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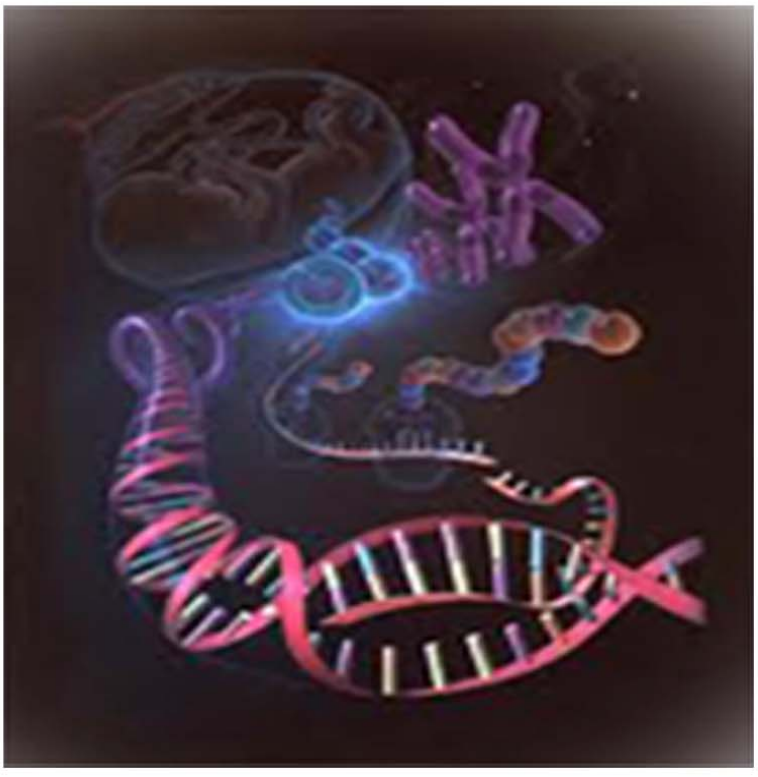

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Research Paper

GROWTH PERFORMANCE OF THAI PANGUS (*PANGASIANODON HYPOPHTHALMUS*) USING PREPARED AND COMMERCIAL FEED

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Growth performance using prepared feed (F_1) was compared with one commercial feed, Quality fish feed (F_2) in two respective treatments of T_1 and T_2. Both treatments were carried out in triplicate at 200/dec for Thai pangus. Average initial weight of Thai pangus was 25.13 g respectively. Growth performances were influenced by feed type. Mean weight gain (g) of Thai pangus were 130.76 ± 14.25 and 88.4 ± 3.40, average weight gain (g) were 1.87 ± 0.21 and 1.26 ± 0.05 and specific growth rate (% day-1) were 1.13 ± 0.06 and 0.94 ± 0.02 in T_1 and T_2 respectively. Feed conversion ratio were 1.93 ± 0.30 and 2.34 ± 0.12, survival percentages were 96.17 ± 3.79 and 97.78 ± 1.76 and fish production (kg/ha/70days) were 6126.58 ± 852.64 and 4274.47 ± 225.19 in T_1 and T_2 respectively. The present research findings suggested that quality feed ingredient like fish meal is essential for feed formulation through which increased growth and production could be achieved.

Keywords: Thai pangus, Growth performance, Commercial feed, pelleted feed, production

INTRODUCTION

Thai pangus (*Pangasianodon hypophthalmus*) is one of the most popular species in aquaculture compared to other species in our country (Begum *et al.,* 2012a). It was introduced for cultivation in Bangladesh in 1989 because of its spectacular growth and acceptable proof (Sarker, 2000). Like other cultivated catfishes, *P. hypophthalmus* is well-known for its faster growth, easy culture system, high disease resistance and tolerance of a wide range of environmental parameter (Begum *et al.,* 2012b; Bardach *et al*., 1972 and Stickney, 1979). Depending on the availability of fingerlings of Thai pangus, monoculture system has been widely disseminated throughout the country. Now, farmers are very interested in Thai pangus culture due to its rapid growth and acceptance of food item (Sayeed *et al*., 2008; Begum *et al.,* 2012a). Thai pangus are aggressive feeders, uniform in size and had good body coloration. Thai pangus growers generally use different supplemental feeds in culture.

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Traditionally, fish meal is the preferred dietary protein source for many farmed fish species (Soltan *et al.*, 2008). High quality fish meal normally contains between 60% to 72% crude protein by weight (Hussein and Jordan, 1991; Al Mahmud *et al.,* 2012). Typical diets for fish may contain from 32 % to 45 % total protein by weight. High density and semi-intensive culture of *P. hypophthalmus* in ponds have been established and are very popular in Bangladesh. Such culture can produce at a rate of as high as 25 - 30 t/ha/yr. with protein rich diets (BFRI and BARC, 2001) and the survival rate of Thai pangus is 85%, stated by Rahman *et al.* (1992). Pangus is a sensitive species to water quality and it is very important to maintain the water quality. Fish culturists are more conscious about the maintenance of optimum condition of water quality parameters (Azad *et al.*, 2004).

Hence forth no study has been taken to test the growth performance of Thai pangus using prepared feed and then compared with the commercial feed. So the main objective of the present study was to check and compare the growth performance of Thai pangus (*P. hypophthalmus*) using handmade and commercial feeds to get a better understanding among the effect of feed on their growth.

MATERIALS AND METHODS

Study Area

The Experiment was carried out for 70 days from June 26 to September 03, 2010 in 6 experimental ponds each of 0.60 decimal, located in the northern side of the Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh. The fry of Thai Pangus (average weight 25.13 g) were supplied by Agro-3 Fish Hatchery and Culture Farm, Mymensingh and stocked into each of the experimental pond at a rate of 150 fish/decimal.

Feeding Methodology

Two types of feed were used during experiment. Prepared pellet feed treated as treatment I (T_1) including Mustard Oil Cake (MOC), Rice Bran (RB), Maize (M), Wheat Flour (WF) and Vitamin pre-mix (Vit.) and commercial pellet feed named "Quality Fish Feed" treated as treatment II (T_2) were designed for the present study. Major ingredient of prepared feed was Fish Meal (FM) supplied by Peninsula Fishing Limited and the other five different types of feed ingredients were collected from local market. Proximate composition of Peninsula Fishing Group supplied FM and local fish meal are given in the Table 1 for comparison. The prepared feed with above composition contained 32% protein. The proximate compositions of prepared feed and quality fish feed are given in the Table 2.

Feed is supplied by spreading method manually twice a day. The fish were fed at a rate of 10% of their body weight during the first 30 days and then gradually reduced to 6% for the

Table 1: Proximate Composition of Peninsula Fishing Limited Supplied Fish Meal and Local Fish Meal

Constituents	% Moisture	% Lipid	% Crude Protein	% Ash	% Crude Fiber	% Carbohydrate
Peninsula Fishing Group supplied fish meal (FM)	17.26	9.11	55.24	18.03	-	0.36
Local fish meal	11.02	5.35	51.75	23.00	1.25	7.63

Table 2: Proximate Composition of Prepared and Quality Fish Feed

Constituent	Amount (%) in Prepared Feed	Amount (%) in Quality Fish Feed (Nursery-2)	Amount (%) in Quality Fish Feed (Starter)
Crude Protein	32.00	31.91	31.91
Lipid (Oil)	14.93	7.62	7.62
Carbohydrate	22.19	24.34	24.34
Crude Fiber	5.80	6.60	6.60
Ash	10.69	17.55	17.55
Moisture	14.39	11.98	11.98

next 10 days. During the first week of August 2% feed is supplied due to the sudden increase of the water temperature. After feeding back 3% was supplied until the termination of the experiment. The power is adjusted based on the weight of the fish during sampling. Fish sampling was done randomly catching 15 fish from each tank every 10 days and the fish were caught with a cast net and the weight was taken by the weight of a precision balance (accurate to 0.1 g).

Estimated Parameter

The following parameters were used to evaluate the growth of fish such as weight gain (g), daily weight gain (g), percent weight gain, Specific Growth Rate (SGR), Food Conversion Ratio (FCR), survival rate (%) and production (kg/ha/ 70 days). Water quality parameters (temperature (^{0}C), dissolved oxygen (mg/L), alkalinity (mg/L), nitrate (mg/L), ammonia (mg/L) and pH) were recorded on fortnight interval by using kit.

Data Analysis

Paired-Samples T Test (Student's T Test) used to test statistically to see whether the influence of both treatments (Feed types) on the growth (weight) and production of fishes were significant or not by using SPSS 11.5 version software.

RESULTS

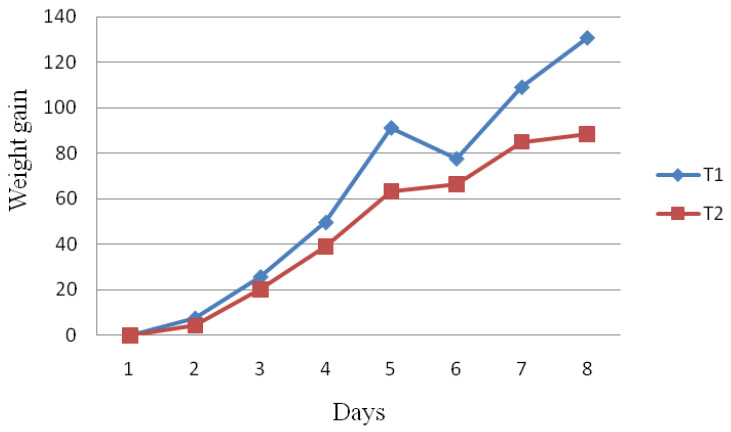
During the study period, water temperature varied from 31.8 to 38.0 ^{0}C in T_1 and T_2. The height temperature (35 ^{0}C - 38 ^{0}C) only recorded within 10 days (01-10 August). The range of pH values recorded in T_1 and T_2 were varying between 7.1 to 8.0 and 7.1 to 8.3 respectively. The mean values of pH were 7.44 ± 0.11 and 7.66 ± 0.14 recorded in T_1 and T_2 respectively. Alkalinity (mg/ l) of the experimental ponds was varied from 80 to 160 and 70 to 220 mg/l in T_1 and T_2 respectively. The mean values of alkalinity were 112.50 ± 10.13 and 100.00 ± 17.42 recorded in T_1 and T_2 respectively. The dissolved oxygen content of the water was varying from 3.5 to 16.0 mg/l in T_1 and 5.5 to 14.0 mg/l in T_2. The mean values of dissolved oxygen content of the water in T_1 and T_2 were 9.0 ± 1.68 mg/l and 8.87 ± 1.44 mg/l respectively. The value of nitrate was 0.09 mg/l and the values of ammonia were varied from 0 to 0.05 mg/l in experimental ponds (Table 3).

The mean weight gain of fish at the end of the experiment was followed by 130.76 g and 88.4 g in T_1 and T_2 respectively (Figure 1). The average weight gain of fish at the end of the experiment was followed by 1.87 g and 1.26 g in T_1 and T_2 respectively. The percent weight gain of Thai

Table 3: Values of Water Quality Parameters With Mean (± SE) Under Both Treatments During The Study Period

Treatment	Replication	Sampling	Temperature°C	pH	Alkalinity mg/L	Dissolve Oxygen mg/Ll	Nitrate mg/L	Ammonia mg/L
T_1	R_1	S_1	32.5	7.4	80	16.00	0.09	0.00
		S_2	31.8	7.1	130	5.00	0.09	0.04
		S_3	38.0	7.4	160	3.50	0.09	0.03
		S_4	32.1	7.4	140	10.00	0.09	0.03
	R_2	S_1	32.5	7.4	80	16.00	0.09	0.00
		S_2	31.8	7.7	100	7.00	0.09	0.05
		S_3	38.0	7.1	100	6.00	0.09	0.03
		S_4	32.1	8.0	110	6.50	0.09	0.03
Mean ± S.E.	33.10 ± 0.74	7.44 ± 0.11	112.50 ± 10.13	9.00 ± 1.68	0.09	0.03 ± 0.006		
T_2	R_1	S_1	32.5	7.4	80	14.00	0.09	0.00
		S_2	31.8	8.0	220	5.50	0.09	0.05
		S_3	38.0	7.4	80	7.00	0.09	0.03
		S_4	32.1	7.4	80	8.00	0.09	0.03
	R_2	S_1	32.5	8.0	70	13.50	0.09	0.00
		S_2	31.8	7.7	80	6.00	0.09	0.02
		S_3	38.0	7.1	100	7.50	0.09	0.03
		S_4	32.1	8.3	90	7.50	0.09	0.03
Mean ± S.E.	33.10 ± 0.74	7.66 ± 0.14	100.00 ± 17.42	8.87 ± 1.44	0.09	0.03 ± 0.005		

Figure 1: Weight Gain of Fishes in Both the Treatments During the Study Period



Pangus in both treatments was 520.25 and 351.72 in T_1 and T_2 respectively. The mean specific growth rates of Thai Pangus in both treatments were 1.13% and 0.94% in T_1 and T_2 respectively. The mean food conversion ratios of Thai Pangus in both treatments were 1.93 and 2.34 in T_1 and T_2 respectively. The survival percentages in both treatments were 96.17 and 97.78 in T_1 and T_2 respectively. The productions of Thai pangus were 6126.58 and 4274.47 kg/ha/70 days in both treatments (Table 4).

The cost of production was based on the Mymensingh whole sale market price of the input used in the year 2010. The Handmade feed cost was Tk. 32.84/kg and the commercial feed cost was Tk. 30.00/kg (Table 5).

DISCUSSION

This study was conducted to know growth performance of Thai pangus using different supplementary feeds and stocking density of 200 fingerlings/dec. Sayeed *et al.* (2008) tested 100/dec in treatments which is lower than the stock of the present experiment. In Mymensingh Region, farmers stocked 230 to 250 fishes/dec in pond (Personal communication with farmers) which is also higher than the stock of the present experiment.

The water quality parameters measured in both treatments were found more or less similar and all of them were within the acceptable range for fish culture. The range of temperature recorded in T_1 and T_2 were varied from 31.80 to 38.00 ^{0}C. The mean temperature was 33.10 ^{0}C which recorded in T_1 and T_2 respectively. However, in the present experiment temperature were 31.00 ^{0}C to 32.00 ^{0}C in most of the period except first week of August. During first week of August, temperature suddenly increased up to 38.00 ^{0}C and the range were 35.00 ^{0}C to 38.00 ^{0}C. Rahman (1996) recorded water temperature from 19.04 to 28.88 ^{0}C in two experimental ponds, which is lower than the result of present experiment. Uddin (2002) found water

Table 4: Growth Parameters of Thai Pangus (*Pangasianodon hypophthalmus*) Observed in Both Treatments During the Study Period

Growth Parameters	Treatments	
	T_1	T_2
Initial weight (g)	25.13 ± 0.09	25.13 ± 0.09
Final weight (g)	155.89 ± 4.89^a	113.53 ± 3.71^b
Weight gain (g)	130.76 ± 14.25^a	88.4 ± 3.40^b
Average weight gain (g)	1.87 ± 0.21^a	1.26 ± 0.05^b
Percent weight gain	520.25 ± 56.72^a	351.72 ± 13.54^b
SGR (% day^{-1})	1.13 ± 0.06^a	0.94 ± 0.02^b
Food conversion ratio (FCR)	1.93 ± 0.30^a	2.34 ± 0.12^b
Survival percentage	96.17 ± 3.79^a	97.78 ± 1.76^a
Fish production (kg/ha/70days)	6126.58 ± 852.64^a	4274.47 ± 225.19^b

Note: a and b significant difference at 5% significance level.

Table 5: Economic Analysis of Fish Production at the End of the Experimental Period

Inputs	T_1		T_2	
	Quantity	Cost (Tk.)	Quantity	Cost (Tk.)
Pond preparation		60		60
Lime and fertilization		30		30
Fingerling	200/dec.	150	200/dec.	150
Feed	34.44 kg	1,131.01	30.17 kg	905.1
Harvesting cost		70		70
Labor		200		200
Total cost		1,641.01		1,415.1
Cost per ha		4,05,329.47		3,49,529.7
Production per ha	6,126.58 kg		4,274.47 kg	
Benefits				
Sell price		6,12,658.00		4,27,447.00
Net benefit/ha/70days		2,07,328.53		77,917.3

temperature varied from 25.60 ^{0}C to 33.00 ^{0}C in farmers carp polyculture ponds, which is almost similar with the value of the present experiment. From the above results, it can be mentioned that the water temperature measured in both treatments were within the range appropriate for growing fish accept the values for the first week of August.

The range of pH values recorded in T_1 and T_2 were varied between 7.10 to 8.00 and 7.10 to 8.30 respectively. The mean values of pH were 7.44 (T_1) and 7.66 (T_2), which indicated good productive condition. Akter *et al*. (2009) recorded pH 7.15 to 7.60 in Kailla oxbow Lake of Mymensingh from summer to winter season and Hoq *et al.* (1996) measured pH from 7.50 to 8.00 in five prawn ponds, which are almost similar with the findings of present experiment. The mean pH values were slightly alkaline in both treatments, which indicated good productive condition of the ponds and suitable for fish culture.

The values of alkalinity (mg/L) of the experimental ponds were varied from 80 to 160 and 70 to 220 mg/L in T_1 and T_2 respectively. The mean values of alkalinity were 112.50 mg/L (T_1) and 100.00 mg/L (T_2), which indicated also good productive condition. Uddin (2002) recorded alkalinity from 45 to 180 mg/L in farmers carp polyculture ponds, which mean value (112.50 mg/L) is similar with the mean value of the present experiment. Narejo *et al*. (2010) recorded alkalinity from 159 to 170 mg/L in aquarium from July to September 2009 into Laboratory of Department of Fresh Water Biology and Fisheries, University of Sindh, Jamshoro, which has some similarity with the findings of present experiment.

The values of dissolved oxygen in T_1 were varied from 3.50 to 16.00 mg/L, whereas the

values of dissolved oxygen in T_2 were varied from 5.50 to 14.00 mg/L. The mean values of dissolved oxygen were 9.00 mg/L and 8.87 mg/L and there is no significant (P>0.05) deference between both treatments. Hoq *et al.* (1996) measured dissolved oxygen from 4.00 to 5.90 mg/L in polyculture of Thai pangus with 7.50 months culture period, which is almost similar with the values of present experiment. Ahmed *et al.* (2009) also recorded dissolved oxygen value range from 3.00 to 5.45 mg/L in four beels (Shidlong, Gangni, Buka, Kailla) of Mymensingh during April 2006 to March 2007, which are similar with the lowest value of present experiment. The optimum level of dissolved oxygen concentration was found up to the range from 5 to 10 mg/L (Swann, 1990), which is lethal for fish culture and it is especially true at high temperature.

Other parameters like nitrite (<0.09 mg/L) and ammonia (<0.09 mg/L) were found very minute amount in experimental ponds, which is not toxic for fish. Nitrite is the major toxic component of the inorganic nitrogen compounds. Uddin (2002) observed nitrate from 0.01 to 0.88 mg/L in farmers carp polyculture ponds, which is higher than present experiment. Dewan *et al.* (1991) recorded ammonia value ranged from 0.50 to 0.62 mg/L in extensive management of Chinese and Indian major carps, which is higher than the result of the present experiment.

The results showed that, the mean weight gain of fish at the end of the experiment were 130.76 g and 88.40 g in T_1 and T_2 respectively, which were significantly different from each other. It was observed from the experiment that, prepared feed is more preferable for fish growth than the commercial feed. Sayeed *et al.* (2008) also found 820.00, 846.00 and 872.00 g mean weight gain of Thai pangus at an 11 months feeding trial with nine rectangular shaped earthen culture ponds and Huq *et al.* (2004) found a mean weight gain (502.77 g) of Thai pangus in polyculture from a period of 7.5 months, which are considerably higher than the result of the present experiment in four months culture period.

Average weight gains of fish were 1.87 g/day and 1.26 g/day in T_1 and T_2 respectively. In both treatments average weight gains were significantly different to each other. Cremer *et al.* (2002) initiated average weight gain of pangus was 6.88 g in two earthen ponds and Sayeed *et al.* (2008) recorded 2.80, 2.56 and 2.64 g average weight gain at an 11 months feeding trial using three supplementary feeds in nine rectangular shaped earthen culture ponds, which are definitely higher than the result of the present experiment. The average weight gain is lower due to high temperature in the first week of August, which resulted plankton bloom. This stressful condition influenced next 20 days feeding trial and yield lower weight gain.

Specific Growth Rates (SGR) of Thai pangus were 1.13 % day^{-1} and 0.94 % day^{-1} in T_1 and T_2 respectively. The highest SGR value (1.13) was recorded in T_1 while the lowest (0.94) was obtained in T_2. According to Razzaque *et al*. (2008), the SGR (0.65 % day^{-1}) of *Pangasius pangasius* with formulated feed in natural ponds, which is lower than the findings of the present experiment. Khan *et al*. (2009) investigated SGR in three treatments (2.46 %, 2.62 %, 2.71% day^{-1}) for a period of 135 days in nine experimental ponds, which are higher than the result of the present experiment. The different SGR values of Thai Pangus in the present experiment might be due to the temperature

difference between regions and protein percentages of feeds applied in the ponds. The other reason might be due to the variation in initial size of Thai Pangus used for the experiment and also could be due to the variation of culture season.

The highest Food Conversion Ratio (FCR) (2.34) was recorded in T_2 while the lowest (1.93) was obtained in T_1. Prepared feed (T_1) showed lower FCR and commercial feed (T_2) showed higher FCR. From the result of the experiment, it can be mentioned that prepared feed is more suitable when compared with commercial feed. Amin *et al.* (2005) recorded FCR 1.65 for pangus culture with eight earthen ponds, which is lower than the value of the present experiment. However, other scientists achieved higher FCR than obtained in the present experiment. Halder and Jahan (2001) observed FCR (2.96-3.09) in 5 months pangus polyculture with carp, which has similarity with the value of the present experiment.

Survival percentages were 96.17 and 97.78 in T_1 and T_2 respectively. The highest survival percentage was obtained in treatment T_2 (97.78 %) and the lowest was in treatment T_1 (96.17 %) and there was no significantly different between two treatments. Sayeed *et al.* (2008) found the survival rates of Thai pangus were 94 to 97% in nine earthen ponds with a period of 11 months. The survival rate of Thai pangus was about 94% to 96% in polyculture of *Pangsius sutchi* with carps in a fish farm reported by Maniruzzaman (2001). These authors achieved almost similar survivals percentages in their experiments with the value of the present experiment. The survival rate was found to be negatively influenced by different planting densities as low planting density had the highest survival rate. It might be due to high competition for food and space between fish and predatory activities.

The production of Thai pangas was 6126.58 and 4274.47 kg/ha/70 days in T_1 and T_2 respectively. According to Khan *et al.* (2009), lower production of pangasiid catfish and silver carp polyculture from present experiment were 5,430.64 to 3,562.89 kg/ha, which conducted with nine earthen ponds for a period of 135 days in three different treatments. Ahmed *et al.* (1996) achieved production of *Pangasius pangasius* as 339.39 kg/ha, 600.00 kg/ha and 624.24 kg/ha over a period of three months in three earthen ponds by using two prepared and one commercial diets, which are lower than the production of the present experiment. Increased production obtained in the present study might be due to intensive care, productivity of the ponds and quality of feeds and feed ingredients used.

The production cost and net income based on the wholesale market price. The handmade feed cost was Tk 32.84/kg and the commercial feed cost was Tk 30.00/kg. By using handmade feed profit was 2,07,328.53 Tk/ha/70days in T_1 and 77,917.3 Tk/ha/70days in T_2 using commercial feed. Khan *et al.* (2009) gave an idea about net return of pangasiid catfish and silver carp polyculture in nine earthen ponds for a period of 135 days and net return were Tk 13,786.67/ha, Tk 40,080.56/ha and Tk 68,533.54/ha in three different treatments, which is lower than obtained in the present experiment. Kader (2003) mentioned that the production of pangasiid catfish was 3,062.01 kg/ha/70 days by using three commercial feed in nine earthen ponds and obtained a net profit of Tk 31,004/ha/70days, which are much lower than the value obtained in the present investigation.

Fish meal of high quality provides a balanced amount of all essential amino acids and fatty acids for optimum development, growth, and reproduction (Miles and Chapman, 2011; Minar *et al.,* 2012). Fish meal supplied by Peninsula Fishing Limited through Agro-3 Fish Hatchery and Culture Farm, had protein percentage higher than the locally available one. Prepared feed from Peninsula Fishing Limited supplied fish meal capitulated better production with Thai pangus. Temperature was found below 32.50 ^{0}C except the first week of August, which was suitable for fish growth. During the experiment, water temperature suddenly increased up to 38 ^{0}C, when water levels reduced to 45-50 cm, which resulted plankton bloom in the first week of August. This situation created stress on experimental fish, for which growth and production were not received up to expected levels. So it can be brought to a close that the prepared feed is batter from commercial feed for Thai pangus culture. Mini ponds should be brought under cultivation, by which fate of small farmers (pond owners) could be uplifted.

CONCLUSION

The utilization of the prepared feed can be used as an important means for a good production of fish. Day by day, price of the commercial feed is increasing. So for better utilization of feed with a minimum cost it is best way to prepare some feed from the unnecessary parts of the kitchen or from other waste. But they should contain a good value. In this case, this study can help to draw some suggestive measure during the time of making home feed for the aquatic species.

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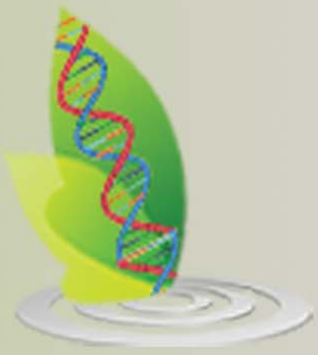

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