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Commercial Feed Meal Effect On The Growth Performance Of Barbonymus Schwanenfeldii (Lampan) Juvenile

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***ABSTRACT**: Lampan (Barbonymus schwanenfeldii) is a commercially important Freshwater fish that is found in the subtropical and the tropical areas like Malaysia. Study on the growth performance of B. schwanenfeldii need to be explored due to their commercial importance. The aim of this study is to determine the growth rate, survival rate, and the commercial Feed meal Conversion Ratio (FCR) for B. schwanenfeldii which had been fed with various types of portentous diets in a controlled environment. This experiment was conducted for a period of 90 days using three types of treatments namely, TP_0 = 32% protein content, TP_1 = 28% protein and TP_2 = 23% protein. All experiments were replicated in triplicates, each treatment was conducted using nine plastic boxes measuring 1 m depth and 2 m diameter. Each container held 330 fish, that were fed twice daily depending on their body weights, at a 10% rate (for the initial 1 month) and at the rate of 5% for later stages. Findings reveale that the fish had significantly ($P<0.05$) different growth rates when fed with different diets. Higher growth rate was observed when the fish were fed with TP_0 (put the value here), that contained a higher protein content, followed by the TP_1 diet (value) and then, by the $TP_{2\ (??)}$. Nevertheless, their survival rate did not differ significantly ($P<0.05$) when the three different treatments were administered. Hence, this study recommends that the B. schwanenfeldii should be cultured in the diet containing 31% protein contents, in a controlled environment.*

***KEYWORDS*:** commercial feed meal, (pH), (DO), Conversion Ratio, (**ºC)**, Growth, *B. schwanenfeldii* (Juvenile)

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I. INTRODUCTION

The B. schwanenfeldii (Bleeker) locally known as Lampam Sungai and is classified under the family of Cyprinidae. This species is distributed widely, particularly in Asia; Mekong River and Chao Phraya, Borneo and Sumatra, and also found in all rivers and lakes of the Peninsular Malaysia (Ahmed et al. 2018) and man-made lake (Lee 1995; Taki 1978). McConnell (2004) suggested that cyprinids distribution largely reflects faunal exchanges early in the Pleistocene. Zulkafli et al. (1999) noted that this species dominated in the open water of Kenyir Lake (in Terengganu) as compared to Semenyih Reservoir (in Selangor) which was distributed more in the riverine systems. The B. schwanenfeldii is widely distributed throughout Malaysia, Thailand, Sumatera, and Borneo (Figure 1; smith 1945). This species is also synonyms to Barbus schwanenfeldii. It has commercial importance for its use as food and aquarium fish. B. schwanenfeldii is a freshwater fish inhibits lakes and rivers at pH range between 6.5 and 7.0, in tropical areas at temperature 20.4–33.7ºC (Isa et al. 2012). The two separate groups were identified by evaluating their phylogenetic relationships (Kamarudin & Desa 2009). One group was found to live in the south and central part of Peninsular Malaysia in Pahang, Jerantut, Padang Piol and the Serting and Muar Rivers. The second group was found to live in the northwest and northeast divisions, which include Tasik Timah Tasoh and Pulau Banding Average size was between 10 and 25 cm and weighs 200 – 600 g. There is a possibility that the fish can reach a maximum size of 30 cm and weights more than 1.0 kg (Christensen 2007)

The variety of the small tropical fish in the Family Cyprinidae categorized as Puntius have recently been renamed as the species Barbonymus. Therefore, the literature can be found using both or one or the other names (Pethiyagoda et al. 2012) The larvae and the juveniles are similar in nature. The genera hold several species that are similar for their apomorphic characteristics such as the deep coloration. The beauty of the B. schwanenfeldii makes them popular for freshwater aquarium owners sold as "ornamentals" (Pet. Peth reported proportional measurements for a relative of the Barbonymus schwanenfeldii called the Puntius sophore. Omitoyin (2016) studied the effects of feeding poultry litter on haematological parameters of Clarias gariepinus juveniles in a twelve week feeding test. Poultry litter generally possesses approximately 25.75% crude protein (Ghaly & MacDonald 2012), which is less than the 40% crude protein diet provided in the control experiment. The results of the study show that by the end of the twelve week feeding trial, the haematological values of haemoglobin, red blood cell, and white blood cell in the blood of the fish were significantly lower than those in the control experiment. Generally, the study highlighted that using poultry litter as a supplementary feed to the fish Clarias gariepinus may result in haematological distortions that ultimately bring about anemic conditions.

This paper investigated the effect of commercial feed pellets on water quality and physiological activities of B.schwanenfeldii (Juvenile) fish The results presented included performance parameters, water quality, dissolved oxygen(DO) (mg / l), water(Ph), temperature (° C), and Fish weight (g), parameters. Parameters are measured either from fish or reservoir in relation to specific dietary protein treatments. The codes / abbreviations used in the three treatments are explained as follows; TP0 is a 32% protein treatment, TP1 is a 28% protein treatment, TP2 is a 23% protein treatment, and a holding tank is an untreated tank.

II. EXPERIMENTAL

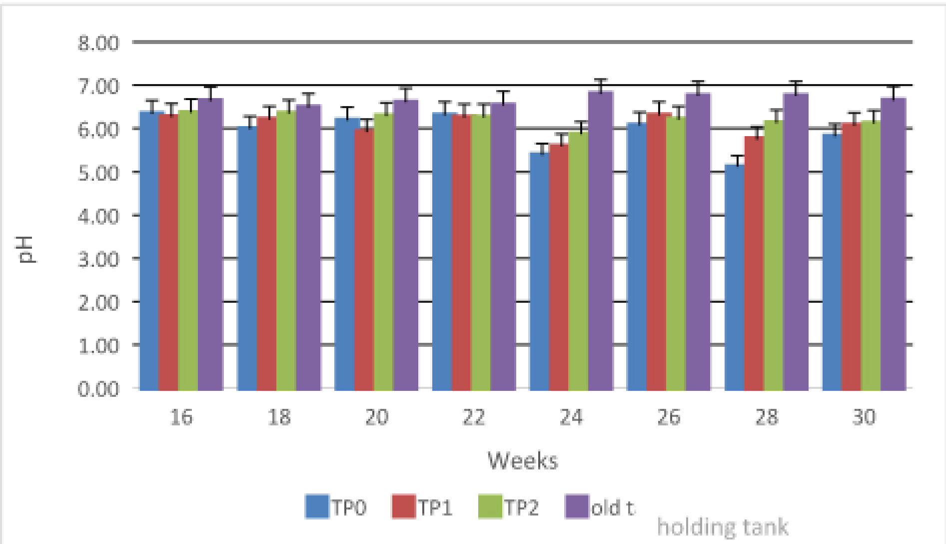
1.1 materials & methods

- Collection of fish samples from the Aquaculture Development Center (Pusat Pengembangan Akuakultur).
- This experiment was conducetd using the water from Chini lake. Commercial fish feed pellets contained 9 gm/kg phosphorous was used for this trail.
- The fry of *B. schwanenfeldii* (Lampam) were kept in two 2000 L containers for two weeks before start the experiment.
- Lastly, the fish were moved to 9 containers with each container having 330 fish. The 9 containers were divided into 3 groups with 3 containers in each treatment.
- Treatment one contained TP0 (32% Protein) commercial feed type, and Treatment two contained TP1 (28% Protein) commercial feed, and Treatment three contained TP2 (23% Protein) commercial feed.
- Increased weight gain (WG), mean growth rate (MGR), specific growth rate (SGR), survival rate and food conversion ratio (FCR) were calculated after 3 months.

III. RESULTS AND DISCUSSION

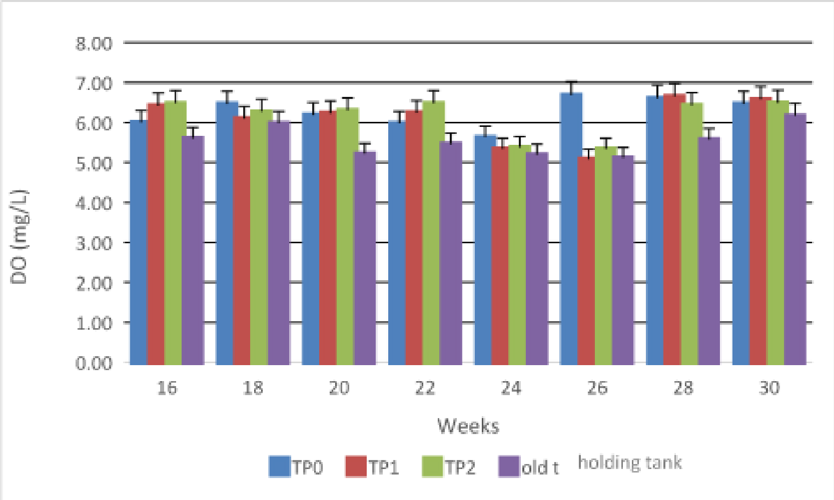
Different fish species tend to have different pH tolerance, and the most recommended pH ranging from 6.5 to 9.0. There was no significant variation in pH for treated and untreated tanks stock with juvenile *B. schwanenfeldii* stage Figure 1. The pH between 5.9 and 6.8 was maintained throughout the experimental period. However, pH did not influence the growth of juvenile *B. schwanenfeldii* during the 30 weeks experimental period. A lower pH interactions, carbon dioxide, alkalinity, and hardness has earlier reported in fish ponds (Wurts 2002). The pH control on water quality and survival of fish has been showed to have less effect on the fish performance (Mota et al. 2018),

Figure 1: The pH levels in various tanks for different dietary protein treatments during the experimental period. Abbreviation: TP0=32% protein, TP1= 28% protein, TP2=23% protein, Holding tank =tank without treatment. a-c Means with no common letters differ at $P < 0.05$



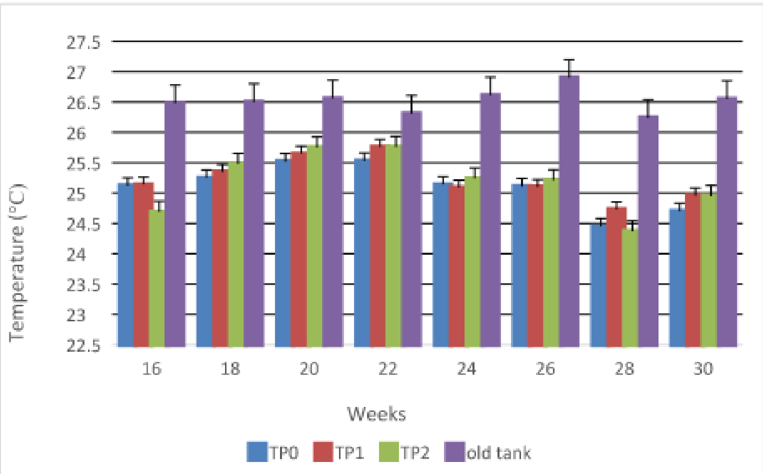
The higher (P<0.05) DO level were observed for TP0, TP1, and TP2 while the lower DO level was noted in holding tank water throughout the experimental period (16-30 weeks) at juvenile stage Figure 2. Comparatively with stage 1 fry slight variations in DO level at 22 to 26 weeks in all treatments was observed at juvenile stage. This variation in DO might be attributed to unclear factor or some decrease in water level. Increased water temperature was previously found to correlate with reduced levels of DO and potential for stress on aquatic juvenile fish . In the fry stage, the DO was found to be slightly increased with an increase in studied periods. A freshwater fish of tropical water require minimum DO is 5 mg/L (80% saturation) for healthy development, tissue restoration, and reproduction (Cerqueira & Fernandes 2002).

Figure 2: Water DO (mg/L) concentration observed in various tanks for different dietary protein treatments during the experimental period. Abbreviation: TP0=32% protein, TP1= 28% protein, TP2=23% protein, Holding tank =tank without treatment. a-c Means with no common letters differ at P < 0.05



Aquatic fish physiology and performance such as body temperature, feed consumption, growth rate, and FCR are influenced by water temperature of their habitat (Moumita et al. 2016). The recorded temperatures during the experimental period (week 16-30) of juvenile *B. schwanenfeldii* are illustrated in Figure 3. The untreated (holding) tank had significantly higher water temperature than treated (TP0, TP1, & TP2) tanks at this developmental stage. The temperature among the treated tanks slightly fluctuated ranges from 24 to 25.5°C, although there was no significant difference among the treated tanks. This range of temperature fall within the suggested optimum temperature recommended for fish performance. According to Buentello et al. (2000) 25 to 32 ºC is an appropriate temperature for feed intake, growth rate and body composition of juvenile fish.

Figure 3: The Temperature (°C) levels in various tanks for different dietary protein treatments during the experimental period. Abbreviation: TP0=32% protein, TP1= 28% protein, TP2=23% protein, Holding tank =tank without treatment. a-c Means with no common letters differ at P < 0.05

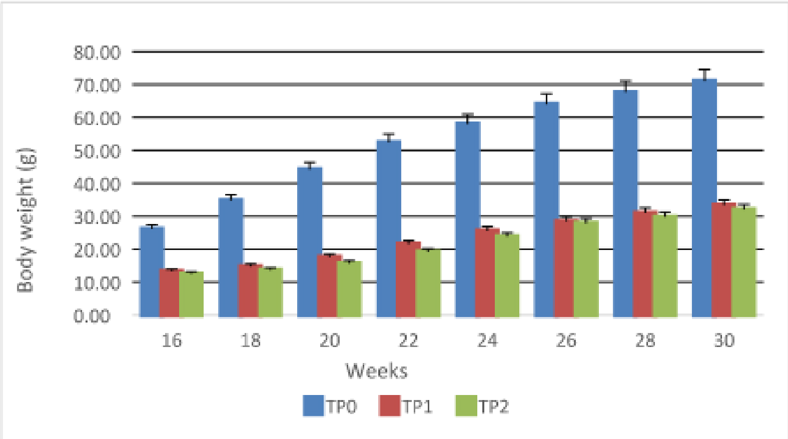


The resultant effect of dietary protein treatment on body weight of the juvenile *B. Schwanenfeldii* is presented in Figure 4. The body weight was linearly increased (P<0.05) with an increase in maturity (by weeks) and dietary protein levels (TP0, TP1, & TP2) in all juvenile *B. Schwanenfeldii*. Lee et al. (2002) have previously suggested that a diet containing high protein and lipid content enhances growth performance in juvenile fish. The TP0 treated *B. Schwanenfeldii* had significantly (P<0.05) greater body weight compared to TP1, and TP2 of treated juvenile *B. Schwanenfeldii*.

There were no significant differences between TP1 and TP2 in body weight throughout the examining periods. Cho et al. (2010) indicated that growth and survival rates of the fish on such dietary groups were 90-93% with no difference among treatments. A similar size of juvenile fish of 55 g average weight responded differently when the high protein was fed to the fish. The similar trend was previously observed in fry stage in the present study where body weight was found to be linearly increased by dietary protein treatment. This suggested positive responses of *B. Schwanenfeldii* to the higher protein content of the commercial pellet feed.

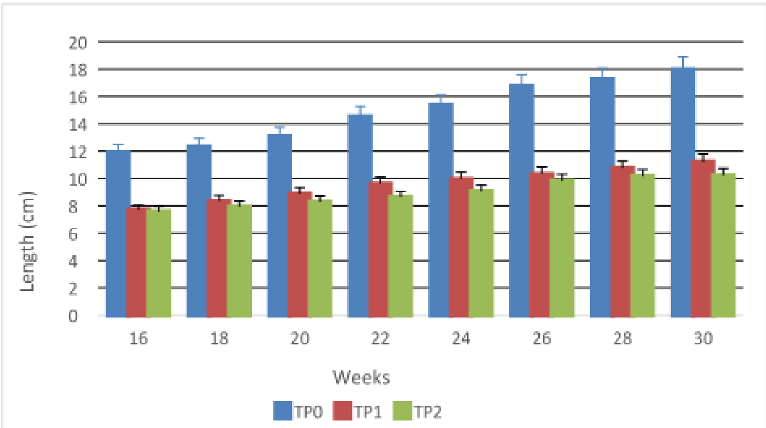
The relationship between the length and weight of fish is very vital in determining the condition of a fish because weight can be predicted from the length of a fish (Blackwell et al. 2000). The lengths of *B. schwanenfeldii* of different groups observed during the adult experimental period are shown in Figure 5. The *B. schwanenfeldii* lengths in all juveniles were found to be linearly increased (P<0.05) with increased in maturity.

Figure 4: Juvenile B. schwanenfeldii body weight (g) observed for different treatments during the experimental period. Abbreviation: TP0=32% protein, TP1= 28% protein, TP2=23% protein, Holding tank =tank without treatment. a-c Means with no common letters differ at P < 0.05



The TP0 had significantly superior length compared to TP1 and TP2 which had the lowest body weight. There were no significant differences between the TP1 and TP2 in term of length. This increased in length corresponded with increased in body weight in all groups. The same trend phenomenon was noted in fry stage as regards to length and weight. The length as a parameter estimates among groups of fish to ascertain the relative condition or robustness of fish population (Kuriakose 2017).

Figure 5: Juvenile B. schwanenfeldii length (cm) observed for different treatments during the experimental period. Abbreviation: TP0=32% protein, TP1= 28% protein, TP2=23% protein, Holding tank =tank without treatment. a-c Means with no common letters differ at P < 0.05



IV. CONCLUSION

The following conclusion can be derived from the current study:

- Distinct diets results in considerably different fry growth rates (P<0.05)
- TP0 (31%) with higher protein content diets had higher growth rate.
- The three treatments did not produce significantly dissimilar survival rates.
- Water variables were examined at the range of 5.9-6.8, 6.0-7.2 (mg/L) and 24-26 (ºC) and for water pH, water temperature and DO during the entire experimental period, respectively.
- The results revealed that the growth of *B. schwanenfeldii* was not significantly influenced by water quality variables for instance water pH, temperature and DO.

This study recommends *B. schwanenfeldii* (Lampan) to be best raised in 31% protein content diets within a controlled environment.

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