Shobuj Bangladesh Publications House
International Journal of Natural and Social Sciences
ISSN: 2313-4461

# Evaluation of commercial feed on growth performance of Tilapia (*Oreochromis niloticus*) in Mymensingh

**Aovijite Bosu[1]*, Monoranjan Das[2], Sajjad Hossain[2], Md. Moniruzzaman[1]**

[1]Bangladesh Fisheries Research Institute, Mymenisngh-2201, Bangladesh
[2]Department of Aquaculture, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

**ARTICLE INFO**

**Article history**

Accepted 21 January 2016
Online release 29 January 2016

**Keyword**

Feed
Quality Assessment
Proximate Composition
FCR
SGR
Tilapia

***Corresponding Author**

Aovijite Bosu
✉ ovi_bosu08@yahoo.com

**ABSTRACT**

A study was carried out to assess the quality of fish feed used in different tilapia (*Oreochromis niloticus*) farms of Trishal and Fulpur Upazila in Mymensingh District. A total of 8 tilapia feeds viz. as C.P, Nourish, Quality Feed, Provita, Paragon, Mega, Fortune and a Farm made feed were collected during February to April 2014. The samples were analyzed for proximate composition in the Fish Nutrition Laboratory, Department of Aquaculture, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh. Growth data were collected from farms record book and analyzed later on. The moisture content of feeds varied from 13.96 to 10.57%. Lipid content varied from 10.38 to 2.69%. The highest 33.60% protein was observed in Quality Feed and the lowest (25.9%) observed in Fortune Feed. The moisture content, Crude lipid, Crude fibre, Carbohydrate and Ash were varied from 13.96 to 10.57%, 6.50 to 4.20%, 40.45 to 24.84% and 14.09 to 8.50%, respectively. The maximum final weight 68.96g was observed in C.P Feed whiles the lowest 21.05g for Fortune Feed. The highest weight gain (63.39g) exhibited by C.P Feed whereas the lowest (19.11g) for Fortune Feed. The highest SGR (70.43%) exhibited by C.P Feed and lowest SGR (21.23%) exhibited by Fortune Feed. The maximum Production 53.17kg/dec./90 days exhibited by C.P Feed while the lowest 26.25kg/dec./90 days exhibited by Fortune Feed. The best FCR observed was 2.97 by feeding C.P Feed and the worst FCR was observed in 4.12 by feeding Mega Feed. Survival rate was varied from 96.39 to 78.36%. The results of the present work will be very much helpful to fish farmers for feed selection and bargain with the feed traders to select suitable feed for their fish to ensure profitable aquaculture operation.

## INTRODUCTION

In the context of declining trends, aquaculture is the most promising option for increasing fish production. In addition to earning profit, aquaculture offers a tremendous opportunity for improving livelihood and nutrition of the poor rural people in Bangladesh. In Bangladesh, tilapia is one of the best candidate, due to several desirable characteristics such as easy seed production, prefer all kind of supplementary feeds, can be cultured at high stocking density, can also be cultured in saline water (salinity 12 – 15 ppt), high yield, resistance to poor water quality and disease, tolerance of wide range of environmental condition, ability to convert efficiently the organic and domestic waste and low cost feed, can be profitably cultured in seasonal ponds and small ditches, canals close to the homesteads. Its rapid growth rate, high demand in local market, suitable for cage culture, etc makes it an important species for rural aquaculture. In Bangladesh, the GIFT tilapia is the most dominating species in the culture systems due to its acceptance for higher growth and production. During the last few years rapid development of farming is achieved in Mymensingh District of Bangladesh. Farmers have been converting their rice fields into tilapia farms for quick profit. In recent years, tilapia has become one of the most popular commercial cultivable species due to its high market demand and price.

Aquaculture production largely depends on the quality of feed. Fish feed and feeding play important roles in quality aquaculture production. A nutritionally balanced feed and adequate feeding are important factors that help to maximize fish production and profitability. Inappropriate feed and feeding strategy could result in environmental

**How to cite this article:** Bosu A, Das M, Hossain S and Moniruzzaman M (2016). Evaluation of commercial feed on growth performance of Tilapia (*Oreochromis niloticus*) in Mymensingh. International Journal of Natural and Social Sciences, 3(1): 73-82.

degradation, disease outbreak, poor growth and high mortality of fishes in the farm. Aqua feeds must satisfy the nutrient requirements of the cultured species in terms of protein and essential amino acids, lipid and essential fatty acids, energy, vitamins and minerals. Farmers as well as different companies are producing feed which may not contain appropriate nutrient composition for tilapia as they have no quality assessment system. The research work will be very helpful for determining the quality of feed that farmer used (both commercial and farm made) in their farms.

## MATERIALS AND METHODS

### Study area

The study was conducted at Dhanikhola and Tarakanda Union of Trishal and Fulpur Upazila, respectively situated in Mymensingh district. Many tilapia fish farms have been constructed in the Trishal and Fulpur Upazila with in last decade.

### Collection of feed samples

Quality assessment of commercial and farm made feed used in different tilapia farms were conducted for the period of three months from February to April, 2014 to determine the nutrient availability in the feed to have sustainable fish production. Feed samples were collected from 8 tilapia farms owned by Nurul Hossain Fish Farm(C.P), Hira Mia farm(Nourish), Abul Jabbar Farm(Fortune), Natural Agro Farm(QFL), Samad Pramanik Farm(Provita), Taslim Hossain Farm(Paragon), Saddam Ali Farm(Mega) and Shohidul Islam Khan Farm(Farm made). The farm owners used C.P, Nourish, Fortune, Quality Feeds, Paragon, Provita, Mega, and a Farm made feeds, respectively. Collected samples were kept in a refrigerator in the laboratory, and then the samples were analyzed for proximate composition on a later date. Before starting the experiment farmers were motivated to keep a registrar, actually a register book was donated to each of the farmers for recording all about farm activities like growth performance data of fish and economic input-output data. The growth performance data as well as input-output data were collected from the farm's record book.

### Preparation of the samples

The samples were taken from the refrigerator and kept to the room temperature for few hours. Then the required amount of samples was finely ground by a small mortar and kept in airtight container for subsequent chemical analysis.

### Laboratory facilities

The analysis of feed was carried out in the Fish Nutrition Laboratory of the Department of Aquaculture in the Faculty of Fisheries, Bangladesh Agricultural University (BAU), Mymensingh.

### Analytical methods

The proximate composition of different fish feeds were analyzed in duplicate according to the standard procedure given in Association of Official Analytical Chemists (AOAC, 2000).

#### *Moisture content in the feeds*

Moisture content was determined by placing an accurately weighed amount (2-3g) ground sample in a pre-weighed porcelain crucible in thermostat oven (Gallenkamp, HOTBOX, Model OVB-306) at 105°C for about 24 hours until a constant weight was obtained. The dried crucible then transferred to desiccators for Cooling and weighed using a sensitive electric balance.

$$\text{Moisture (\%)} = \frac{Original\ sample\ weight - Dried\ sample\ weigh}{Origingal\ sample\ weight\ (g)} \times 100$$

#### *Ash content in the feeds*

Accurately weighed samples (about 2-3 g) were taken in porcelain crucibles and placed in a muffle furnace at 550°C for 6 hours. The crucibles were taken out and cooled in desiccators and weighed in a sensitive electric balance.

$$\text{Ash content (\%)} = \frac{Wt\ of\ crucible\ with\ ash\ (g) - Wt\ of\ empty\ crucible\ (g)}{Wt\ of\ sample\ (g)} \times 100$$

***Crude protein content in the feeds***

Crude protein of the samples was estimated by using Kjeltec 2020 digestion analyzer. A sample of 0.5 g and a blank was taken in the digestion tube for digestion at high temperature; 10 ml of concentrated sulfuric acid and 1.1 g digestion mixture were added in the tube. Then the digestion tube set in the digestion chamber fixing at 420°C for 45 minutes ensuring water supply, easier gas outlets etc. After digestion the tubes were allowed to cool and 5 ml of sodium thiosulphate (Na2S2O3) (33%) and 30 ml sodium hydroxide (NaoH) solution was added in each tube. Then the distilled extraction was collected with 25 ml of Boric acid (4%) and titrated with standard hydrochloric acid (0.2N). The nitrogen value obtained was converted into percentage of crude protein by multiplying with a factor of 6.25 assuming that protein contains 16% nitrogen.

%Nitrogen =

$$\frac{Miliequvalent\ of\ Nitrogen\ (0.014) \times titrant\ value\ (ml)}{Sample\ weight\ (g)} \times 100$$

% Crude protein = % Nitrogen x 6.25

***Crude lipid content in the feeds***

Crude lipid was determined by extracting a weighed quantity (2-3 g) of samples with analytical grade acetone in ground joint Soxhlet apparatus. Extraction was allowed to continue by heating in the electric heater at 70°C temperature until clear acetone (without oil) was seen in siphon, which took about 3 hours. Then the round bottom flask of the apparatus was separated and the extract was transferred to a pre-weighed beaker and left for evaporation of acetone in an oven at 105°C. After the evaporation of acetone, only the lipid was left in the beaker which was later calculated in percentage.

% Crude lipid =

$$\frac{Wt\ of\ beaker\ with\ lipid - Wt\ of\ empty\ beake}{Wt\ of\ samples\ (g)} \times 100$$

***Crude fiber content in the feeds***

A small amount of finely ground sample (1-2 g) was taken in to a filter crucible and was inserted into the hot extractor unit (Hot Extractor, Model-1017). 150m1 of pre-heated 0.128M H2SO4 was added into the reagent heating system and 2-3 drops of N- Octanol were added through the valves. The mixture was digested for 30 minutes. Acid was then removed from it by filtering and washing with warm distilled water (three times). The residue in the flask was boiled with required 150ml of 0 0.223M KOH for 30 minutes and then filtered with subsequent washed in warm distilled water (3times) and acetone. The residual content was then dried in hot air oven at 105°C for an overnight and then weighed and placed in to the muffle furnace at 500°C for 3 hours and again weighed. The loss of weight represented the crude fiber.

Then percent crude fiber was calculated by the following formula:
Crude fiber (%) =

$$\frac{Oven\ dried\ wt\ of\ sample\ (g) - Ash\ wt\ of\ samples\ (g)}{Wt\ of\ sample\ (g)} \times 100$$

***Nitrogen free extracts (NFE)***

Nitrogen free extract (NFE) which is a soluble carbohydrate was calculated by subtracting the sum of the percentage contents of moisture, crude protein, lipid, ash and crude fiber from 100.

Nitrogen free extract (NFE) calculated as:
NFE % = {100- (moisture + crude protein + crude lipid + ash + crude fiber)} %

**Growth parameters**

Every month interval, growth in weight (g) was measured. The following parameters were used to evaluate the growth of fish such as weight gain (g), specific growth rate (SGR % day), feed conversion ratio and production (Kg/dec/90days).

Weight gain (g), Specific growth rate (SGR), Feed conversion ratio (FCR), Survival rate were

calculated according to standard formula described elsewhere.

**Production**

The production was determined by multiplying the average gained weight (g) of each fish by the total number of fish survived at the end of the experiment.

## RESULTS AND DISCUSSION

### Nutritional quality of different tilapia farm's feeds

***Moisture %***

The moisture content was found 11.91, 12.26, 13.96, 13.41, 13.29, 13.47, 10.57, 12.10% in C.P, Nourish, Fortune Feed, Quality Feed, Provita, Paragon, Mega, and a Farm made feed, respectively. A variation was observed among different types of Tilapia feeds, in case of moisture content. The highest (13.96%) moisture was observed in Fortune Feed and the lowest (10.57%) moisture was observed in Mega Feed. The second highest (13.47%) moisture was observed in Paragon Feed and the second lowest (11.91%) was observed in C.P Feed (Table 1). The moisture content of all the feeds was higher than the standard value of ≤ 10%.

Some variation was observed among different types of tilapia feeds in case of moisture content. Some of the parameters studied lies between desired values and some deviated from the desired values. The highest (13.96%) moisture was observed in Fortune Feed and the lowest (10.57%) moisture was found in Mega Feed whereas medium value (11.91%) was observed in CP Feed. The lowest (10.4%) moisture was found in Mega Feed. The moisture content of all the feeds was higher than the standard value of ≤ 10%. Seenapa et al. (1991) found that a diet containing 9.9% moisture was optimum for the growth of Catla fry. Roy (2002) reported that a diet containing 9.8% moisture were more suitable for GIFT tilapia.

***Crude lipid %***

The lipid content was found 2.69, 9.59, 8.95, 10.38, 9.7, 9.78, 9.59, and 7.51% in C.P, Nourish, Fortune Feed, Quality Feed, Provita, Paragon, Mega, and a Farm made feed, respectively. A variation was observed among different types of Tilapia feeds, in case of lipid content. The highest (10.38%) lipid was observed in Quality Feed and the lowest (2.69%) lipid observed in C.P Feed, which seems to be very low (Table 1).

The lipid content varied between 10.38 and 2.69%. The high lipid value of Quality Feed, Nourish Feed, Paragon Feed and a farm made feed might be due to the use of high amount of oil meal/cake in formulation procedure. The maximum (10.38%) lipid content was found in Quality Feed which was very close to Nourish Feed (9.59%) as well as Paragon (9.7%). The minimum lipid content (2.69%) was found in C.P Feed, which seems to be very low. The present finding is higher to the findings Wilson (2000) reported that lipid level in catfish feeds should be 5 to 6%. Luquet (2000) stated that dietary lipid levels of 5 to 6% are often used in tilapia diet. Singh (1991) reported that the optimum lipid requirements of Indian major carp were determined to be 4-6%. Akand *et al.* (1991) found that SGR, and weight gain (%) were significantly high ($P<0.05$) in *H. fossilis* fed 10% lipid diet but at highest SGR and weight gain (%) were obtained with the diet containing 5% lipid.

***Crude Protein %***

The crude protein content was found 26.96, 29.76, 25.9, 33.60, 32.35, 32.21, 31.86, 27.3% in C.P, Nourish, Fortune Feed, Quality Feed, Provita, Paragon, Mega, and a Farm made feed, respectively. A variation was observed among different types of Tilapia feeds, in case of crude protein content. The highest (33.60%) protein was observed in Quality Feed and the lowest (25.9%) protein observed in Fortune Feed (Table 1). For tilapia protein content should be at least 30% of the feed, some of the value seems to be inferior.

The crude protein content ranged from 25.9 to 33.60% in case of commercial feed and a farm made feed, respectively. Fish feed traders of this region has been selling this type of feeds in ample although the quality of feeds are mostly unknown to fish farmers. The highest (33.60%) protein content was observed in Quality Feed and the lowest (25.9%) protein content was obtained in

Fortune Feed. Protein is the major nutrient for growth. The protein requirement of fish is influenced by various factors such as fish size, water temperature, feeding rate, availability and quality of natural foods, overall digestible energy content of diet (Wilson, 2000). Hepher (1990) found that most fishes required 35-50% protein in their diets. Lall (1991) found that protein requirements of common carp, grass carp and tilapia were 31-38, 41-43 and 30-40 %, respectively. Wilson (2000) reported that most of the commercial catfish feeds contain 32% crude protein. Li at el. (1991) found that diet containing 25.7% protein; meet the requirements of amino acid for juvenile Nile tilapia. Roy (2002) reported that a diet containing 27.87% protein appears to be more suitable for GIFT tilapia. Mollah and Hossain (1990) reported that 39.5% protein appeared suitable for rearing of *C. batrachus.* Begum *et al.* (2008) found that the feed at a level of 40% protein was most effective in changing the growth and maturity of *M. gulio.* The protein (%) content of the feeds was less than the standard (35-50%) for carnivorous fish as prescribed by (MOFL 2004). Different manufacturer maintained less protein (%) and low quality protein to make the feed cost effective as farmers wanted. Furthermore, farmers often could not get sustainable or high fish production, therefore, they would like to buy low cost feed for cost effective production. Moreover, the causes of less protein (%) might be due to the low quality of raw material as well as quality fall due to storage facilities and manufacturing process.

***Ash %***

The ash content was found 12.59, 12.26, 10.00, 13.37, 8.50, 10.56, 8.54, and 12.71% in C.P, Nourish, Fortune Feed, Quality Feed, Provita, Paragon, Mega, and a Farm made feed, respectively. A variation was observed among different types of tilapia feeds, in case of ash content. The highest (13.37%) ash was observed in Quality Feed and the lowest (8.50%) ash observed in Provita Feed (Table 1). Ash content of all the feed were found within the acceptable range.

The ash content of the feeds used was ranged from 13.37%, to 8.50%. The highest (13.37%) ash noted from QFL and the value is close (12.71%) to Farm feed. The lowest (8.50%) ash content was estimated from Provita Feed which was similar (8.54%) to Mega Feed. Paragon Feed (10.56%) and Fortune Feed (10.00%) stands at the middle. Results revealed that the ash content of commercial as well as farm made feeds was in the acceptable range of the recommended value.

***Crude Fibre %***

The crude fibre content was found 5.40, 4.60, 6.50, 4.40, 4.70, 4.20, 4.50, and 6.35% in C.P, Nourish, Fortune Feed, Quality Feed, Provita, Paragon, Mega, and a Farm made feed, respectively. A variation was observed among different types of tilapia feeds, in case of crude fibre content. The highest (6.50%) crude fibre was observed in Fortune Feed and the lowest (4.20%) crude fibre observed in Paragon Feed (Table 1).

Fiber content varied among different tilapia feeds from 6.50 to 4.20%. The highest (6.50%) fiber content was in Fortune Feed which was similar to the farm made feed (6.35%). The lowest (4.20%) fiber was measured from Paragon Feed which was more or less identical to Mega Feed (4.50%), Provita Feed (4.70%), Quality Feed (4.40%) and C.P Feed (5.40%) holds on intermediate portion in respect of fibre content. Roy (2002) reported that a diet containing 10.75% crude fiber appears to be more suitable for GIFT tilapia.

***Carbohydrate %***

The carbohydrate content was found 40.45, 31.53, 34.69, 24.84, 31.46, 29.78, 34.94, and 34.03% C.P, Nourish, Fortune Feed, Quality Feed, Provita, Paragon, Mega, and a Farm made feed, respectively. A variation was observed among different types of tilapia feeds, in case of carbohydrate content. The highest (40.45%) carbohydrate was observed C.P Feed and the lowest (24.84%) carbohydrate observed in Quality Feed (Table 1). Some of the feed contain more carbohydrate than the standard one (<30% for carnivorous or omnivorous fish feed) especially the C.P, Nourish, Provita, Mega and Fortune Feeds.

The amount of carbohydrate ranged between 40.45% and 24.84% of different tilapia feeds. The maximum (40.45%) Carbohydrate was observed in C.P Feed. The minimum (24.84%) Carbohydrate

was found in Quality Feed. In between maximum and minimum lied other feeds like Fortune Feed (34.69%), Mega Feed (34.94%), Farm feed (34.03%), Paragon Feed (29.78%) and the Provita Feed (31.28%). Ali *et al.* (2008) reported that the diet containing 13% CHO were more suitable for Nile tilapia. Bhuiyan (2002) found that the diet containing 34.53% CHO were more suitable for carp poly culture. Roy (2002) reported that a diet containing 29.18% CHO appeared to be more suitable for GIFT tilapia. The seed used in different farms were not identical. Fish were used by different farmers depend on the availability of the fry nearby. The initial weight varied from 5.57 to 1.94g. The highest initial weight (5.57g) was denoted from Nurul Hossain Farm using C.P Feed whereas the lowest weight (1.94g) was observed in Abul Jabbar Farm using Fortune Feed.

Table 1
Proximate composition of different feeds used in tilapia farms.

| Name of farm's | Protein % | Moisture % | Lipid % | Ash % | Fibre % | Carbohydrate |
|---|---|---|---|---|---|---|
| 1. Nurul Hossain Fish Farm(C.P) | 26.96 | 11.91 | 2.69 | 12.59 | 5.40 | 40.45 |
| 2. Hira Mia Farm (Nourish) | 29.76 | 12.26 | 9.59 | 12.26 | 4.60 | 31.53 |
| 3. Abul Jabbar Farm (Fortune) | 25.9 | 13.96 | 8.95 | 10.00 | 6.50 | 34.69 |
| 4. Natural Agro Farm (QFL) | 33.60 | 13.41 | 10.38 | 13.37 | 4.40 | 24.84 |
| 5.Samad Pramanik Farm (Provita) | 32.35 | 13.29 | 9.7 | 8.50 | 4.70 | 31.46 |
| 6. Taslim Hossain Farm (Paragon) | 32.21 | 13.47 | 9.78 | 10.56 | 4.20 | 29.78 |
| 7. Saddam Ali Farm (Mega) | 31.86 | 10.57 | 9.59 | 8.54 | 4.50 | 34.94 |
| 8. Shohidul Islam Khan Farm (Farm made) | 27.3 | 12.10 | 7.51 | 12.71 | 6.35 | 34.03 |

**Growth Parameters of fish**

***Initial weight (g)***

The initial weight of tilapia used in different farms was not identical. Fish were brought from the nearby availability hatchery fry by different farmers. The highest weight (5.57g) was denoted from Nurul Hossain Fish Farm using C.P Feed, whereas the lowest (1.94g) was observed in Abul Jabbar Farm using Fortune Feed, Samad Pramanik Farm using Provita Feed, and Taslim Hossain Farm using Paragon Feed. The second highest initial weight (4.44g) was found in Sohidul Islam Khan using Farm made Feed, and the second lowest (2.32g), was found in Saddam Ali Farm using Mega Feed.

The seed used in different farms were not identical. Fish were used by different farmers depend on the availability of the fry nearby. The initial weight varied from 5.57 to 1.94g. The highest initial weight (5.57g) was denoted from Nurul Hossain Farm using C.P Feed whereas the lowest weight (1.94g) was observed in Abul Jabbar Farm using Fortune Feed.

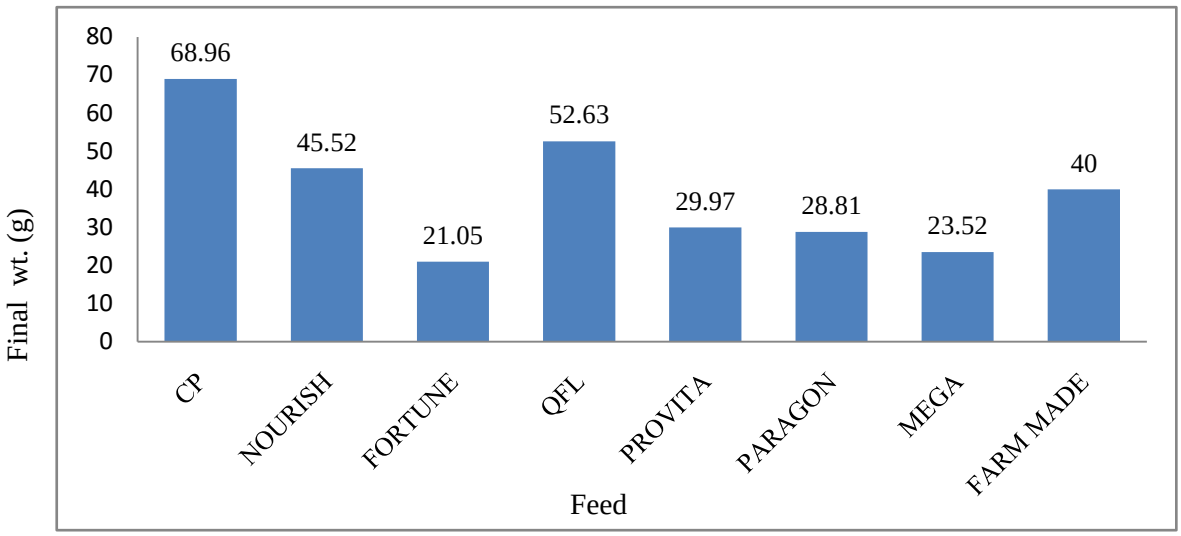


Figure 1
The final weight of tilapia feeding different feeds in different tilapia farms of Trishal and Fulpur Upazila.

***Final weight (g)***

The final weights of tilapia in different farms were not identical. In the present study variable final weight of fish in different farms were observed. The maximum final weight (68.96g) was observed from Nurul Hossain Fish Farm using C.P Feed, while the lowest (21.05g) was Abul Jabbar Farm using Fortune Feed. The second highest (52.63g) weight was found in Natural Agro Farm using Quality Feed and the second lowest (23.52g), found in Saddam Ali farm using Mega Feed (Figure 1).

The final weight of the tilapia in different farms was not identical. In the present study variable final weight of fish in different farms were observed. The maximum final weight (68.96g) were observed from Nurul Hossain Farm using C.P Feed, while the lowest (21.05g) was Abul Jabbar Farm using Fortune Feed, The second highest (52.63g) weight was found in Natural Agro Farm using Quality Feed and the second lowest (23.52g), found in Saddam Ali Farm using Mega Feed.

***Weight gain (g)***

The weight gains of tilapia in different farms were not identical. In the present study variable weight gain of tilapia feeding different feeds were observed. The highest (63.39g) weight was gained in Nurul Hossain Fish Farm using C.P Feed, whereas the lowest (19.11g) was observed in Abul Jabbar Farm using Fortune Feed, which was very close (21.2g) to Saddam Ali Farm using Mega Feed (Table 2).

The weight gain of tilapia in different farms was not identical. In the present study variable weight gain of tilapia feeding different feeds were observed. The highest (63.39g) weight was gained in Nurul Hossain Farm using C.P Feed, whereas the lowest (19.11g) was observed in Abul Jabbar Farm using Fortune Feed, which was very close (21.2g) to Saddam Ali Farm using Mega Feed.

***Specific growth rate (SGR %/ day)***

The Specific growth rate of tilapia in different farms was not found to be identical. In the present study variable specific growth rate were observed in different farms. The highest Specific growth rate (70.43%) was found in Nurul Hossain Fish Farm using C.P Feed. On the contrary, the lowest (20.55%) Specific growth rate was denoted in Abul Jabbar Farm using Fortune Feed. The second highest (55.6%) was found in Natural Agro Farm using Quality Feed, and the second lowest value (21.23%) was found in Saddam Ali Farm using Mega Feed (Table 2).
The Specific growth rate of tilapia in different farms was not found to be identical. In the present study variable specific growth rate were observed

in different farms. The highest Specific growth rate (70.43%) was found in Nurul Hossain Farm using C.P Feed. On the contrary, the lowest (20.55%) Specific growth rate was denoted in Abul Jabbar Farm using Fortune Feed. The second highest (55.6%) was found in Natural Agro Farm using Quality Feed, and the second lowest value (21.23%) was found in Saddam Ali Farm using Mega Feed Specific growth rate in different farms indicate that different parameters like stocking density, protein content of feed, pond management etc combine determines the growth.

**Production (kg/dec./90days/)**

The production of tilapia in different farms should not be identical. In the present study variable Table 2
The growth parameters of tilapia in different farms.

production were observed in different farms. The maximum Production (53.17kg) was obtain from Nurul Hossain Fish Farm using C.P Feed, while the lowest (26.25kg) production in Abul Jabbar Farm using Fortune Feed (Table 2).

The production of tilapia in different farms should not be identical. In the present study variable production were observed in different farms. The maximum Production (580gm/dec) was obtained from Nurul Hossain Farm using C.P Feed, while the lowest (427.52gm/dec) production in Abul Jabbar Farm using Fortune Feed. Like growth production depended on various factors like culture environment, stocking, feed and feeding as well as other related management those were different in different farms.

| Farm name | Weight gain(g) | SGR (% /day) | Production (kg/dec./90days) |
|---|---|---|---|
| 1. Nurul Hossain Fish Farm(C.P) | 63.39 | 70.43 | 53.17 |
| 2. Hira Mia Farm (Nourish) | 42.11 | 46.78 | 46.78 |
| 3. Abul Jabbar Farm (Fortune) | 19.11 | 21.23 | 26.25 |
| 4. Natural Agro Farm(QFL) | 50.04 | 55.6 | 45.79 |
| 5. Samad Pramanik Farm (Provita) | 28.82 | 32.02 | 33.38 |
| 6. Taslim Hossain Farm (Paragon) | 24.72 | 27.46 | 37.51 |
| 7. Saddam Ali Farm (Mega) | 21.2 | 23.55 | 30.09 |
| 8. Shohidul Islam Khan Farm (Farm made) | 40 | 44.44 | 44.11 |

**Feed conversion ratio (FCR)**

Feed conversion ratio of different feeds used in different farms ranged between 2.97 and 4.12. The highest (4.12) feed conversion ratio was observed in Saddam Ali Farm using Mega Feed, and the lowest (2.97) feed conversion ratio was found in Nurul Hossain Fish Farm using C.P Feed. The maximum net income was obtained (20,571 BDT/dec.) in Nurul Hossain Fish Farm using C.P Feed whereas a negative income (-676 BDT/dec) was observed in Saddam Ali Farm using Mega Feed (Figure 2).

A low FCR value is an indicator of better food utilization efficiency of formulated feed. Feed conversion ratio of tilapia in different farms ranged between (4.12 and 2.97). The highest i.e. worst volume (4.12) feed conversion ratio was observed in Saddam Ali Farm using Mega Feed and the lowest i.e. best (2.97) feed conversion ratio was found in Nurul Hossain Farm using C.P Feed.

The higher FCR obtained indicated that feeds used were not up to the mark and further researches are needed to find out a standard feed for the tilapia.

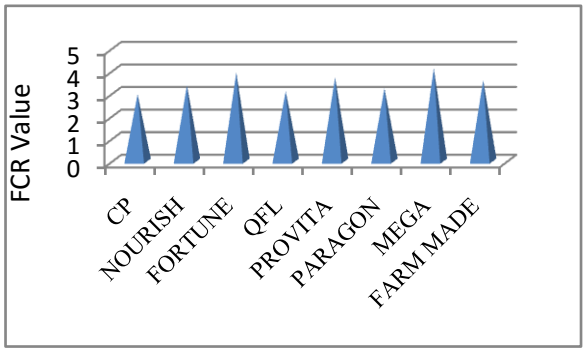


Figure 2
Feed conversion ratio of different feeds used.

**Survival rate (%)**

The survival rate of tilapia in different farm varied from 78.36 to 96.39%. The maximum (96.39 %) survival rate was noted in Nurul Hossain Farm using C.P Feed, whereas the lowest (78.36 %) was found in Saddam Ali using Mega Feed. Survival rate is satisfactory in all the farms. Survival rate inversely related the density of fish in the culture system (Figure 3).

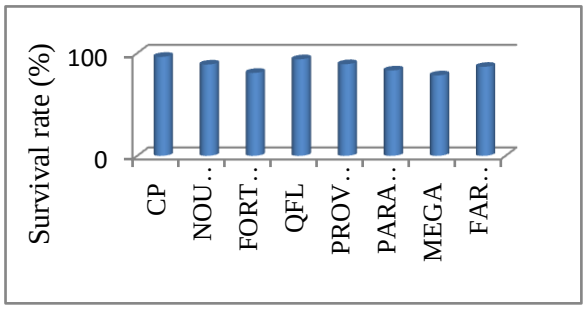


Figure 3
Survival rate of tilapia feeding different feeds used.

The survival rate of tilapia in different farm varied from 78.36% to 96.39%. The maximum (96.39 %) survival rate was noted in Nurul Hossain Farm using C.P Feed, whereas the lowest (78.36 %) was found in Saddam Ali Farm using Mega Feed. Survival rate is satisfactory in all the farms. Survival rate is supported to inversely relate the density of fish in the culture system, the result of study is more or less similar to the expectation Kohinoor *et al.* (2012) reported that the survival rate of *Oreochromis niloticus* 87% for culture fed with commercial feed during four months experimental period.

## CONCLUSION

Farmers as well as different companies are producing feed which may not contain appropriate nutrient composition for tilapia as they have no quality assessment system. National feed management policy has been introduced by the Government to ensure required nutrition and quality of fish feed with reasonable price and also for maximum utilization. The results of the present work will be very much helpful to fish farmers for feed selection and bargain with the feed traders to select suitable feed for their fish to ensure profitable aquaculture operation.

## REFERENCES

Akand AM, Hasan MR and Habib MAB (1991). Utilization of CHO and lipid as dietary energy sources by stinging catfish, Heteropneustesfossilis (Bloch). In: Fish nutrition research in Asia. (ed. by S.S. De Silva.), Proceedings of the Fourth Asian Fish Nutrition Workshop. Asian Fish.Soc. Spec. publ. 5, 205 pp Asian Fisheries Society, Manila, Philippines. pp. 93-100.

AOAC (2000). Official methods of Analysis. 17th end. Association of Official Analysis Chemists.Washington DC. 2200 pp.

Begum M, Pal HK, Islam MA, and Alam MJ 2008: Formulation of quality fish feeds from indigenous raw materials and their effects on growth and maturity of Mystus gulio. Journal of Bangladesh Agricultural University, 6(2) 355-360.

Hepher B (1990). Nutrition of pond fishes. In: Requirement for protein, Reprinted. Cambridge University Press, Cambridge, U.K. 182-186.

Lall SP (1991(. Concepts in the formulation and preparation of a complete fish diet, in: Fish nutrition research in Asia. (Ed. by De Silva SS), Proceedings of the Fourth Asian Fish Nutrition Workshop. Asian Fish. Soc. Spec. publ. 5. Pp.205. Asian Fisheries Society, Manila, Philippines. Pp.1-2.

Li Z, Lei W, Ye J and He X (1991). The nutritional value of commercial feed ingredients for Nile tilapia (Oreochromis niloticus L.) in China, In: Fish nutrition research in Asia. (Ed. by S.S. De Silva.), Proceedings of the Fourth Asian Fish

Nutrition Workshop. Asian Fish. Soc. Spec. publ. 5, 205 pp. Asian Fisheries Society, Manila, Philippines. pp. 101-106.

Luquet P (2000). Tilapia, *Oreochromis spp*. *In :* Handbook of Nutrient requirment of Finfish. (Ed. by R.P. Wilson.), CRE press, Boca Raton Ann Arbor, Boston, London. Pp.169-180.

MOFL (2004). Fish Feed Reference Standards for Bangladesh. Ministry of Fisheries and Livestock, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.

Mollah M.F.A, and Hossain M.A, 1990: Effects of artificial diets containing different protein levels on growth and feed efficiency of catfish (Clarias batrachus). Indian J. Fish., 37(3) 251-259.

Roy R, 2002: Effect of stocking density on the growth and survival of GIFT tilapia fed on formulated diet. MS Thesis. Departmentof Aquaculture, BAU, Mymesingh.

Seenapa D and Devaraj KV (1991). Effects of feeding levels on food utilization and growth of catla fry, In: Fish nutrition research in Asia. (ed. by S.S. De Silva.), Proceedings of the Fourth Asian Fish Nutrition Workshop. Asian Fish.Soc. Spec. publ. 5, 205 pp. Asian Fisheries Society, Manila, Philippines. pp. 49-54.

Wilson RP (2000). Channel catfish, *Ictaluruspuntatus*. In: Handbook of Nutrient Requirement of Fisnfish. (ed. by R.P. Wilson.), CRC Press, Boca Raton Ann Arbor, Boston, London. pp. 35-53.