2014).

The Trinidadian guppy, *P. reticulata*, indicates variety in colour pattern on each side. Spot asymmetry emerges because entire pattern elements are absent from one side or are situated in an alternate position on either side. Pairs of males were chosen that

varied in melanic spot asymmetry. In other respects the pair of males were matched for body size, display rate and other aspects of colour pattern (Sheridan et all., 1997).

Guppies are likely the most well-known livebearer among both aquarium owners and advanced breeders. These fish are for the most part vigorous and tolerant of an extensive variety of aquarium conditions hence they are regularly prescribed for amateurs. However, because of intense selective breeding, fancy guppies can be harder to maintain than their wild ancestors. Ornamental fish and particularly live breeders are the most popular pet fish and breed effectively. Guppies are one of these fishes and display awesome variety. The species is the best known as a good choice for beginner aquarists, since they are hardy and reproduce rapidly (Sahandi et al., 2013).

Male guppies, *P. reticulata,* are extremely polymorphic in body coloration and dorsal and caudal fin shape.(Nicoletto, 1991). Male guppies which are smaller than females, have elaborate caudal and dorsal fins, whereas females are blunter in colour. Wild guppies typically do feeding on a variety of food sources that also include benthic algae and aquatic insect larvae. They are terribly versatile and flourish in an exceedingly big selection of natural and ecological conditions. Guppies are utilized as a model living being in the field of ecology, evolution, and behavioral studies.

2.2 Mosquito Larva as Feed Fish

Popular aquarium fish, *Poecilia reticulata* normally known as guppy was presented in different countries for mosquito control and frequently approximately called ‘mosquito fish’. It has been found to establish itself in both fresh and polluted waters (Begum, 2013). Mosquito larva as live fish food nourishment as a rule is an uncommonly sensible supply of fish food. It will be positive to include live food actively as major aspect of guppy fish diet since live food not enthusiastically offered to fish in an interior artificial environment. Feeding live food is critical for fish as a result it not solely will live food mimic the feeding habit of fish in their natural surroundings and live food can also can offer many benefits that commercial feeds have not been able to replicate to the current day.

The value of live food is that they are quickly perceived as prey even by recently foreign imported wild-caught fish. They usually consist of cheap materials locally available such as terrestrial area that been easy to transmitted diseases to guppy fish if eat the live food. Guppies have the ability to survive and duplicate in both fresh and polluted waters to solve this problem. A comprehension of the rearing science of *P. reticulata* is an essential necessity for the successful multiplication of the fish, hence successful mosquito control. The guppy is suitable for mosquito control due to its flattened head, protruded mouth, small size and its voracious appetite for living on prey, especially insect larvae (Bay, 1967).

2.3 Egg Yolk as Feed Fish

Eggs, especially their yolks, are thought to be a standout amongst of the most important sources of vitamin D in the diet. According to Mattila (1995) the best dietary source of vitamin D in the average Finnish diet was fish, followed by fortified margarine, meat and liver, and egg yolk. Eggs are particularly interesting vitamin D source because in addition to cholecalciferol they contain significant amounts of the five times more vitamin D active. (Mattila et all., 1999)

Chicken egg yolk eventually is highly nutritious more than egg white. However, its high energy protein ratio being a diet for very young fish result in inadequate intake of protein fundamental for greatest development. Raw egg contains the expansion matter avoiding that should be neutralize before the egg will be fed to fish that achieved by the application of heat. However, change of state unprocessed egg might causes irreversible separation of the two egg fraction, yolk and white, attributable to denaturation of protein components in each fractions.

The egg yolk is isolated from the surrounding ingredient of egg white by the three-layered vitelline membrane. It additionally has the organic capability of furnishing the developing with lipids, proteins, vitamins, and minerals. Moreover, the accumulated maternal antibodies offer the primary immune defense of the embryo. Egg yolk comprises of approximately 48% water, 33% lipid, and 17% protein (Mann and Mann, 2008).

2.4 Cucumber as Feed Fish

Fish with specialized consumption desires that will terribly cash in on fresh food. As an example do advantage once making an attempt to condition fish for reproducing there a high protein diet of fresh food. The foods that do not have processed before encouraging called as new nourishment. This class of fish food includes fresh vegetables.

Although vegetable matter is low in fat and protein however they comprise of abundant required carbohydrates, fiber, and vitamins. Before to feeding vegetable can also can be blanched in order to break down the tough membranes (Fishora, 2017). Commonly, the vegetables that fed to a spread of tank fish includes lettuce, spinach, cabbage, watercress, and green peas. Guppy fish as omnivores can doubtless be healthier and additional colorful if do supplement their diet with the rare plant matter and even several carnivorous species will eat plants for helpful nutrients. Cucumber are promptly acknowledged even their alimental value is low however much better choices embrace include blanched curly lettuce, zucchini and canned peas.

2.5 The Growth of Guppy Fish

The rate of growth were familiar well by the very fact that the body estimate, body length and body weight in fish are extremely variable characters. It is very imperative to consider the genetic control of development within the fish for fish breeding and cultivation. The variations of growth of guppy *P. reticulata* were discovered among strains, and between genders, within the closed colonies maintained (Nakajima and Taniguchi, 2002). The diverse materials as the feed can influencing the body length at different ages were estimated as a marker of growth by using scale drawn on the aquarium. Young fry take roughly three or four months to reach maturity.

The fish in every tank of batch will weight and count once every two weeks. This was wiped out in order to monitor survival and to update the feeding ration, according to each individual growth rate following the weekly deliberation. All of the fish in the aquarium are separate into males and females, then can weight by an individually at the end of this experiment. This was done to compare the consequences of the treatments on growth and survival as because the coincident of variance (CV) in the fish growth for both sexes (Harpaz et all., 2005). Body measure in angle is a to a great degree variable character. In most fish species there are impressive contrasts between the mean sizes of various populations and in addition between the sizes of people having a place with the same population (Ryman, 1973). The general development can delude since the females become speedier and to a bigger size.

2.6 Behaviour of the Guppy Fish

In shoaling fish the behaviour of individuals is powerfully influenced by the presence of predators and range number of conspecifics present, with the resulting feeding strategies a compromise between various costs and benefits (Day et all., 2001).

Guppies are generally peaceful, however nipping behaviour is once in an exceedingly whereas shown between male guppies or towards different prime swimmers like individuals from the Xiphophorus genus (platies and swordtails) and sometime the different of fish with prominent fins, for example angelfish. Guppies ought not to be kept as a solitary fish in an aquarium because both males and females show signs of shoaling, and are generally found in large gatherings in nature. Its most famous characteristic is its propensity for breeding, and it can breed in both freshwater and marine aquaria.

Fish may also prefer to school with certain individuals, and experience, typically termed familiarity and appears to play an crucial role in alternative of schooling partner in (Griffiths and Magurran, 1998).

Social network theory is used to elicit details of the social organisation of a population of free-ranging guppies, *P. reticulate* (Croft et all., 2004). Specially designed for livebearer organic process tanks which may be suspended inside the aquarium and are available from aquatic retailers.

2.7 Life Cycle of Guppy Fish.

The guppy that also otherwise called the millionfish is a small colourful freshwater species of tropical fish that naturally found within in the streams and lakes of South America. There are about 300 different of type guppy that spread throughout Barbados, Brazil, Guyana, Netherlands Antilles, Trinidad and Tobago, and Venezuela. The guppy is an especially vibrant colourful fish and regularly shows elegant patterns from on it tail fin. Differentiation between the female guppy and the male guppy can be quite easily distinguished cause of the fact that the female guppy has a small, patterned tail where the tail of the mail guppy is much longer and generally has fewer markings. The female guppy has additionally the tendency to be bigger than the male guppy. (A-Z Animals, Nov 2008).

The guppy brings forth live youthful, implying that the eggs are initial brooded among the female guppy and furthermore incubate inside the female guppy. The hatching time of the guppy is about a month which after the female guppy could bring forth a greater amount of 100 child guppies that which are called as fry. When the guppy fry are born, at that point they are will ready to eat and swim around unreservedly. The guppy fry are likewise can detect and stay away from older guppies which is imperative when around more seasoned guppies as they frequently move toward becoming nourishment to the more established guppies. The time taken of guppy angle for being developed in grown-up guppies is inside two or three months. After once mating with a male guppy, the female guppy is apparently have the capacity to conceive an offspring various circumstances. The female guppy could stores the sperm of the male guppy inside her and after brief time of

giving birth to her fry, the female guppy is prepared to end up noticeably pregnant again and by utilizing the put away sperm that make reasons why the guppy is frequently called the millionfish. (A-Z Animals, Nov 2008).

Table 1: The taxonomy of Guppy fish.

Kingdom:	Animalia
Phylum:	Chordata
Class:	Actinopterygii
Order:	Cyprinodontiformes
Family:	Poeciliidae
Genus:	Poecilia
Common Name:	Guppy
Scientific Name:	*Poecilia Reticulata*
Origin:	South America
Diet:	Omnivore
Optimum pH Level:	5.0 - 7.0

Sources: (A-Z Animals, Nov 2008)

CHAPTER 3

MATERIALS AND METHODS

3.1 Feed Fish For Guppy Fish.

In this study, guppy fish (*Poecilia reticulata*) used as the main material in this experiment. The body growth were weighed under the period of conducted the experiment are over 110 days or around 4 month. The ways to weight the fish are using the small beaker with the water and recorded the weigh. Then, put the guppy fish inside the beaker and weighed again and recorded. The body weight was weighted by weeks, guppy fish was weight using digital balanced and recorded the weight of guppy fish. The formulation are

Where, guppy fish weight

= (Total weight of guppy fish + beaker + water) – (total weight of beaker + water)

After that, three of guppy fish were tested in one bigger beaker by given different feed to do the experiment. The guppy fish are omnivore then it do not have problem to give vegetable as feeds. The first feed as the feed is in mosquito larva that been collected from water retention. The second feed is egg yolk that being boiled and the third feed is

cucumber that were cut the peel and make the small size. The cucumber were given by stick in thin wood at the surface. The feed given directly to the guppy fish and the observation when feeding observed on 30 minutes to record their behaviours.

The mosquito larva that obtained from drain at the open place make it easy to find and be as the fish feed. The larvae given directly to guppy fish, and put inside the beaker. Preparing the egg yolk as the fish feed start with boiled an egg. The shell and the white egg were removed because only egg yolk that needed. The egg yolk given to guppy fish by hand and crush inside the water. The management of water condition need to be care to sure that the mortality of guppy fish do not occurs because the egg yolk make the water condition become cloudy and odour to guppy.

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Based on Matthew (2015) say that the most widely accepted vegetables for fish were zucchini and cucumber. These are especially appreciated by live-bearers, but nearly any fish that eats plants or algae in the wild will accept these by slice it up into small pieces and the seeds were remove then feed it to the fish. Only the solid part of cucumber are acceptance. Otherwise, these types of vegetables can contaminate your aquarium tank and start fouling the water quickly. The uneaten cucumber left in the tank were removed after three or four hours as after this time they have lost most of their taste so the fish are less interested in them. A piece of vegetable can be attach inside the tank with a vegetable clip to feed the guppy fish. Precaution to remove any uneaten vegetables within 48 hours or it will start to rot in the aquarium.

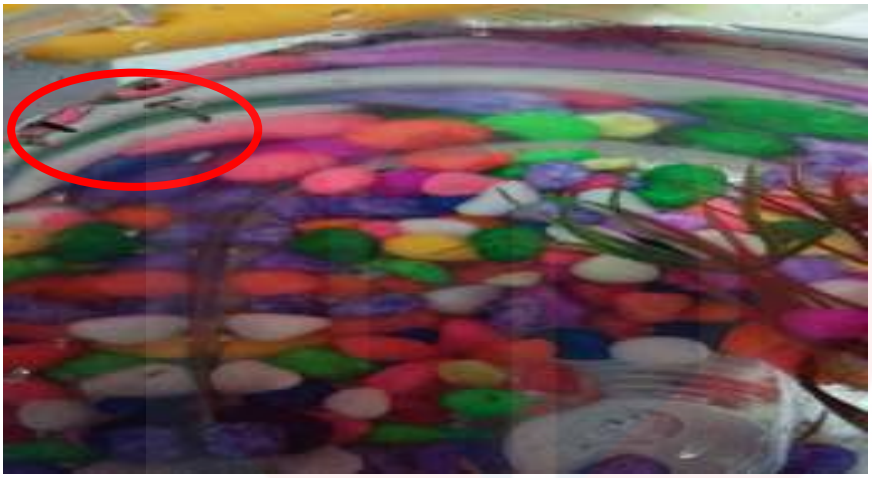

Figure 3.1: Larvae as feed.

Figure 3.2: Egg yolk as feed.

Figure 3.3: Cucumber as feed.

3.2 Behaviour of the Guppy Fish.

Past studies have used the Poeciliidae family as the subject of experiments relating to invasiveness, boldness and activity. Parameters of boldness and activity are related to seeking behavior and ability to move in an unfamiliar place. They specifically used guppy that were used as a biological control for mosquitos. They found a positive correlation between boldness and exploratory behavior. They also found that there were behavioral differences between sexes in their different parameters such as boldness. Males were bolder than females, however females had a higher exploration tendency compared to males. Other past studies have suggested that the boldness behavior of guppies relates to their dispersal ability in the wild (Ruth, 2017). The behaviour observed when feeding the feed to the guppies that take about 30 minutes by do observation either the guppies eat the feed or not and either they fighting over the feed in the specified period. The behaviour was observed and recorded to study their behaviour.

3.3 Analysis Data Using Spss.

The data wiere obtain from the body weight of guppy fish that were recorded weekly over the period 5 month from each of the three guppy fish in the treatment. The data were analyses one way ANOVA using Software Statistical Package for the Social Sciences (spss).

Figure 3.4: Guppy eat egg yolk.

Figure 3.5: Guppy fight when eat.

Figure 3.6: Guppy Die.

CHAPTER 4&5

RESULTS AND DISCUSSION

4.1 Body Weight of Guppy Fish.

The weeks of determination of body weight of guppy fish (*P. reticulata*) was observed throughout the four month. For treatment 1 that has been label as constant was given mosquito larva or larvae as the fish feed, while for the treatment 2 was given egg yolk as the fish feed and the treatment 3 was given cucumber as the fish feed. Designed for the treatment 1, the body weight that has been weight constantly given almost increase every weeks compare to others beakers. The treatment 2 also give increase of body weight but it also give negative value of body weight. The treatment 3 actually give the worst of body weight because the body weight of guppy fish loss and make the guppy fish die, it is because the cucumber actually have high content of water. According of Nithya Shrikant, (2017) because composition of cucumbers about 96% water from the wholesome that could aid to fish loss of weight.

Table 4.1: Mean and Standard error values of average body weight of guppies in different type of feed.

Treatment	Mean ± standard error
Mosquito larva (Treatment 1)	0.6219 ± 0.01336 g
Egg yolk (Treatment 2)	0.5096 ± 0.01405 g
Cucumber (Treatment 3)	0.5360 ± 0.22058 g

A one-way analysis of variance was conducted to evaluate the null hypothesis that there is significant no differences between different feed to guppy fish (N=16). The independent variable, the different feed to guppy fish included three treatment: Mosquito larva (*M*= 0.62; *SD*= 0.93, n=16), Egg yolk (*M*= 0.51; *SD*= 0.98, n=16) and cucumber (*M*= 0.54; *SD*= 0.22, n=16). The ANOVA was significant, $F(1,45) = 422.37$, $p < 0.05$, n=16. Thus, there is significant evidence to reject the null hypothesis and conclude there is a significant different of different feed to guppy fish.

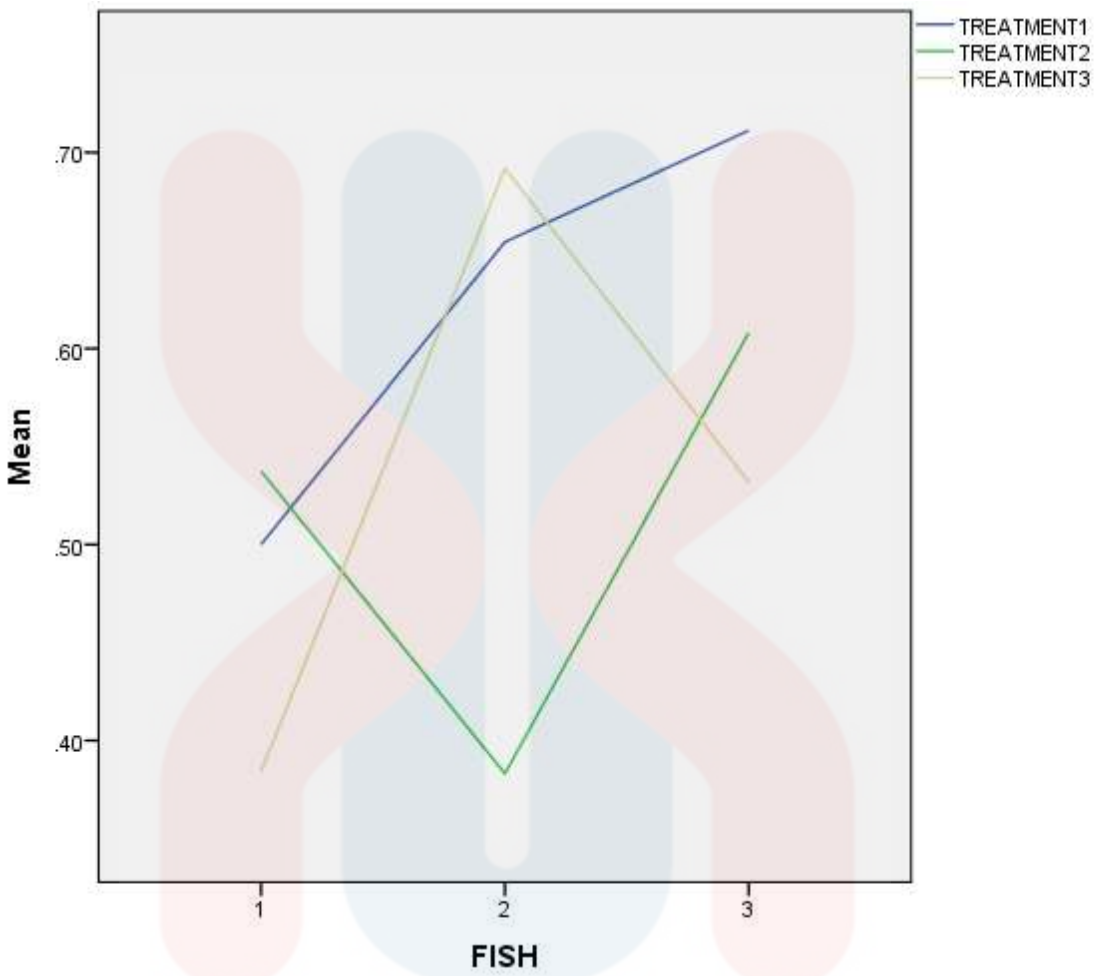

Figure 4.1: Body weight of guppy in each treatment.

Post hoc comparisons to evaluate pairwise differences among treatment means were conducted with the use of Turkey HSD test since equal variances were tenable. Test revealed significant pairwise differences between the mean score of body weight of guppy fish of mosquito larva as the guppy feed and body weight of egg yolk as the guppy feed, $p < .05$. Body weight of cucumber as guppy fish do not significantly differ from other two treatment, $p > .05$.

In this research, from the treatment 1 the guppy fish the mosquito larva as the feed that give effect of body weight for 16 weeks in inside environment. Three of guppy fish in treatment 1 and the guppy fish was weight separately. The record for body weight the first fish in beaker 1 is 0.45g in first week, it unchanged for the second week but make increase in third week in 0.47g and again constant for fourth weeks. For the next weeks, the body weight constantly increase by weeks until 0.53g in weeks 16. The initial record of body weight in second fish is 0.50g, it also unchanged in second weeks but make increase in body weight until weeks 16 where resulted 0.56g. it also happen in third fish which make increase by the initial body weight of guppy fish is 0.32g and become 0.43g in weeks 16.

From the treatment 2 guppy fish consume the egg yolk as the feed that give effect of body weight for 16 weeks. The record for body weight the each fish in treatment 2 can be summarize that overall it gain weight but there also happened loss of weight occur for guppy fish. The guppy loss weight at week 6 and second guppy loss the weight in week 9. While, the third guppy loss the weight in week 9 and week 15. From the treatment 3 the guppy fish consume the cucumber as the feed that give effect of body weight for 16 weeks. The record for body weight of the guppy fish show that the cucumber actually cannot be the only feed to guppy because cucumber act as supplement and also aid in loss of weight that make the guppy die week 13. For the third guppy fish, it constantly show decreases in body weight until weeks 16 that make the guppy dies at week 12. The initial of body weight is 0.72 and the last recorded of body weight in week 13 is 0.70g.

From the research, it can be conclude that the best of fish feed that can be consider as the most consume by the guppy fish is mosquito larva based on the positive effect toward body weight in the indirectly that supply most nutrition toward guppy fish. While, the worst of fish feed is cucumber or any vegetable. It is not to say that vegetable is not edible to be feed of the guppy but it not give the suitable nutrition compare to human, the cucumber is the best food to diet or loss the weight. Even though, mostly guppy fish were eat whatever we give as the feed but either the negative effect happen we need to consider to not make the rate or mortality to increase.

Based on the result, it can be conclude that it encounters the hypothesis which is carried out in the early of the experiment where state that the mosquito larva feed to guppy fish will be the best feed to guppy fish because compare to other feed, egg yolk and cucumber. It easy to find the mosquito larva and make it easy to feed the fish that act as not chemical composition to not harm the guppy. Then, it also can control the production of the mosquito that spread the dangerous disease toward human especially dengue and zika diseases. It became the effective ways to erase the disease that eventually do not have any cure or treatment yet to recover from the disease, at least it will reduced the dangerous diseases by natural ways. The guppy (*P. reticulata*) is a freshwater fish popularly that kept in aquariums which eats mosquito larvae and egg. At the same time, guppy will help reduce the spread of disease that caused by parasite, for example malaria the disease that caused by the parasite *Plasmodium*, which is transmitted to humans through mosquito bites. Then, the guppies will control mosquitoes that left in stagnant water puddles where the place breeding of mosquito by eat the mosquito larvae and also cause reduce of mosquito population.

In Shillong in Northeastern India, the ways to breed guppies has been introduce by government authorities organize malaria counteractive workshops that teach participants how to breed Guppies. The state was observed a 50 percent reduction in mosquito-borne diseases after the breeding of guppies was started for controlling malaria in 2012. Nripendra Kumar Sarma from the public health engineering department said that bio-control helped Assam fundamentally lessen its malaria cases because they also do breeding guppy fish for malaria control. (Rhodi Lee, 2014).

The other studies are conducted on the practicality of utilizing guppy (*P. reticulata*) to control the mosquito that causes the disease known as chikungunya fever has been finished by a group of specialist from the National University and Salid de Laderas Network in Cali (Analia, 2015). A review by the group of analyst's individuals that come from the U.S., the West Indies, Canada and Brazil has conducted a research efforts looking into the effectiveness and security of discharging guppies to reduce the quantity of mosquitoes and they also state that guppies can turn into an intrusive species putting different species in danger.

The researches of paper distribute that the group will describes about the research they do and they reason they put in trust that guppies are not an effective tool for battling the spread of irresistible diseases. The general population have been tossing guppies into lakes, streams and different places where there is standing water to reduce mosquito populations for a considerable length of time. Guppies will eat mosquito larvae that lie on the surface after it discharge and keep the mosquito from developing to development and

bite other people. Outbreaks of mosquito-borne diseases become the most instances have been in response locals that have been utilized the practice in the studied regions that recently moderate the spread of the infection, for example Zika virus. However, the researches is not solely unproven, but harmful to other animal species in a similar water (Bob Yirka, 2016).

Then, the researchers found more proof that sure about guppies that ought to be classified as an invasive species when presented outside of its native environment. The fish reproducing more rapidly and expending a greater amount of the local food sources that other animals living in the same water causes the other to die out. Nevertheless, the other a few specialists, for example, those working for the Malaria Consortium have discovered that placing guppies in water tanks in tropical zones diminishes the spread of dengue fever in places like Vietnam and claim that there is no possibility of the guppy fish invading a set up biological system (Bob Yirka, 2016).

According to Rana W. El-Sabaawi et al. (2016) stated that review from the study of epidemiology, conservation, ecology and evolution are used to demonstrate that the confirmation for the viability of guppies in controlling mosquitoes is weak and the chances of accidental guppy presentation into local ecosystems are extensive and furthermore that guppies can easily build up populations and harm these oceanic biological systems.

Currently, there are not any vaccines or antibodies for the diseases, for example Zika virus and the only prevention by concentrates on bringing down the shot of the carrier mosquito that being bitten one as the basic avoidance technique to sort out larvicidal predators in water bodies where the mosquitoes will breed to increase their population. These predators would reduce population of contaminated mosquitoes by feeding on mosquito larvae or eggs. In recent years, guppies (*P. reticulata*) have been utilized on a large scale to fight dengue and Zika epidemics (Rana et al., 2016).

The exploration by research center examinations that encourage mosquitoes to guppies not indispensable by and large infer that guppies are a successful predator since guppies consume mosquito larvae. However, it is likely these generally straightforward by which starve guppies beforehand and only offer them mosquitoes to eat that overestimate the effectiveness of guppies as mosquito predators. Guppies additionally eat fewer mosquitoes in polluted water that prove the guppies have a greater diversity of food choices (Rana et al., 2016).

The examinations happen early do not utilize legitimate experimental design or statistics, and many community-wide tests do not report sufficient pre-treatment data. It is because of such limitations that make it reasoned that despite the fact that fish reduce the density of larval *Aedes* spp. (mosquitoes that spread dengue and Zika) in water containers and actually difficult to connect fish to a reduction in grownup of *Aedes* or to a decline in disease. The exploratory have proof that demonstrate of guppies as the control mosquitoes is inconsistent and problematic (Rana et al., 2016).

The composition of a normal estimated egg weighs approximately 57 grams (about 2 ounces) are recorded. The shell constitutes 11 percent, the white constitutes 58 percent and the yolk constitute 31 percent from this weight of egg. Regularly, these proportions do not vary appreciably for small or large eggs. The percentage composition of the edible portions is the percent for whole egg come from water 74%, protein 13%, fat 11% and ash 1%. While the percent for white egg are 88% of water and 11% of protein and the percent for egg yolk are 48% of water, 17% of protein, 33% are fat and 1% of ash (Johnson and Ridlen, 2017).

Eggs content the chemical that particularly profitable as a source of protein. The fat in the yolk is so finely mixed that make it is processed effectively that fish also can be feed. The proportion is around 2 to 1 of unsaturated to saturated fats. One of the acid, Oleic acid is the fundamental unsaturated fat that do not give effect on blood cholesterol. Eggs are contain vitamin A, the B vitamins that from thiamin, riboflavin, and niacin, and vitamin D that are essential and youthfulness for development. At that point, eggs contain an abundant supply of minerals, for example iron and phosphorus that are basic for building and maintaining strong, healthy bodies (Johnson and Ridlen, 2017).

The colour of the yolk is a consequence of the presence of two substance mixes which are lutein and zeaxanthin. Both of the compounds known as xanthophylls that can also be classed as carotenoid compounds. The xanthophylls are from a similar synthetic sources to which beta-carotene which the compound that gives carrots their orange colour that also including the fundamental colour-creating compounds in red peppers, capsanthin

and capsorubin, interestedly in chicken feed that can cause the yolks to appear a deep orange or even red (Andy Brunning, 2016).

The composition of the egg yolk in total weight are 30-33% that composed from vitelline membrane and yolk. The total solids content of yolk is about 50-52%. For lipid and protein components where the content come from the lipids in 31%, the protein in 17%, the neutral lipids in 65%, lipovitellins in 69%, the phospholipids (30%) and the content of lipovitellins is 58% where the livetins in 12%. The content of solid of egg yolk are 50% come from the additional content where it is neutral lipids is 21% of yolk, phospholipids is 10% of yolk, cholesterol is 1.55% of yolk, phosvitin is 1.25% of yolk, IgY is 0.4% of yolk and lutein is 7.5-22 mg/g yolk (Dong Ahn, 2017).

According to E.Falwel (2017) that express the specific for egg yolks which contain more vitamins and bigger amounts of those vitamins than egg whites. Each of egg yolk contains seven vitamins which are B6, folate, a B vitamin, B-12, A, D, E and K. Moreover, the others of the vitamins A, D, E and K are discover just in egg yolks and not in egg whites and egg yolks are one of just a modest bunch of nourishments in which vitamin D is naturally found.

Minerals also can act as crucial nutritional same with vitamin that necessary for building block fundamental for completing body capacities like adjusting electrolytes. Each of egg yolks and egg whites each have 13 assortment of minerals that include calcium, magnesium, iron, potassium, sodium and selenium. The egg yolk has bigger measure of

most minerals although both the egg white and egg yolk contain these minerals. For example, 90 percent of an egg's calcium is in its yolk and 93 percent of its iron content is in the yolk while 7 percent in the white from the substance (Elizabeth, 2017).

Cucumber as the fish feed are not the new thing to the lover of guppy fish. Even though it is not famous as the other feed but it also give benefit to the guppy fish. Cucumber has high in valuable supplements and additionally certain plant mixes and cancer prevention agents that may help treat and even keep a few conditions. The cucumbers are certainly low in calories however it also have high in vitamins and minerals content and contain a decent measure of water and dissolvable fiber, making them perfect for advancing hydration and supporting in weight reduction but only for human and not suitable for fish. In fact, cucumbers content of 96% water in total composition that prove it have a high content of water compare other vegetable like carrots. Cucumber usually should be eaten unpeeled to maximize the nutrient content because it will reduce the amount of fiber, as well as certain vitamins and minerals when peeling cucumber. Moreover, cucumber have antioxidant molecules that will block oxidation where it is a chemical reaction that forms highly reactive atoms with unpaired electrons known as free radicals. (Sources: USDA National Nutrient Data base, 2017)

The proportion for 28g of cucumber as the example to get the value of information. For calorie information, the calories is 17.6 kJ in total where it come from the carbohydrate in 14.7 kJ, the fat in 1.3 kJ and the protein in 1.7 kJ. For carbohydrates information, the total carbohydrate are 1.0g where it have the dietary fiber in 0.1g, the starch in 0.2g and the sugars in 0.5g. For protein and amino acids have total protein value in 0.2g. For vitamins information, the value for Vitamin A is 8.82mg, Vitamin C is 0.8mg and Vitamin K is 4.6mg. For minerals information, it comes from the calcium in 4.5mg, the iron in 0.1mg, the magnesium in 3.6mg, then phosphorus in 3.6mg and potassium in 41.2mg. (Sources: USDA National Nutrient Data base, 2017)

It is not really good to guppy fish because it make weight loss because the composition of cucumbers are about 96% content of water from whole that could aid in weight loss. Cucumber also have disadvantage, the present of the toxins likely cucurbitacins and tetracyclic triterpenoids in cucumber is a thing to worry about. (Nithya Shrikant, 2017). Cucumber seeds are the source of cucurbitinan which an ingredient that is known to possess innate diuretic properties that will cause in extreme elimination of the fluid from the body in result when ingested in large quantities (Nithya, 2017).

Guppy have problem early of the experiment, because guppy die with short care management that make the experiment a bit disturbed but the problem has overcome with more precautions in take care of the guppy. The ingested foods by the fish but cannot be processed by fish will go through the body and contribute to the water contamination.

Determination on amount of encourage that can be nourished to a tank of guppies will be known by the breeder's filtration and water changing practices because the waste product such as ammonia, nitrites and nitrates lessens accessible oxygen in the water influencing the guppy health and development. The more food that is nourished to a tank the higher the fish waste which raises the ammonia levels. The efficient of filtration have to be care by the breeder to know which one suitable for used to separates these harmful components. In fact, water can changes diminish the concentration of ammonia, nitrites, and nitrates. The frequency of water changes that often will increase the amount of food that can be sustained to a tank. Excessive water changes can lessen the good bacteria levels where it restrains the breakdown of ammonia and nitrates causing an environmental crash (Bryan, 2017).

A breeder of guppy can visually know the condition of water either it is in poor or good condition. Regardless the tank in a clean water but the ammonia and nitrite level can be at dangerous levels. Guppies in distress will have fish hovering at the top water surface gasping for oxygen and will have loss of appetite. Water changes are important to lessen the ammonia, nitrite, and nitrate levels because the nitrates are toward the finish of the organic vigorous cycle and can be viably lessened by water changes. Plants also could help utilize and reduce nitrates, but it not sufficiently quick for the typical guppy population and feeding program. When nitrate levels are in very high content, it cause regularly sudden death of maybe a couple angle that can happen. Dangerous nitrite levels will cause nitrite poisoning in the guppy and turn its blood to a red darker showing a deprivation of oxygen. When these detrimental compounds are at high levels, the guppies are weakened and growth is inhibited (Bryan, 2017).

4.2 Behaviour of the Guppy Fish.

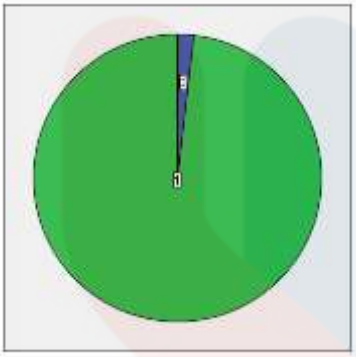

Figure 4.2.1: Feed intake in beaker1.

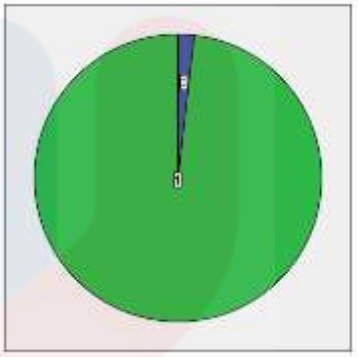

Figure 4.2.2: Feed intake in beaker2.

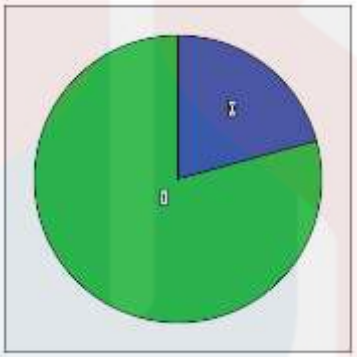

Figure 4.2.3: Feed intake in beaker3.

In this study, behaviour of the guppy has been observed at feeding habits where do observation either guppies eat the feed given. From the study, the result show that guppy always eat the mosquito larva in figure 4.2.1 that act as feed while for cucumber in figure 4.2.3, guppies eat the less. It is because the guppies has known as mosquito eater while for cucumber, even guppies has known as omnivore but it sometime not familiar with new environment that vegetable as their new daily diet that be the reason they do not eat often compare egg yolk and larvae. Guppies have been known to fight the spread of malaria. Malaria is passed on to humans by mosquitoes, but guppies eat mosquito larvae, which helps reduce the number of mosquitoes and slows the spread of the disease.

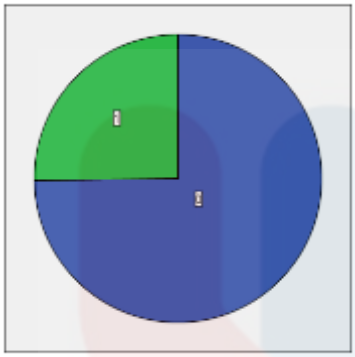

Figure 4.2.4: Quarrels in beaker1.

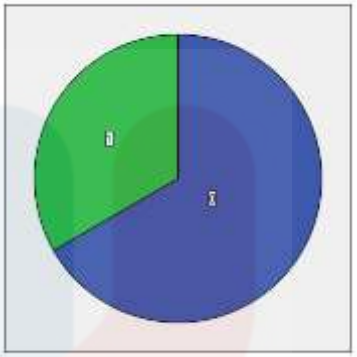

Figure 4.2.5: Quarrels in beaker2.

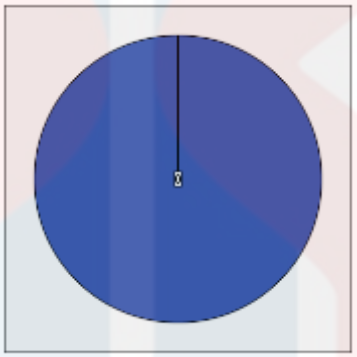

Figure 4.2.6: Quarrels in beaker3.

Then, other behaviour of the guppy has been observed at feeding habits where do observation either guppies fighting in feeding or not. Guppies will sometimes attack other guppies, especially those of the same sex, and they may also attack larger, slow-swimming fish with trailing fins and long tails. (Cindy Quarters, 2017). From the study, the result show that guppy always fight when they are felling hungry and desperate to eat the mosquito larva or egg yolk that show in figure 4.2.4 and figure 4.2.5 while for cucumber in figure 4.2.6, guppies do not fight over the vegetable. Sometime the cucumber will float at the surface and after long time, the taste also has change and give loss of interest toward the cucumber become the reason guppy do not fight over cucumber.

Behaviour studies are ordinarily utilized as part of toxicology research because of the attributable to the unbelievable utensils to quantify physiological end-points caused by exogenous chemicals. Both of reproductive and non-reproductive behaviours for in mammals have been utilized for a drawn out stretch of the time, though in teleost fishes non-reproductive behaviours have gotten small consideration when to compared with reproductive behaviours. In fact, animals will change their behavior to maintain a strategic distance from a wide range of sorts of predators. It have been an important framework for Trinidadian guppies (Poecilia reticulate) to examine the advancement of antipredator behavior because geographically isolated population's expertise different amounts of the aquatic predation (S. Hallgren et all., 2011).

Based on the beforehand archived, fish that from the downstream population like guppy fish, it will reacted more firmly toward the aquatic predator than fished that from population of upstream that assessing for extended timeframes. Additionally, it also displayed a robust behavioral reaction to the aerial predator of potential. The comparable location show of response from both of the populations but they are varied in used of the precise performances. The upstream fish will not move at the tank bottom but will tended to hide under shelter to hide from other especially the predators. From the research that have been done before, the fish that come from the high-chance stream invested more in time examining the potential predator than did fish from the low-chance stream. Other than that, they also discovered about the populations vary in the capacity to recognize new predators with fish that encountering fewer predators less than able predict. (Magurran and Seghers, 1990).

The guppies are in high of hazard streams because they are usually will exposed to many different freshwater and marine predatory fish and make them perceiving predators to build their survival. The guppies was generally accustomed determine the behavioral and evolutionary questions also identifying with predation because it shows awesome polymorphism among geographically isolated populations. The guppies that found in the most stream in the Northern Range Mountains of Trinidad at West Indies it can be grouped into distinct population types by their stream area. Since extensive fish are unequipped for colonizing areas above waterfalls, upstream guppies encounter couple of savage fish. The guppies could have multiple predator effect where the shoaling can chose based on against in upstream populations because the advantages for guppy is to get lower than the expenses of expanded in aerial predation. The guppies will experience the lower rates of aquatic predation that near the surface compare in deep water. Thus, the vertical use of the water column may reflect the perceived risk for each type of predator (Templeton and Shriner, 2004).

That has been for many decades for biologist show interest for the kinematics of the swimming that become a subject. The scientists do the experiment toward several factors of underwater locomotion of fishes after the physics of fin propulsion, buoyancy and drag and thrust, to muscle physiology and the adaptation of body morphology. But about the jumping behavior of fishes still lack of information. From the researchers, the fishes have been inform about the jump out of the water for three reasons. The guppy want to get non-aquatic prey, want to keep away from predation from underneath want to arrange obstacles in migration routes. At that point, the examination of the jumping

kinematics of the Trinidadian guppy has been finished by the specialists of Soares and Bierman, (2013), and recommend that the observation of jumping research in guppy fish may developed in the future.

For a few of fish species that bounce to consume not aquatic items of food. This methodology enables the fish to abuse arboreal and terrestrial prey, for example bugs, arachnids, and other of insect. One of the example are bowman angles where the fish are notable for their capacity to target prey with a bolus of water, however likewise ready to bounce and catch the prey in the midair. The Trinidadian Guppy, Poecilia reticulata also is known for its quick advancement and living space. Guppies are the common fish in the northern mountains of Trinidad and endemic to streams that vary in their ecological characteristics (Bredena et all., 1999).

Fishes that come from the lower parts of streams are sharing the natural surroundings with predators and have repeatedly, independently colonized and adapted to upstream environments that contain no predators (Oosterhout, 2006). The researches do the estimation of the attributes of spontaneous jumping of guppies that reared in the research facility from area of high predation. The unexpectedly of fish that hop out from the water without being fortified by a startle boost or areal prey things but do not under occasional movement weight. At that point, they evaluated this conduct and exhibited that it incorporates a preliminary period of moderate in reverse swimming, trailed by quick forward swimming and an aerial phase. The outcome show that until now, there are no depictions of areal jumping in fishes up that demonstrating this preparatory reverse swimming stage.

Further of the examination that startle kinematics and bouncing physiology is required before the conclusion about mutual neutral substrate come out and make it limited to know the information. Sudden the beginning of the bouncing conduct have given the idea about happing kinematics and the high cost of creating that keeping up the neural circuitry that expected to drive at such behaviour, it is sensible to think about how conceivable it is that a portion of a similar circuitry components might be utilized as a part of both of these hopping and C-begin.

The guppies have plausibility that could bounce out of the water as a type of startle reaction, however it is improbable that hopping is associated with regular movement (Alexander et all., 2006) because of the introduce the guppies as not known to change territories seasonally. The researches have been hypothesize that a hopping behaviour is think and has been chosen as a procedure for dispersal in view of the guppy bouncing occasions that begin gradually with a preliminary stage and happen without external stimulation. The theory that been fortify by the analysts expresses that bouncing is versatile for dispersal could be additionally tried through similar investigations toward both of upstream and downstream populations. Uncertainty if the dominant are the local habitat adaptation then it will be anticipated to the secondary populations that where low of the predation at the upstream and not under the similar dispersal pressures populations. As the original where at downstream and high predation was the jumper originator population that eventually led to a reduction in bouncing possibility and performance.

Water volume likewise impact predation activities and feeding rate. When, they do the experiment, 2 liters of water was utilized as a part of the experiment that make they led to think about guppies as predators of normal mosquito larvae in Malaysia where the predation activities and encouraging rate diminished. Fish invested more energy in foraging and hunting down mosquito larvae. The feeding rate diminished when water volume of water was expanded, and the feeding rate expanded when the quantity of predators and the densities of preys were expanded. The ecological factors, for example, temperature and lighting additionally impact the predation productivity of larvivorous fish, however salinities do not influence the predation activities. The predation activities increment when the temperature is expanded and the feeding rate higher than in dark condition (Saleeza et all., 2014).

CHAPTER 5

CONCLUSIONS AND RECOMMENDATION

Guppy fish (*P. reticulata*) is one of the ornamental fish farming that become one of the most valuable industries in recent years. Ornamental fish are regularly referred as living gems due to their color, shape and behavior. They are peaceful, generally tiny, attractively colored and could be suited in kept space. Moreover, rather than the way of life of palatable fish, information on the dietary requirements and feeding ornamental fish is limited. Nutrition has an important influence on development and reproductive potential of aquarium fish, and different live feeds have been utilized for fish rearing.

In the event of freshwater ornamental fish culture, there is a little information on the nutritional requirements to cover reproductive requirements. At that point, however other live feeds and diets effectiveness must be studied on angel fish growth and reproductive performance in end. Digestive tracts of wild guppies, contained for the most part benthic green growth and aquatic insect larvae. Males fed at lower food densities and ingested more per peck than females of comparative weight.

The result that have been showed in this study that the feed that consume by the guppy has been proved by the experiment that tell the guppy has become the predator to the mosquito larvae that make it valid outcome of the study. The behaviour that been observed resulted that more interest in know about guppy fish because it has many movement or attitude that unknown but really fascinated.

For the recommendation, it necessary to do future investigations that ought to incorporate include comparisons between both of the populations that come from locations with high and low levels of predation, and also correlations of the kinematics of males and females. Male guppies have been appeared to move from their pool of origin more frequently than females and the probability of emigration is significantly biased toward upstream development. Therefore, it is conceivable that jumping is more noticeable among males from high predation sites than among other groups.

Moreover, requirement to do more research toward guppy. The behavior not widely study and lack of information of guppy fish compare to other fish. There are a lot of study about behaviour of guppy fish but commonly not from our country. It should broad to other for the future our country will be country guppy breeder just like Singapore even though we have bigger area in geometrically in comparison to cover the place. It also can be done toward other ornamental fish that has commonly in important toward aquaculture life that maybe cause by not awareness people and lack of knowledge and interested to them.

REFFERENCES

Analia Murias (2015). Guppy fish stocked to control chikungunya vector mosquito. From the magazine Fish Info & Services Co.Ltd.

Amanda J.R.S, EdD, (2011). From the source YouTube. Retrieved with: https://www.youtube.com/watch?v=jYn5Jv7Gh4s&t=138s

Andy Brunning, (2016). The Chemistry of Eggs & Egg Shells. Compound Interest. Retrieved from: http://www.compoundchem.com/2016/03/26/eggs/

A-Z Animals (Nov 2008) retrieved with: https://a-z-animals.com/animals/white-tiger/.

Bay, E.C. 1967. Mosquito control by fish. *Chronicle, WHO.* **21**: 415

Begum, R. A. R. A. (2013). Breeding Biology Of Guppy Fish , Poecilia Reticulata (Peters ,1859) In The Laboratory, *39*(December), 259–267

Bob Yirka (2016). Research group suggests using guppies to control mosquitoes be abandoned. From the magazine phys.org. Retrieved with: https://phys.org/news/2016-10-group-guppies-mosquitoes-abandoned.html

Bryan Chin, (2017). Maximum Growth in Guppies. Breeding and Showing Guppies. From the website guppywest.com. Retrieved with: http://www.guppywest.com/ArticleMaximumGrowth.html

Cindy Quarters, (2017). How to Tell if My Guppy Fish Are Fighting. Types of Fish. Retrieved with: https://pets.thenest.com/tell-guppy-fish-fighting-3669.html

Cock V.O., Domino A.J., Stephen M. C., Jonatan B., Nicola J. B., Indar W. R., Ryan S. M., Nadia P., and Joanne C. (2006). Balancing Selection, Random Genetic Drift, and Genetic Variation at the Major Histocompatibility Complex in Two Wild Populations of Guppies (Poecilia Reticulata). The Society for the Study of Evolution. 60(12):2562-2574. https://doi.org/10.1554/06-286.1

Croft, D. P., Krause, J., & James, R. (2004). Social networks in the guppy (*Poecilia reticulata*), 516–519. https://doi.org/10.1098/rsbl.2004.0206

Day, R. L., Macdonald, T. O. M., Brown, C., Laland, K. N., & Reader, S. M. (2001). Interactions between shoal size and conformity in guppy social foraging, 917–925. https://doi.org/10.1006/anbe.2001.1820

Dong Ahn, (2017). Egg Components. Animal Science Department Iowa State University. Retrieved with: http://www.public.iastate.edu/~duahn/teaching/Neobiomaterials%20and%20Bioregulation/Egg%20Components.pdf

Einen O., Alne H., Helland B.G., Helland S.J., Hemre G.I., Ruyte B., Refstie S. and Waagb R. Nutritional Biology in Farmed Fish. Aquaculture Research: From Cage to Consumption

Elizabeth Falwell, (2017). What Are the Benefits of Egg Yolks? From the magazine livestrong.com. Retrieve from: https://www.livestrong.com/article/424690-can-you-substitue-egg-beaters-for-eggs-when-baking/

Felix B., Margaret B.P., Micheal R., Donald T. and Carlos A.F. (1999). Molecular Phylogeny of the Live-Bearing Fish Genus Poecilia (Cyprinodontiformes: Poeciliidae). Molecular Phylogenetics and Evolution. 12-2 (95-104). https://doi.org/10.1006/mpev.1998.0600.

Fernando A.A. and Phang V.P.E. (Dec, 1985). Culture of the guppy, *Poecilia reticulata*, in Singapore. From the book Aquaculture 51 (1), 49-63. Retrieved from: https://doi.org/10.1016/0044-8486(85)90239-X

Fishora (2016), Type of Fish Feed. Fish Laboratory. Retrieved by: http://fishlaboratory.com/fish/types-of-fish-feed

Gertrude V. D. and Donald L. K. (1981). Food and feeding behavior of the guppy, Poecilia reticulata (Pisces: Poeciliidae). Canadian Journal of Zoology. 59(4): 684-701, https://doi.org/10.1139/z81-098

Griffiths, N. W., & Magurran, A. E. (1998). Sex and schooling behaviour in the Trinidadian guppy, 689–693

Hallgren S., Volkova K., Reyhanian N., Olsén K.H., Hällström I.P. (2011). Anxiogenic behaviour induced by 17α-ethynylestradiol in male guppies (Poecilia reticulata).

Fish Physiology Biochemist. 37(4):911-8. Doi: 10.1007/s10695-011-9488-x.

Harpaz, S., Slosman, T., & Segev, R. (2005). Effect of feeding guppy fish fry (Poecilia reticulata) diets in the form of powder versus flakes, 996–1000. https://doi.org/10.1111/j.1365-2109.2005.01308.x

Heather J. A., John S. T., Sampson S.T. W., and Felix B. (2006) Parallel Evolution and Vicariance in the Guppy (Poecilia Reticulata) Over Multiple Spatial and Temporal Scales. The Society for the Study of Evolution. 60(11):2352-2369. https://doi.org/10.1554/06-288.1

International, A. N., Journal, Q., & Biology, O. F. (2014). Reproductive Response Of The Guppy Fish Poecilia Reticulata For Homeopathic Medicine , Natrum Muriaticum, *2*(3), 932–935

John endeler (2014). The science behind Guppy, Guppy Evolution. Caravan Lab. Retrieved from: http://www.guppyevolution.org/science/

Johnson H.S. and Ridlen S.F. (2017). Incubation and embryology. University of Illinois Extension. Retrieved from: https://extension.illinois.edu/eggs/res16-egg.html

Lawal M.O., Edokpayi C.A. and Osibona A.O. (2012). Food and Feeding Habits of the Guppy, Poecilia reticulate. Drainage Canal Systems in Lagos, Southwestern Nigeria. Department of Marine Sciences, University of Lagos, Akoka, Lagos, Nigeria. West African Journal of Applied Ecology, vol. **20** (2)

Magurran A.E. and Seghers B.H. (1994). Predator inspection behaviour covaries with schooling tendency amongst wild guppy, *Poecilia reticulata*, populations in Trinidad. Behaviour 128:121-134.

Matthew Seymour (2015). Feeding Vegetables to Aquarium Fish. From the Magazine Pro Theme on Genesis Framework.

Mann, K., & Mann, M. (2008). The chicken egg yolk plasma and granule proteomes, 178–191. https://doi.org/10.1002/pmic.200700790

Mattila, P., Lehikoinen, K., Kiiskinen, T., & Piironen, V. (1999). Cholecalciferol and 25-Hydroxycholecalciferol Content of Chicken Egg Yolk As Affected by the Cholecalciferol Content of Feed

Milad K., Amin F., and Mohammad S. (2012). Growth and reproductive performance by different feed types in fresh water angelfish (Pterophyllum scalare Schultze. 3(3): 175–179. PMCID: PMC4299979.

Nakajima, M., & Taniguchi, N. (2002). Genetic control of growth in the guppy ž Poecilia reticulata /, 393–405

Nicoletto, P. F. (1991). The relationship between male ornamentation and swimming performance in the guppy , Poecilia reticulata, 365–370

Nithya Shrikant (2017). 10 Strange Side Effects Of Cucumber. From the magazine stylecraze.com. retrieved with: http://www.stylecraze.com/articles/strange-side-effects-of-cucumber/

NR S., Y Norma R. and M S.Azirun (2014). Guppies as Predators of Common Mosquito Larvae in Malaysia. Institute of Biological Sciences, Faculty of Science, University Malaya, Kuala Lumpur, Malaysia; 2Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, MA, USA. 45-2 (299-308)

Rana W.E.S., Therese C.F., Piata S.M., Richard A.M., Luisa R. M., Rosana M., Dawn A. T. P., Misha L. W., Eugenia Z. (2016). Biodiversity and ecosystem risks arising from using guppies to control mosquitoes. Biology Letters. DOI: 10.1098/rsbl.2016.0590

Rhodi Lee (2014). World Malaria Day: India fights mosquitoes with guppy fish project. From the magazine Tech Times

Ruth Jean Aekim (2017). Boldness and Exploratory Behavior of the Guppy, *Poecilia Reticulata,* In Moorea, French Polynesia. Integrative Biology, University of California, Berkeley, California 94720 USA. Retrieved with: http://ib.berkeley.edu/moorea/uploads/6/6/8/3/6683664/ruth_jean_ae_kim_final_paper_copy.pdf.

Ryman, N. (1973). Two-way selection for body weight in the, *246*, 239–246

Sahandi, J., Jafaryan, H., Moradi, P., & Tadiri, C. H. (2013). Effect Of In-Feed Probiotic Blend On Growth Performance And Infection Resistance Of The Guppy (Poecilia Reticulata), 243–250

Sheridan, L., & Pomiankowski, A. (1997). Female choice for spot asymmetry in the Trinidadian guppy, 1523–1529

Soares D. and Bierman H.S. (2013). Aerial Jumping in the Trinidadian Guppy (Poecilia reticulata). PLoS ONE 8(4): e61617. https://doi.org/10.1371/journal.pone.0061617

Templeton C.N. and Shriner W.M. (2004). Multiple selection pressures influence Trinidadian guppy (Poecilia reticulata) antipredator behavior**.** Behavioral Ecology, Volume 15, Issue 4, 1 July 2004, Pages 673–678, https://doi.org/10.1093/beheco/arh065.

The importance of quality fish feed and their proper management in ponds. Aquaculture Research and Development Center, Kajjansi. National Fisheries Resources Research Institute (NAFIRRI) 220-266. Retrieved with: http://aquaticcommons.org/20443/1/feeds%202.pdf.

APPENDIX A

Table A.1: One-ways ANOVA.

Descriptives

			N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	Between-Component Variance
							Lower Bound	Upper Bound			
TREATMENT1	1		16	.5000	.02733	.00683	.4854	.5146	.45	.53	
	2		16	.6544	.02097	.00524	.6432	.6655	.62	.68	
	3		16	.7113	.01310	.00328	.7043	.7182	.69	.73	
	Total		48	.6219	.09257	.01336	.5950	.6488	.45	.73	
	Model	Fixed Effects			.02128	.00307	.6157	.6281			
		Random Effects				.06311	.3503	.8934			.01192
TREATMENT2	1		16	.5375	.02049	.00512	.5266	.5484	.50	.56	
	2		16	.3831	.02845	.00711	.3680	.3983	.34	.43	
	3		16	.6081	.01424	.00356	.6005	.6157	.59	.63	
	Total		48	.5096	.09733	.01405	.4813	.5378	.34	.63	
	Model	Fixed Effects			.02185	.00315	.5032	.5159			
		Random Effects				.06643	.2237	.7954			.01321
TREATMENT3	1		16	.3844	.03386	.00846	.3663	.4024	.32	.43	
	2		16	.6919	.01471	.00368	.6840	.6997	.67	.71	
	3		16	.5319	.31722	.07931	.3628	.7009	.00	.72	
	Total		48	.5360	.22058	.03184	.4720	.6001	.00	.72	
	Model	Fixed Effects			.18438	.02661	.4824	.5896			
		Random Effects				.08879	.1540	.9181			.02153

Table A.2: The one-ways ANOVA of body weight the guppies.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
TREATMENT1	Between Groups	.382	2	.191	422.370	.000
	Within Groups	.020	45	.000		
	Total	.403	47			
TREATMENT2	Between Groups	.424	2	.212	443.669	.000
	Within Groups	.021	45	.000		
	Total	.445	47			
TREATMENT3	Between Groups	.757	2	.378	11.131	.000
	Within Groups	1.530	45	.034		
	Total	2.287	47			

Table A.3: Post hoc test using Turkey HSD of body weight of guppies.

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) FISH	(J) FISH	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
TREATMENT1	1	2	-.15438*	.00752	.000	-.1726	-.1361
		3	-.21125*	.00752	.000	-.2295	-.1930
	2	1	.15438*	.00752	.000	.1361	.1726
		3	-.05688*	.00752	.000	-.0751	-.0386
	3	1	.21125*	.00752	.000	.1930	.2295
		2	.05688*	.00752	.000	.0386	.0751
TREATMENT2	1	2	.15438*	.00773	.000	.1357	.1731
		3	-.07063*	.00773	.000	-.0893	-.0519
	2	1	-.15438*	.00773	.000	-.1731	-.1357
		3	-.22500*	.00773	.000	-.2437	-.2063
	3	1	.07063*	.00773	.000	.0519	.0893
		2	.22500*	.00773	.000	.2063	.2437
TREATMENT3	1	2	-.30750*	.06519	.000	-.4655	-.1495
		3	-.14750	.06519	.072	-.3055	.0105
	2	1	.30750*	.06519	.000	.1495	.4655
		3	.16000*	.06519	.047	.0020	.3180
	3	1	.14750	.06519	.072	-.0105	.3055
		2	-.16000*	.06519	.047	-.3180	-.0020

*. The mean difference is significant at the 0.05 level.

Table A.4: Example draft of behaviour guppies.

RESULT BEHAVIOUR

FEED INTAKE DAILY

DAYS	DATES	BEAKER 1	BEAKER 2	BEAKER 3	REMARKS
1	25/6	1	1	0	
2	26/6	1	1	0	
3	27/6	1	1	1	
4	28/6	1	1	1	
5	29/6	1	1	1	
6	30/6	1	1	1	
7	1/7	1	1	0	
8	2/7	1	1	1	
9	3/7	1	1	1	
10	4/7	1	1	1	
11	5/7	1	1	1	
12	6/7	1	1	1	
13	7/7	1	1	1	
14	8/7	1	1	0	
15	9/7	1	1	1	
16	10/7	1	1	1	
17	11/7	1	1	1	
18	12/7	1	1	1	
19	13/7	1	1	1	
20	14/7	1	1	1	
21	15/7	1	1	0	
22	16/7	1	1	0	
23	17/7	1	1	1	
24	18/7	1	1	1	
25	19/7	1	1	1	
26	20/7	1	1	1	
27	21/7	1	1	1	
28	22/7	1	1	1	
29	23/7	1	1	1	
30	24/7	1	1	1	
31	25/7	1	1	0	
32	26/7	1	1	1	
33	27/7	1	1	1	
34	28/7	1	1	1	
35	29/7	1	1	1	
36	30/7	1	1	1	

Table A.5: example draft of body weight of guppies.

BEAKER 1 (Mosquito larva as fish feed)

No	Date	Guppy fish	Weight of beaker + water (g)	Weight of guppy fish + beaker + water (g)	Weight of guppy fish (g)
1	30/6/2017	1	68.55	69.00	0.45
		2	68.33	68.83	0.50
		3	67.95	68.27	0.32
				Average weight of guppy fish	**0.423**

BEAKER 2 (Egg yolk as fish feed)

No	Date	Guppy fish	Weight of beaker + water	Weight of guppy fish + beaker + water	Weight of guppy fish
1	30/6/2017	1	67.57	68.19	0.62
		2	66.98	67.32	0.34
		3	61.16	61.83	0.67
				Average weight of guppy fish	**0.543**

BEAKER 3 (Cucumber as fish feed)

No	Date	Guppy fish	Weight of beaker + water (g)	Weight of guppy fish + beaker + water (g)	Weight of guppy fish (g)
1	30/6/2017	1	60.76	61.45	0.69
		2	65.03	65.62	0.59
		3	64.61	65.33	0.72
				Average weight of guppy fish	**0.667**

Figure A.1: Location of the larvae at residential area.

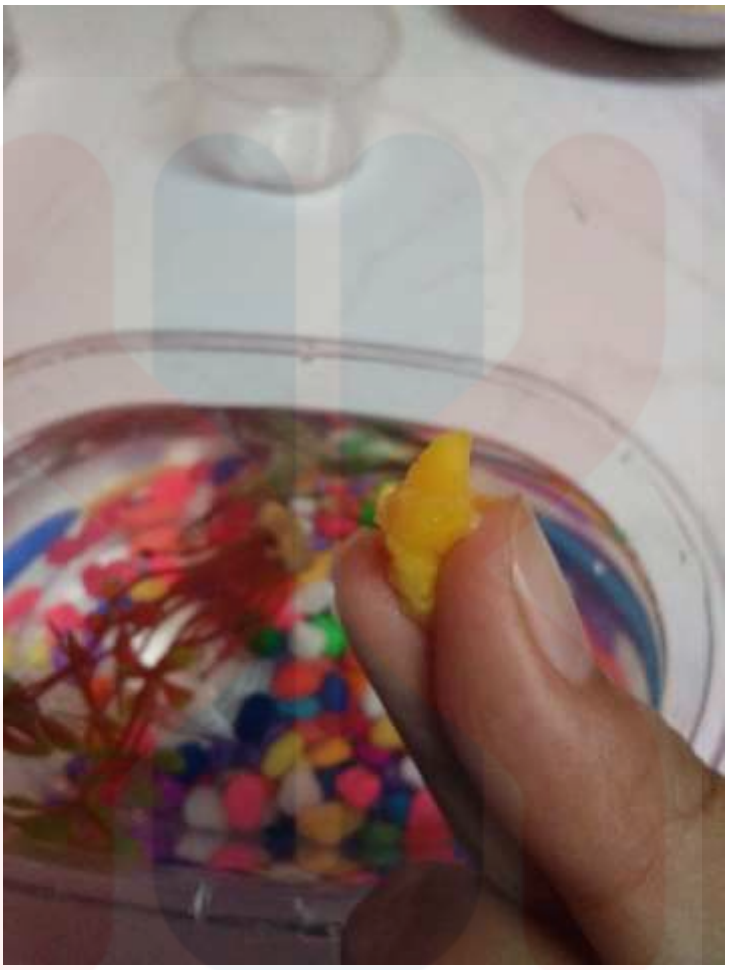

Figure A.2: Egg yolk that been boiled first before give to guppy fish.

Figure A.3: Weight the guppy fish using digital balanced.