Effect of Feeding Method and Locally Produced Blood Meal Incorporated Diet on Growth of Young Male Guppy Fish (*Poecilia reticulata*)

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Introduction

The tropical ornamental fish production is among the most valuable industries in the world and the live bearer guppy fish (*Poecilia reticulata*) are the most popular species among hobbyists (Harpaz *et al.*, 2005). Information on dietary requirements of guppy fish has been mainly evaluated by the individual experience of the farmers and is readily available. Guppy fish is known as omnivorous and require 40-45% dietary protein level in their diet (Harpaz *et al.*, 2005). Fish feed is the single highest costly input in the ornamental fish industry and traditionally fish meal is regarded as the commonest and most popular source of protein in the commercial feed production (Otubusin *et al.*, 2009). Jonston (2005) cited in Oubusin *et al.* (2009) has reported that global supply of fish meal would not be sufficient to satisfy the demand in 2014. Hence, the present study aimed to evaluate the use of blood meal as an alternative protein source for the fish meal in the young male guppy fish diet and the form of feeding that could be administered.

Methodology

The experiment was carried out at the Ornamental fish breeding and training centre (NAQDA), Rambadagalla. Eight hundred and ten numbers of fifty-day old male guppy fish were used in the experiment. The fish were stocked in 18 glass aquarium tanks of similar size (45 L) at the stocking density of fish/liter. Two types of feed, fish meal diet (A) and blood meal incorporated diet (B) were administrated in three different forms; pulp form, flake form and powder form. Two feed types in three feeding methods were prepared as below. Blood meal powder was prepared by drying them in an oven at 60 C^0 over 24 hours and powdered meal mixed with other ingredients in diet B as an alternative feed ingredient for fish meal. The six treatments are indicated below.

Table 1. Treatments used

Feed	Form of diet		
A. Fish meal diet (control)	Pulp (T1)	Flake (T2)	Powder (T3)
B. Blood meal diet	Pulp (T4)	Flake(T5)	Powder (T6)

Proximate composition of the fish feed is given in Table 2.

Table 2. Proximate composition of fish feed (fish meal diet & blood meal diet /100 g)

Proximate composition	(A) Fish meal diet	(B) Blood meal diet
DE(Kcal/1Kg)	304.8	305.1
Crude Protein%	45	45.74
Crude Fat%	9.84	9.1
Crude Fibre%	3.7	3.6
Ash%	10.09	12.08
Methionine%	0.84	0.9
Calcium%	2.61	2.29
Phosphorous%	1.32	1.11

Water quality in the tanks was maintained by siphoning tanks once per every two days. Lengths (mm) and weights (g) were measured using an analytical balance (AQT- 200) with a precision of 0.01 mg and a Vernier caliper (Tricle brand) with a precision of 0.02 mm respectively. 9 fish were taken randomly for the measurements from each tank. The differences in weight gain, mean weight gain, length, mean length, relative growth rate, survival rate and water quality parameters (water appearance, Ammonia, pH, Nitrate) were tested using two-way ANOVA in two factor factorial design. The experiment was carried out for 30 days and using the data collected at the period of study following rates and ratios were calculated.

$$\text{Relative growth rate (RGR \%)} = \frac{(Wf - Wi)\ g}{Wf\ g} \times 100$$

$$\text{Daily Weight Gain (DWGg/day)} = \frac{(Wf - Wi)\ (g)}{\text{Culture period (days)}}$$

Where Wf = Final average weight at end of experiment
Wi = Initial average weight at beginning of experiment

$$\text{Survival Rate (\%)} = \frac{\text{Number of fish that survived}}{\text{Number of fish stocked}} \times 100$$

Results and Discussion

The growth performance of the guppy for six treatments is shown in Table 3 and in Figure 1. As indicated, the highest growth is obtained in feeding the diet in powder form for both diet types. It would be due to free access to the feed by the fish since powder feed is distributed all over the surface of the tank and floating longer period compared to the other feeds. The lowest weight gain is shown in flake feed.

Table 3.Summary (means) of the growth performance of guppy fish (*Poecilia reticulata*)

Treatment	Initial weight (g)	Final weight (g)	DWG (g/d)	RGR (%)	Initial length (cm)	Final length (cm)	DLG (cm/d)	Survival rate (%)
T1-Pulp	0.070	0.294	0.007	76.19	2.00	3.02	0.034	99.25
T2-Flake	0.082	0.246	0.005	66.66	2.09	2.77	0.022	99.25
T3-Powder	0.086	0.300	0.007	71.33	2.07	3.01	0.031	99.25
T4-Pulp	0.072	0.262	0.006	72.51	1.97	2.81	0.028	99.25
T5-Flake	0.074	0.235	0.005	68.51	2.02	2.84	0.027	99.25
T6-Powder	0.084	0.317	0.007	73.50	2.08	3.00	0.030	99.25

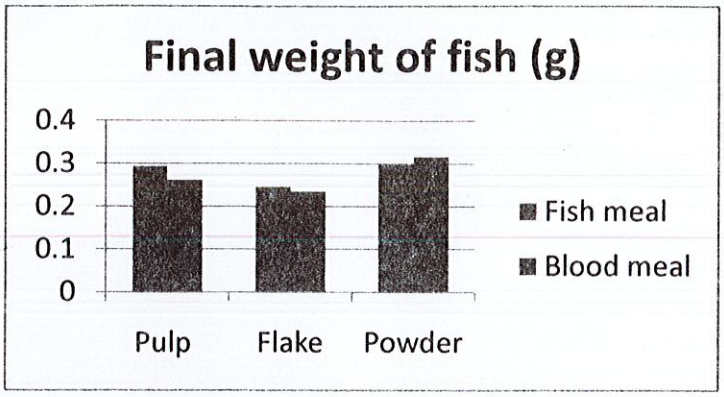

Figure 1. Final mean weight gains of fish (g)

Statistical analysis

The statistical analysis proved that the feeding form significantly affected the growth rate of young guppy fish as powder feeding has shown the best growth performances while lowest growth rate distinguish in flake feeding method ($P<0.05$). The control feeding method (pulp feeding) that is currently used in most of guppy fish farmers also demonstrated low growth rate compared to the powder feeding. The treatment effect was not statistically significant ($P>0.5$) meaning that both fish meal diet and blood meal incorporated diet have shown similar results on the growth responses of young guppy fish.

Conclusion

It can be concluded that 100% replacement of fish meal with blood meal has no significant effect on the growth responses of young guppy fish but both meals give similar results. Hence, blood meal can be considered as a good alternative to fish meal. Feeding fish with a powder form diet will be more beneficial for the farmers since it gives significantly higher growth.

References

Harpaz, S., Slosman, T. and Segev, R. 2002. Effect of feeding guppy fish fry (*Poecilia reticulata*) diets in the form of powder versus flakes, 2005 (36).

Otubusin, S.O., Ogunleye, F.O. and Agbebi, O.t., 2009. Feeding Trials using Local Protein Sources to Replace Fishmeal in Pelleted Feeds in Catfish (Clarias Gariepinus Burchell 1822) Culture, 2009 (1), pp.142-147.