Executive Summery

Government estimates, about 2 to 2.5 million mostly unskilled young persons are entering into the labour market every year (BBS, 2017). Compared to this, the number of jobs available is only a small fraction of the number of job seekers. The majority of the younger peoples including disproportionate amounts of women and disadvantaged groups are low-skilled with poor-productive jobs in the informal economy, or are self-employed. Upgrading skills is one method of improving the income and livelihoods of these workers and can help to bring them out of poverty. Government of Bangladesh has taken initiatives to develop human resources through technical education establishing Technical School and Colleges under Directorate of Technical Education. Fish culture and breeding is one of the major trades that has been deployed to educate both male and female students for inhouse and in practice as well. The present set of research activities were designed to quantify the aquaculture-based knowledge and practical skills of students both male and female participating in TVET in comparison to the normal practices for aquaculture activities. In the research work the framers' pond were selected for aquaculture activities and for the trial the students from Class-IX and Class-X were selected those who have homestead ponds for their own. Nine ponds were grouped into three different treatments in triplicate, herein designated as Control, Male and Female. Sex reversed tilapia (SRT) fingerlings were stocked in all plots with a same density of 100 dec^{-1}. All of the proposed pre and post stocking protocols were recorded through formulated skill measurement sheet accordingly. One of the major expected outcomes from TVET education is to develop the skills of the students enrolled with Technical School and Collages. To measure the aquaculture skills through Fish Culture and Breeding trade a skill measurement sheet was formulated to compare for both male and female students as well in comparison to fish farmers are usually doing aquaculture practices. As per data collected by skill measurement sheet a series of indicator were measured and found that the Female students showed the best performances in the aquaculture practices followed by Male students and lowest by the neighbor fish farmers. Increasing management practices with better knowledge and dedication increased gross economic returns in Female treatment. The highest benefit-cost ratio (BCR) was observed in Female treatment with a value of 79.08% and there was significant difference in BCR and lowest in Control with 17.38% and medium in Male with 46.72% and highest in Female treatment.

1.0 Introduction

Bangladesh is considered as one of the economic success stories globally. The Government of Bangladesh aims to attain the middle-income status by 2045 and recognizes the potential contribution of Technical Vocational Education and Training (TVET) to the growth of the economy by creating skilled manpower and jobs. A lack of adequate education and skills are stopping Bangladeshis from obtaining quality jobs and the country ranks below many others in the region for levels of literacy, education and skills. TVET through different trade is also contributing to reduce poverty by providing employability skills, particularly to those who drop out of school early and to the large number of unemployed and underemployed adults. At this point quantifying the aquaculture skills acquisition through TVET and practices in Fish production and self-employment was targeted for the research activities.

1.1 Statement of the problem

More than two million people, mostly young, are entering into the labour market every year, of which only half a million is being trained. The 2016-17 Labour Force Survey shows that millions of working age population are still out of the labour force, unemployed or employed in the informal sector. Labour market-oriented training could convert these people into human capital and meet the industry demand. There has been a significant structural economic shift, away from traditional agriculture towards export-oriented manufacturing and services sectors. This has increased demand for skilled workers, particularly in export-oriented manufacturing industries.

About 63% of the country's total population belongs to the age group of 15 to 49 years and 37% of the labour force in the age group 15-29 years. This relatively young population is often cited as the country's "demographic dividend". Bangladesh needs to capitalize the youth force by skilling them before this demographic dividend disappears in a decade. Bangladesh has an ambitious target to reach middle income status by 2024. To do so, the country should increase investment in the socio-economic development, expand the share of manufacturing in GDP, increase and diversify exports and produce quality skilled workers for internal and external labor market as well.

1.2 Importance and rational of the study

Homestead pond culture occurs as a small component of the larger household farming system. Homestead ponds are used for multiple purposes including bathing, washing and watering livestock. In addition, many households excavate soil with which to raise the base of their homes

in order to avoid flooding. As a result many households in rural Bangladesh possess a small pond close to their homestead (Huda et al., 2010; Kranzlin, 2000). In the past, ponds such as these are often used to capture wild fish which entered during flooding in the monsoon season, and in some cases were stocked with fry harvested from nearby rivers, but received very little, if any, additional intentional management. As the availability of hatchery produced seed has increased, and management and yields have improved following the extension efforts of numerous successive large projects, fish culture has become an increasingly important use of the available pond resources, and the promise of fish culture now serves as an incentive for homestead pond construction or renovation. For instance, a survey by Barman (2001) in northwest Bangladesh reports that more than half the small ponds located close to homestead areas and beside farmers' fields had either been dug or renovated in recent times for the purpose of fish culture.

The Asia-Pacific is currently home to nearly 60% of 15- to 24-year-olds in the world, which accounts for 16% of the region's population (UN 2015). Moving into the future, while these numbers will continue to remain substantial, they are expected to trend downward in all sub-regions of the Asia-Pacific (UN 2015), in contrast to the rising numbers in Africa. However, this number accounts for nearly half of the individuals considered jobless across the Asia-Pacific, a region where unemployment is generally considered low in comparison to the global average (ILO 2017 and 2018a). Among the countries proportion of 15 to 24 year olds that were unemployed was 12.8% in Bangladesh (2017) (ILO 2018b).

However, anecdotal evidence suggests strongly that as demand for cultured fish has risen along with availability of seed and knowledge of culture practices, the potential value of ponds has increased to the point where these problems have diminished significantly. As a result, ponds are now frequently leased out to others where intractable intra-household disagreements over benefit sharing would have previously prevented their productive use. This trend may encourage leaseholders of such ponds to manage them in a commercially oriented manner commensurate with their need to recoup lease costs (Barman et al, 2002a). Nevertheless, it seems plausible that many of the 7.82% and 1.42% of ponds listed by DOF as 'culturable' and 'derelict' respectively (i.e., those not utilized for fish culture) may remain in this state due to problems related to multiple ownership (DOF, 2010).

1.3 Scope of the Study

Bangladesh has a well-developed system of examinations for formal TVET qualifications, particularly regarding theoretical coverage. There are several excellent private providers, including nongovernment organizations (NGOs), and many focus on disadvantaged youth and adults. Other good practices include the establishment of the National Skills Development Policy and the industry skills councils and the initiatives for devolution of authority and flexibility in raising revenues among technical training centers. However, with the national policy and financial support this study will find out the scope of the engagement for the students both boys and girls in their homestead ponds as their learning by doings in practical and income generation as well.

In Bangladesh generally employers do not participate meaningfully in setting training policies or content, or in evaluating results. Similarly, public training institutions lack the initiative to consult employers in preparing and updating standards, and regular mechanisms for labor market analysis do not exist. A rigid training supply response is evident in the system's inability to modify curricula as needed, largely due to administrative bureaucracy and lengthy training programs. Many vocational students have no intention of practicing the occupational skills they are studying and actually plan to pursue higher education, suggesting improper targeting. However, Government financing for TVET is inadequate and cost-recovery schemes (e.g., fees from trainees), as well as other income-generation activities, are insufficient. High failure and dropout rates, a low employment rate, and low-capacity utilization waste a substantial number of resources. Lack of institutional autonomy among institutions results in lack of accountability. Rather than this youths are constrained in accessing land, financial services and other resources, and decision-making circles amid systems dominated by gerontocracy.

1.4 Objectives of the study

Its main objective of the study was to quantify the aquaculture-based knowledge and practical skills of students (especially female youths) participating in TVET and to enable them to find gainful employment in the private sector. However, the major objectives of this study were to:

(i) Involving the TVET students with aquaculture practices and working as associated workforce of the family member;

(ii) Learning by doing in the family environment and develop the ownership in the income generating activities;

(iii) Understand the participation of youth in aquaculture, including opportunities and challenges for participation;

(iv) Quantifying the extend of gender issue are doing in the relation to youth participation, and

(v) Explore the potential areas for further potentials that could support improved youth participation in aquaculture. Stands

1.5 Research questions

The research questions were designed to quantify the aquaculture-based knowledge and practical skills of TVEL students especially female youths. However, three research questions were formulated to achieve the objectives were formulated are as follows:

1. What extent do the male students achieve the aquaculture skills through Fish Culture and Breeding trade?
2. What extent do the female students achieve the aquaculture skills through Fish Culture and Breeding trade?
3. Is there any significant different within the male and female students in terms of their achieved skills on aquaculture and also comparison with normal aquaculture practices?

2.0 Materials and methods

2.1 Study area and experimental design

This study was carried out in nine homestead mini ponds with different sizes ranging from 3.0 to 6.0 dec. in Sadar Upazila of Kushtia District (23° 55′ 11.48″ N latitude, 89° 13′ 12.11″ E longitude), Bangladesh for a period of four months from January to April, 2022. In the research work the framers' pond were selected for aquaculture activities and for the trial the students from Class-IX and Class-X were selected those who have homestead ponds for their own. Nine ponds were grouped into three different treatments in triplicate, herein designated as Control (ponds operated by the fish farmers), Male (ponds operated by the male students) and Female (ponds operated by the female students). Sex reversed tilapia fingerlings were stocked in all plots with a

same density of 100 dec^{-1}. All of the proposed pre and post stocking protocols were recorded through formulated skill measurement sheet accordingly.

2.2 Pre-stocking preparations

2.2.1 Pond preparation

The selected ponds were prepared by drying, liming the bottom soil (@ 250kg/ha of CaO) and enclosed by fine nylon mosquito net. Then after five days, ponds were filled up with underground water if required and fertilized with organic fertilizer at the rate of 2,000 kg ha^{-1} to enhance the growth of plankton population especially zooplankton in the water bodies and waited for a week to allow the water becoming suitable for stocking.

2.2.2 Stocking of fish

After two weeks of fertilization, all male tilapia fingerlings were purchased from a private nursery and transported to the study site by oxygenated polyethylene bags and stocked at the rate of 100 dec^{-1}. for all three treatments. Before stocking the initial mean weights of the fingerlings were measured using sensitive balance. The bags were kept in ditch of rice plots about 30 min for temperature adjustment and then fingerlings were gradually released. During stocking initial weight (g) were recorded for 10% of the stocked fingerlings.

2.3 Post stoking management and sampling

2.3.1 Feed supply

After stocking, in all the treatments, a 25% protein containing floating pellet feed were applied at the rate of 5-15% of estimated fish biomass thrice daily at 8.30 in the morning 12.30 in the noon and at 16.30 in the afternoon. The fingerlings were fed @ 15% of their body weight for the initial three weeks and were reduced to 5% from the subsequent weeks.

2.3.2 Growth measurement:

The growth of fishes of all ponds were monitored fortnightly by using random sampling method. At least 10 fishes were sampled by the help of a cast net to measure the growth to assess the health status and for feed adjustment.

2.3.3 Harvesting of fish:

After four months of rearing, the fish were harvested by dewatering the ponds. During harvest, they were counted and weighted to assess survival rate, growth and total production.

2.3.4 Economic analysis:

At the end of the experiment, the value of the fishes were estimated with the present value of local market. Benefit-cost analysis of different treatments were calculated on the basis of the prices of fertilizer used, fish seed, fish feed used and the income from the estimated value of harvested tilapia fish.

3.0 Methods of Data Analysis and Presentation

Comparison of treatment mean were carried out using simple mathematical analytical process.

4.0 Results and Discussion

4.1 Skill measurement

One of the major expected outcomes from TVET education is to develop the skills of the students enrolled with Technical School and Collages. To measure the aquaculture skills through Fish Culture and Breeding trade a skill measurement sheet was formulated to compare for both male and female students as well in comparison to fish farmers are usually doing aquaculture practices (Appendix-A). As per data collected by skill measurement sheet a series of indicator were measured and the findings are described below.

4.1.1 Aquatic weed control

Aquatic weeds are unwanted and undesirable vegetation that reproduce and grow in water. If left unchecked may choke the water body posing a serious menace to pisciculture. They also provide breeding grounds and harbor predatory insects, limit living space

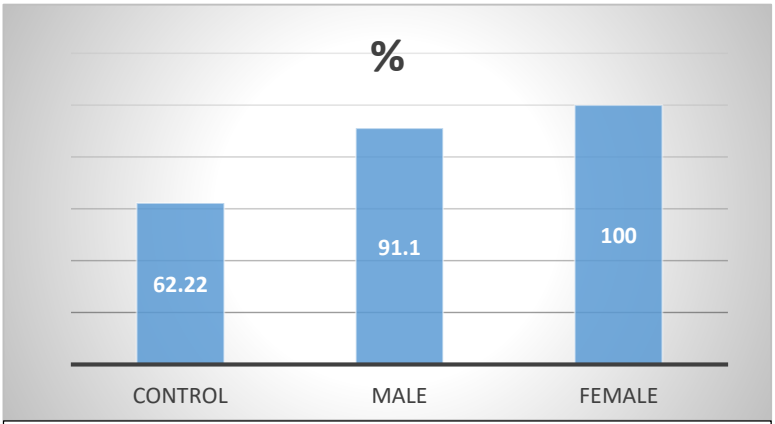

Figure-1: Performance on aquatic weed control

for fish, cause imbalance in dissolved oxygen budget and some weeds release toxic gases that cause fish death and add foul smell to water. From the findings of this present research work it was stated that the aquatic control was done by the fish farmers and TVET students in different ways. The percentage of the effort required were made by the pond owners are shown in the Figure-1 and it was found that the pond preparation was highest in Female treatment (100%) and lowest from the Control treatment (62.22%) followed by Male treatment (91.1%).

4.1.2 Removal of unwanted and predator fish

Unwanted or "wild" fish may be predators which eat newly stocked fingerlings, or they may compete with fingerlings for food. In either case, they create problems for the fish pond manager. Unwanted fish can be eliminated at harvest when a pond is drained and dried. Poisons are effective in ponds which cannot be completely drained and dried. Poisoning should be done with caution to avoid harmful effects to humans, livestock, and the surrounding environment. From the findings of this present research work it was stated that the removal of unwanted and predator fishes were done by the fish farmers and TVET students in different ways. The percentage of the effort required were made by the pond owners are shown in the Figure-2 and it was found that the pond preparation was highest in Female and Male treatments (100%) were lower than the Control treatment (40%).

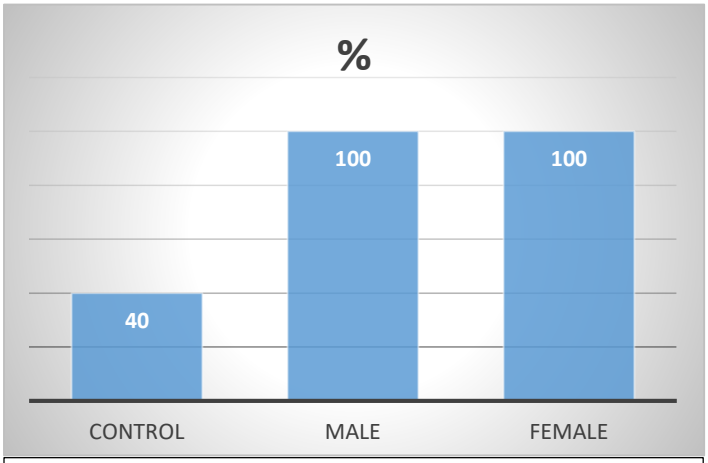

Figure-2: Performance on removal of unwanted and predator fish

4.1.3 Liming

Applying lime ensures healthy environment in pond and increases productivity. Use 1kg lime per dec. in the basal level of dry pond. Fill the pond with water after 2-3 days of applying lime. If it is not possible to make the pond dry then use lime in the pond at the same rate. The tanks, which are acidic in nature, are less productive than alkaline ponds. Lime is used to bring the pH to the desired

level. From the findings of this present research work it was stated that the liming was done by the fish farmers and TVET students in different ways. The percentage of the effort required were made by the pond owners are shown in the Figure-3 and it was found that the pond preparation was highest in Female and Male treatments (100%) were lower than the Control treatment (80%).

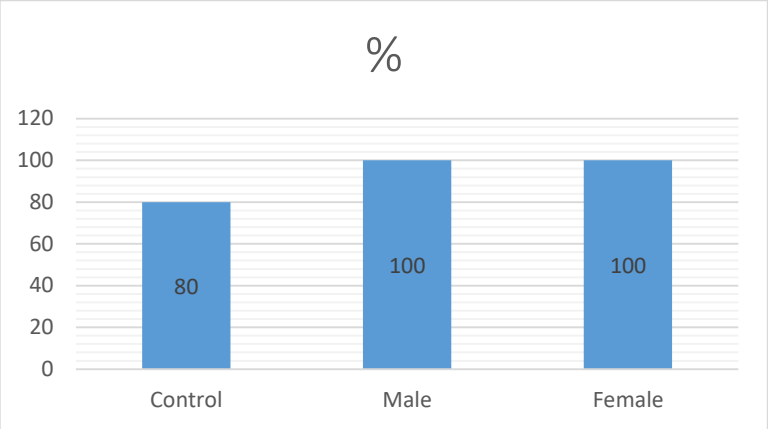

Figure-3: Performance on liming procedure

In addition, lime also has effects on increasing the pH and also acts as buffer and avoids fluctuations of pH. It increases the resistance of soil to parasites and its toxic effect kills the parasites; and hastens organic decomposition. At this point selection of lime has an important role in aquaculture. From the findings of this present research work it was stated that the selection lime was done by the fish farmers and TVET students in different ways. The percentage of the effort required were made by the pond owners are shown in the Figure-4 and it was found that the pond preparation was highest in Female and Male treatments (100%) were lower than the Control treatment (80%).

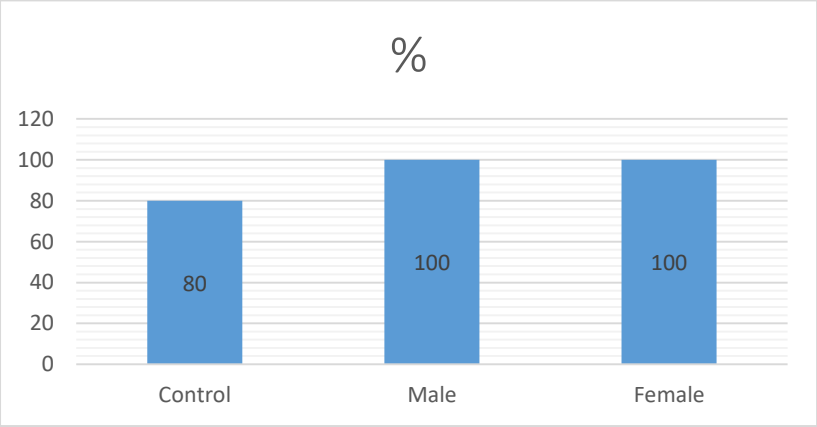

Figure-4: Performance on lime selection

Lime can be applied to the pond at any time of year. However, if the pond is to be fertilized, lime should be applied 15 days before the fertilizer application. This is necessary because lime combines with soluble phosphorous and becomes bound in bottom sediments. Phosphorous in pond sediment is released as pH rises to neutral and above and oxygen levels increase. Periodic

lime application may be necessary if the pond is flushed by heavy runoff rainfall or acidic compounds enter the pond from the watershed. From the findings of this present research work it was stated that the liming time was done by the fish farmers and TVET students in different ways.

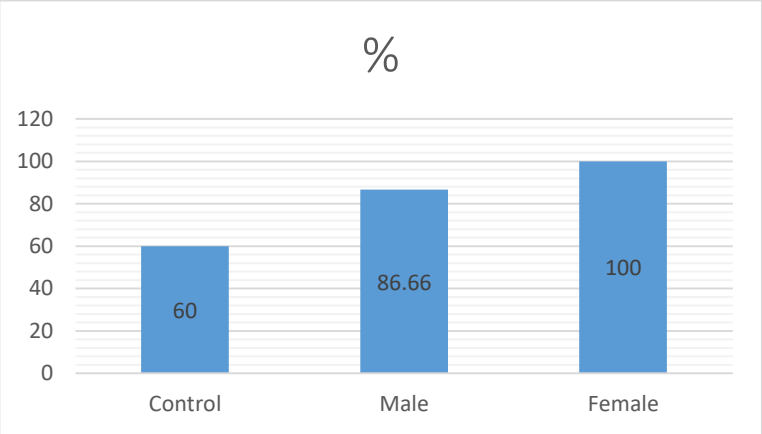

Figure-5: Performance on liming time

The percentage of the effort required were made by the pond owners are shown in the Figure-5 and it was found that the pond preparation was highest in Female treatments (100%) and were lowest in the Control treatment (86.66%) followed by Male treatment (60%).

4.1.4 Pre-stocking fertilization

Fertilization of the pond is an important means of intensifying fish culture by increasing the natural productivity of the pond. Applying pre stocking fertilization in the pond increases the growth and production of fish and also increases the availability of natural food of fish. From the findings of this present research work it was quantified that the pre-stocking fertilization were done by the fish farmers and

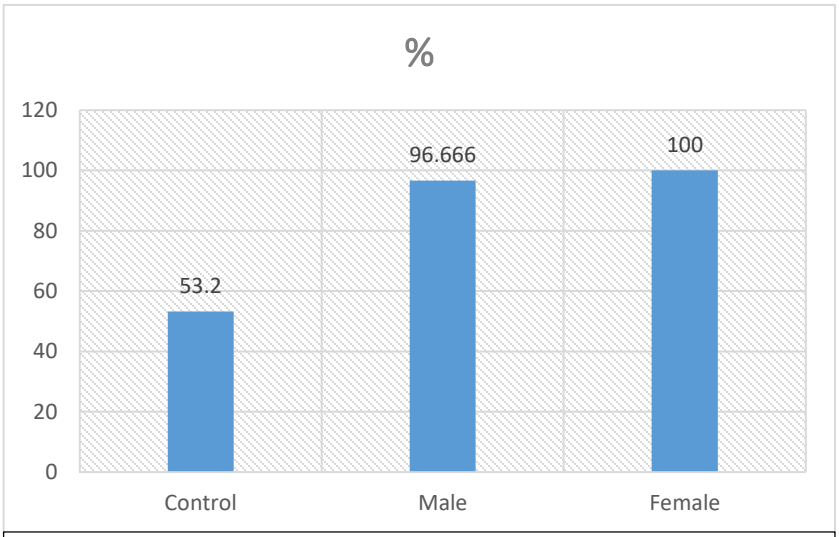

Figure-6: Performance on pre-stocking fertilization

TVET students in diverse ways. The percentage of the effort required were made by the pond owners are shown in the Figure-6 and it was found that the pond preparation was highest in Female treatments (100%) and lowest in the Control treatment (53.2%) followed Male treatments (96.66%).

In addition, the fertilization schedule has to be prepared after studying the quality of the pond soil. Both organic and inorganic (chemical fertilizer) fertilizers are necessary for production of phytoplankton and zooplankton in the pond. A combination of both Organic and Inorganic fertilizers may be used for best results. The

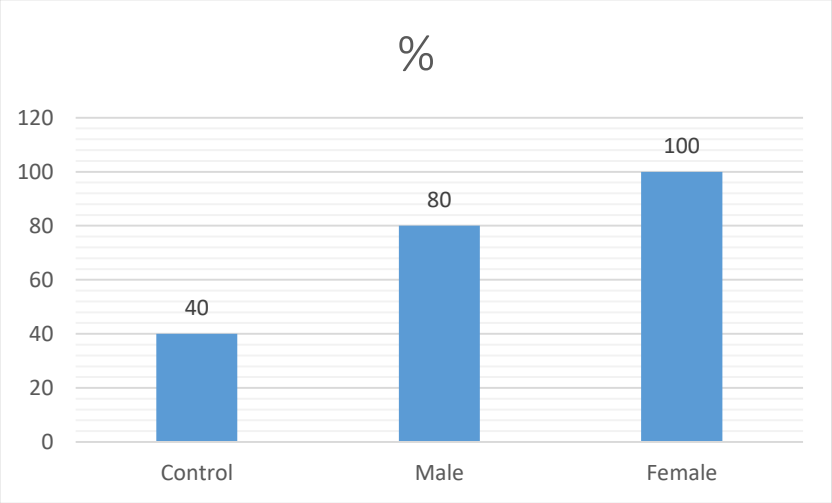

Figure-7: Performance on doses for pre-stocking fertilization

fertilization has to be suitably modified depending on the growth of the fish, available food reserve in the pond, physico-chemical conditions of the pond and climatic conditions. From the findings of this present research work it was calculated that the pre-stocking fertilization were calculated by the fish farmers and TVET students in various ways. The percentage of the effort required were made by the pond owners are shown in the Figure-7 and it was found that the pond preparation was highest in Female treatments (100%) and lowest in the Control treatment (40%) followed Male treatments (80%).

4.1.5 Observation of natural food

Natural food is found naturally in the pond. It may include detritus, bacteria, plankton, worms, insects, snails, aquatic plants and fish. Their abundance greatly depends on water quality. Liming and fertilization, in particular organic fertilization, can

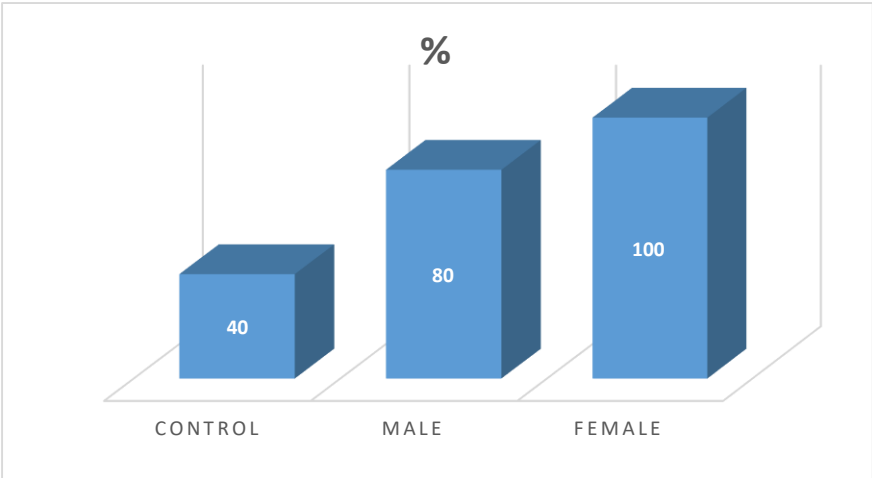

Figure-8: Performance on observation of natural food

help to provide a good supply of natural food for fish. Presence of natural food in the aquaculture ponds are required for the adjustment of artificial feed and were done by the pond owners in the present research. From the findings of this present research work it was calculated that the process to observe the presence of natural food were calculated by the fish farmers and TVET students. The percentage of the effort required were made by the pond owners are shown in the Figure-8 and it was found that the pond preparation was highest in Female treatments (100%) and lowest in the Control treatment (40%) followed Male treatments (80%).

4.1.6 Fingerling stock management

Fingerling is a broad term applied to a juvenile fish that is about the size of a finger. The definition of what length classifies a fish as a fingerling varies between species, but the Food and Agriculture Organization (FAO) generally defines a fingerling as ranging in length from 10 to 15 centimeters. If it seems like the fingerling is diseased or has any form of injury or deformity. A diseased fingerling could pose a health risk to other fishes in the farm. Good quality fingerlings will have a form that is free of diseases. Injury or any form of deformity that could lead to a loss. From the findings of this present research work it was calculated that the process to acclimating of fish fingerling were done by the fish farmers and TVET students. The percentage of the effort required were made by the pond owners about the quality of fish fingerling are shown in the Figure-9 and it was found that the pond preparation was highest in Female treatments (100%) and lowest in the Control treatment (40%) followed Male treatments (80%).

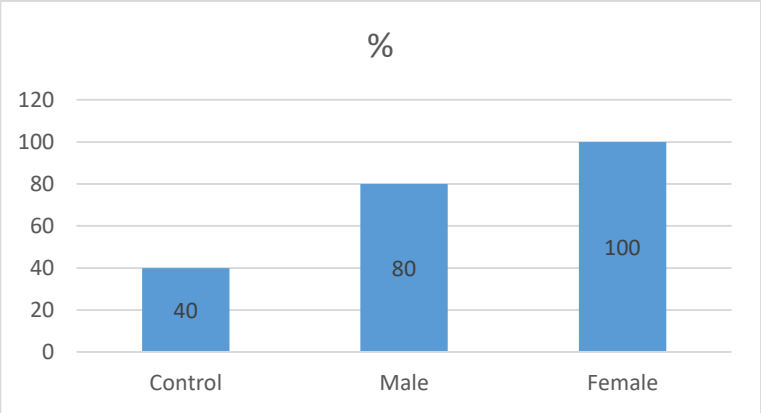

Figure-9: Performance on fingerling stock management

The objective of acclimating fish fingerling is to decrease the stress as much as possible. It is done by gradually allowing them to get used to your pond water's temperature, pH level and water chemistry. From the findings of this present research work it was calculated that the

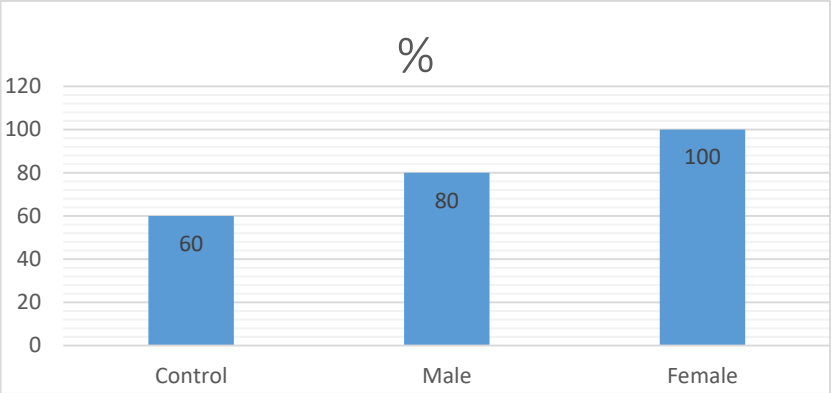

Figure-10: Performance on process to acclimating of fingerling

process to acclimating of fish fingerling were done by the fish farmers and TVET students. The percentage of the effort required were made by the pond owners for acclimating of fish fingerling are shown in the Figure-10 and it was found that the pond preparation was highest in Female treatments (100%) and lowest in the Control treatment (60%) followed Male treatments (80%).

Disinfection is employed as a common disease management tool in aquaculture establishments. It may be used as a routine practice in biosecurity programmes designed to exclude specific diseases, as well as a routine sanitary measure employed to reduce disease incidence within farms, or it may be used in disease eradication (stamping out) efforts. The specific reason for disinfection will determine the disinfection strategy used and how it is applied. The general principles pertaining to disinfection of aquaculture establishments involve the application of chemical treatments in sufficient concentrations, and for sufficient periods, to kill all pathogenic

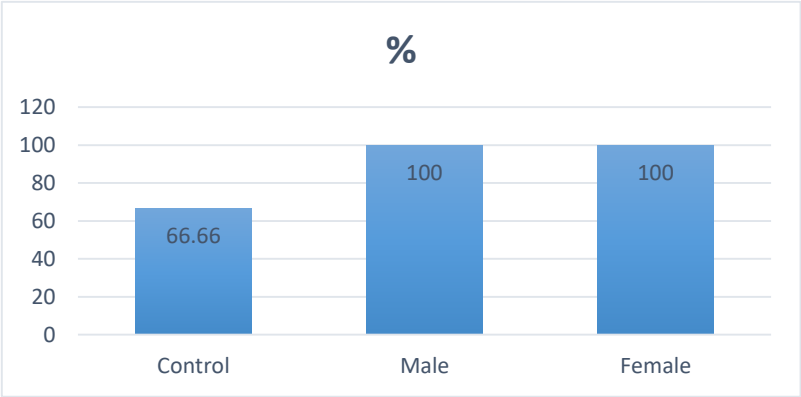

Figure-11: Performance on process to treatment of fingerling

organisms that would otherwise gain access to surrounding water systems. From the findings of this present research work it was calculated how the farmers and TVET students were treating the fish fingerling. The percentage of the effort required were made by the pond owners for

acclimating of fish fingerling are shown in the Figure-11 and it was found that the pond preparation was highest in Male and Female treatments (100%) and lower in the Control treatment (66.66%).

4.1.7 Supplementary food supply

Supplementary feeds are feeds regularly distributed to the fish in the pond. They are made from a mixture of carefully selected ingredients to provide all the nutrients necessary for the fish to grow well. They must be made in a form which the fish find easy to eat and digest. These feeds are quite difficult to make on the farm and are usually quite expensive to buy. However, feeding time and application have a great impact on aquaculture production. From the findings of this present research work it was calculated that the process to observe the feeding time and application process were done by the fish farmers and TVET students. The percentage of the effort required were made by the pond owners are shown in the Figure-12 and it was found that the pond preparation was highest in Female treatments (97.6%) and lowest in the Control treatment (40%) followed Male treatments (86.66%).

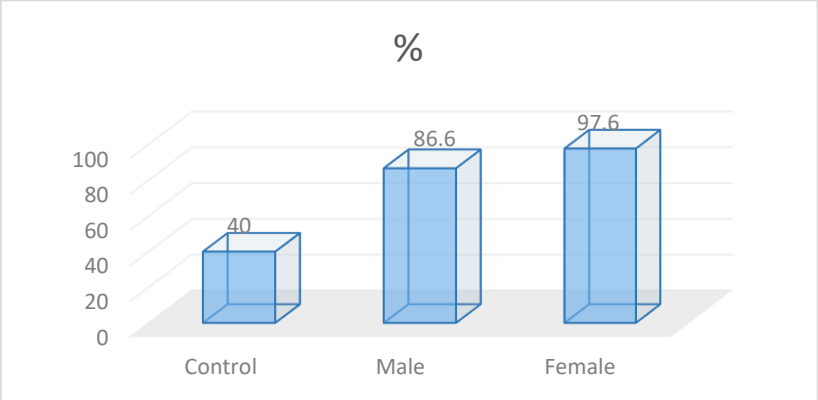

Figure-12: Performance on process supplementary food supply

4.1.8 Sampling of Fish and adjustment of feed

Fish samples must be taken from every pond prior to harvest in order to assure a consistently high-quality processed product. The two main criteria to be considered are flavor and the condition (appearance) of fish. The most basic probability sampling procedure used in fish population sampling is simple random sampling,

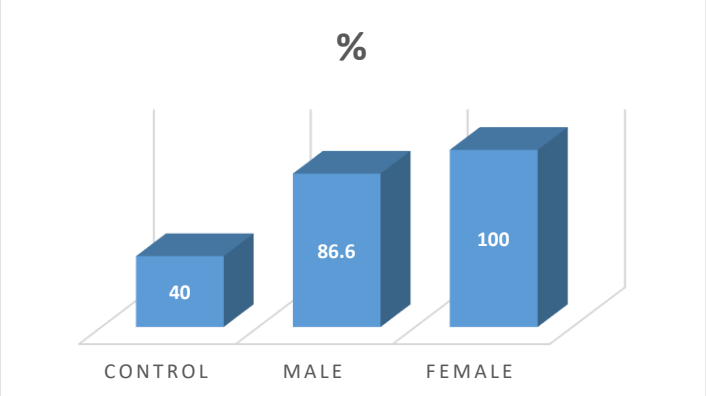

Figure-13: Performance on process sampling of fish and adjustment of feed

in which a predetermined number of sampling sites is selected from all possible sampling sites such that every potential site has an equal chance of being selected. From the findings of this present research work it was calculated that the process to sampling of fish were done by the fish farmers and TVET students. The percentage of the effort required were made by the pond owners are shown in the Figure-13 and it was found that the pond preparation was highest in Female treatments (100%) and lowest in the Control treatment (40%) followed Male treatments (86.6%).

A sample represents an entire population and therefore should be large enough to detect any variations. At farm level, monthly sampling is ideal, although the shorter the time between samplings, the better the results. Sampling is the process of weighing fish to determine the growth rate and performance. Fish sampling involves taking weights and measurements such as body length, and the weight of the fish population. The best time for sampling is in the morning or evening. At least 5 to 10% of the total population should be sampled to represent the entire population of fish. It helps in observing the growth trends of fish, helps to estimate the total weight of fish in the water and helps to determine the condition of the fish in respect of health status, and growth rate.

From the findings of this present research work it was estimated that the process to calculate the required feed through sampling were done by the fish farmers and TVET students. The percentage of the effort required were made by the pond owners are shown in the Figure-14 and it was found that the pond preparation was highest in Female treatments (100%) and lowest in the Control treatment (40%) followed Male treatments (84.44%).

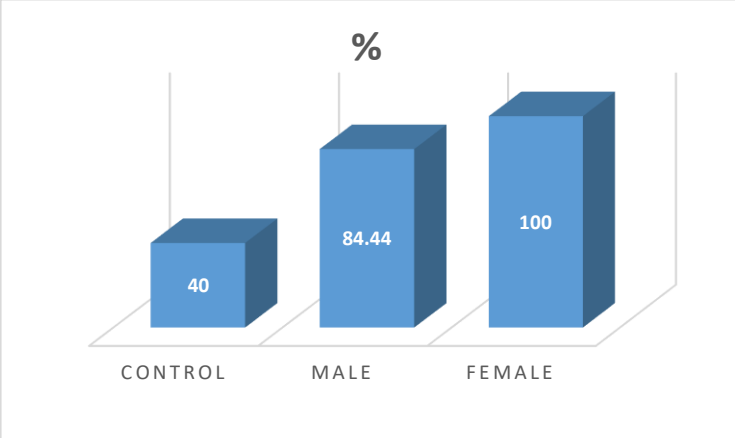

Figure-14: Performance on process calculate the required feed

4.1.9 Harvesting of fishes

Harvesting of fish means the number or weight of fish caught and retained from a given area over a given period of time. Total pond harvest is accomplished by draining and seining. First, the pond is partially drained (20-30%) to concentrate the fish. Thereafter, the pond is repeatedly seined until most (80%) of the fish are captured. The pond is then drained further and the seining process is continued. From the findings of this present research work it was estimated that the process to calculate the required feed through sampling were done by the fish farmers and TVET students. The

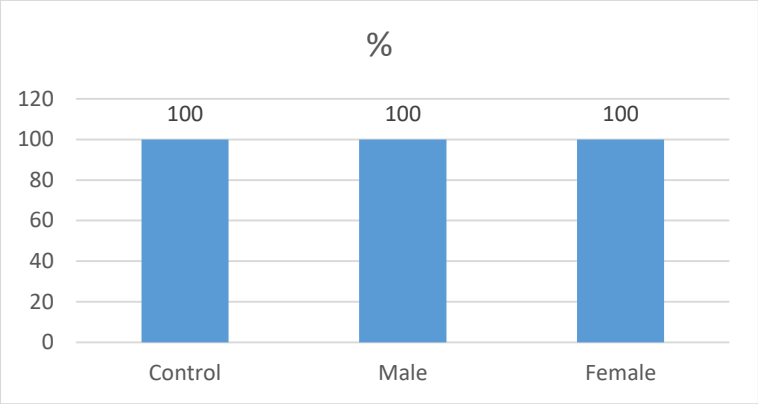

Figure-15: Performance on process harvesting of fishes

percentage of the effort required were made by the pond owners are shown in the Figure-15 and it was found that the pond preparation was highest in Female treatments (100%) and lowest in the Control treatment (40%) followed Male treatments (84.44%).

4.1.10 Overall skill scale through TVET education

The expected outcomes of aquaculture skills from TVET education with developed skill measurement sheet was calculated to compare for both male and female students as well in comparison to fish farmers are usually doing aquaculture practices. As per data collected by

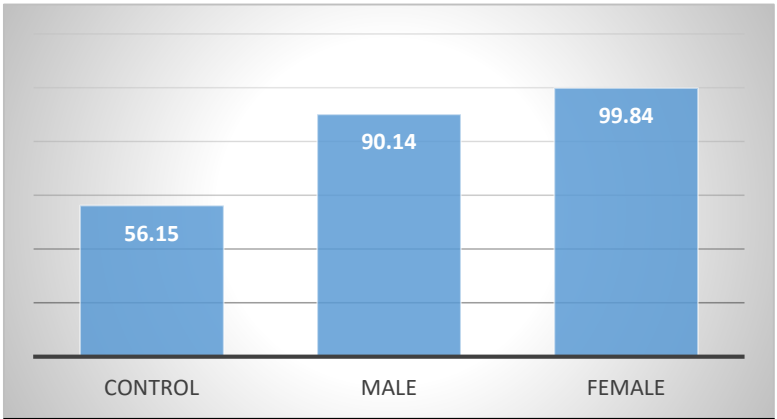

Figure-16: Overall skill scale through TVET education

skill measurement sheet a series of indicator were measured and the result shows that overall percentage are shown in the Figure-16 and it was found that the overall performances was highest

in Female treatments (99.84%) and lowest in the Control treatment (56.15%) followed Male treatments (90.14%).

4.1.11 Benefit-cost analysis

At the end of the experiment, fishes were harvested and weighed and value of the fishes were estimated on the basis of local market price. Benefit-cost analysis of different treatments were calculated on the basis of the prices of fertilizer used, fish seed and the income from the sale or estimated value of tilapia fish. The following simple equation was used:

$R = I - (Fc + Vc + Ii)$

Where *R*, net return; *I*, total income from tilapia; *Fc* = Fixed costs, *Vc* = Variable costs and *Ii*, interest on investments.

The prices of inputs and tilapia correspond to the Kushtia wholesale market prices in 2022 and are expressed Bangladesh Taka (BDT). The net benefit and benefit-cost ratio (BCR) were calculated using the following formula:

BCR = (Total income/Total cost) ×100

4.2 Fish growth and yield parameters

Growth and yield parameters of tilapia are shown in Table 1 and fortnightly growth increment under different treatments are presented in Figure 16. Different treatments had significant effect on the individual growth

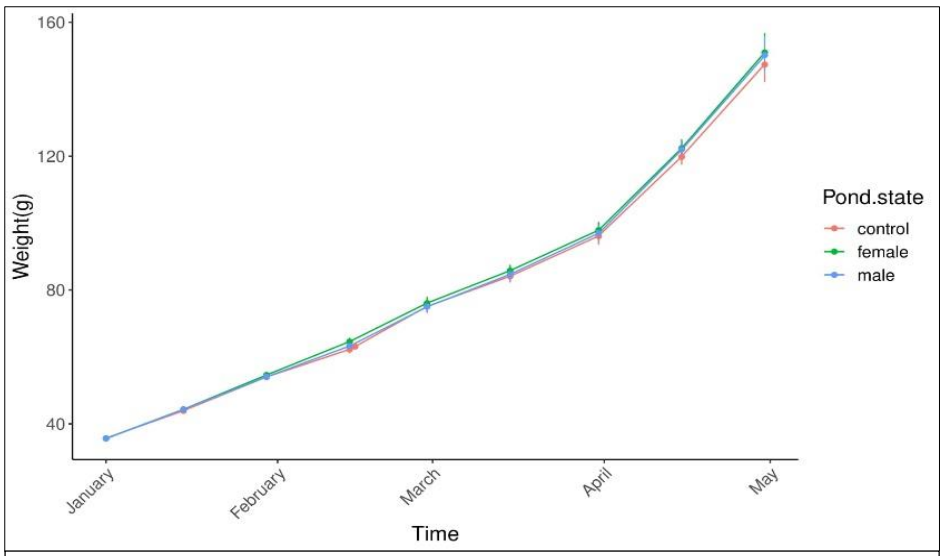

Figure-17: Fish growth patterns for different treatments

parameters and total yield of tilapia. There was no significant difference between treatments for survival rate. Harvesting weight of tilapia also highest for the female treatment and lowest in the Control treatment followed by Male treatment.

Table-1: Fish yield parameters for different treatments

Species/yields parameters	Control	Male	Female
Individual stocking weight (g)	34.93	35.10	34.73
Individual harvesting weight (g)	121.41	140.92	186.18
Survival rate (%)	97.42	97.88	97.62
Individual weight gain (g)	86.48	105.82	151.45
FCR (%)	1.35	1.42	1.46
Net yields (kg^{-1} dec.)	3.94	4.60	6.06

4.3 Comparison of economic returns

Table-2: Comparison of economic returns

Items	Amount	Treatments			
		Control	Male	Female	
Variable cost					
Pond preparation (BDT)	LS	135	135	135	
Cow dung	Total Kg/Dec	66	66	66	
Urea	Total Kg/Dec	22	22	22	
TSP	Total Kg/Dec	44	44	44	
Fish fingerlings	Total Nos./Dec	300	300	300	
Fish feed	Total Kg/Dec	685	685	685	
Fish harvesting (BDT)	LS	77	77	77	
Subtotal (BDT)		1329	1329	1329	-
Financial returns					
Fish	Total Kg/Dec	13	14.5	17	
Return (BDT)		1560	1950	2380	
Benefit-cost ratio (BCR)		17.38	46.72	79.08	

Increasing management practices with better knowledge and dedication increased gross economic returns in Female treatment. The highest benefit-cost ratio (BCR) was observed in Female treatment with a value of 79.08% and there was significant difference in BCR and lowest in Control with 17.38% and medium in Male with 46.72% and highest in Female treatment.

5.0 Recommendations

1. More engagement of the students for further development;

2. Extend fisheries curriculum from 16 to 134 institutions or as required, and

3. Introduces these skilled workforce to both private and public sector.

4. However, through this research it is quantified that the female students are performing better then the male and further research is required to find out the factors are influencing for the better understanding and practicing the fish culture in their homestead ponds.

6.0 Conclusion

The knowledge base and practical skills of students (especially female youths) participating in TVET were quantified through this research program. The fisheries education through Fish Culture and Breeding Trade is to increase the number of human resources working for the private sector and the number of small-scale commercial fish farmers with enhanced aquaculture knowledge and up-to-date practical skills to help sustainably grow the sector and make it more inclusive. The female students shown the best performance in aquaculture practices and understood that they will be able to involve themselves in family aquaculture system and find a gainful employment in the private sector.

6.0 References

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Some Moments of Fields' Trial

Pond Preparation

Fish Fingerling Stocking

Feeding and Sampling

Fish Sampling

দক্ষতার পরিমাপক ছক

পুকুর :

ক্রমিক নং	নির্দেশক	সম্পূর্ণ নির্মূল (৫)	আংশিক নির্মূল (৪)	শুধু ভাসমান আগাছা নির্মূল (২)	মোট
১.	জলজ আগাছা দমন				

ক্রমিক নং	নির্দেশক	পুকুর শুকিয়ে (৫)	বার বার জাল টেনে (৪)	বিষ প্রয়োগ করে (২)	মোট
২.	রাক্ষুসে ও অবাঞ্চিত দমন				

ক্রমিক নং	নির্দেশক	১ কেজি/শতাংশ (৫)	৫০০গ্রাম/শতাংশ (৪)	২ কেজি/শতাংশ (২)	মোট
৩.১	চুন প্রয়োগ				

ক্রমিক নং	নির্দেশক	পাথুরে চুন (৫)	কলি চুন (৪)	ডলোমাইট (২)	মোট
৩.২	চুনের ধরণ				

ক্রমিক নং	নির্দেশক	রৌদ্রজ্জল সময় (৫)	বিকেলে (৪)	মেঘলা আকাশে (২)	মোট
৩.৩	চুন প্রয়োগ সময়				

ক্রমিক নং	নির্দেশক	সঠিক মাত্রা ও পদ্ধতি (৫)	সঠিক মাত্রায় তবে পদ্ধতি সঠিক নয় (৪)	সঠিক মাত্রা ও পদ্ধতিতে নয় (২)	মোট
৪	মজুদ পূর্ব সার প্রয়োগ (মাত্রা)				

ক্রমিক নং	নির্দেশক	২০০টি/শতাংশ (৫)	২০০টি/শতাংশ অপেক্ষা কম (৪)	২০০টি/শতাংশ অপেক্ষা বেশি (২)	মোট
৫.১	পোনার পরিমান				

ক্রমিক নং	নির্দেশক	নিয়মানুসারে শোধন করা হয়েছে (৫)	নিয়মানুসারে শোধন করা হয় নাই (৪)	পোনা শোধন করা হয় নাই (২)	মোট
৫.২	পোনা শোধন				

ক্রমিক নং	নির্দেশক	নিয়মানুসারে করা হয়েছে (৫)	নিয়মানুসারে করা হয় নাই (৪)	পোনা অভ্যস্তকরণ করা হয় নাই (২)	মোট
৫.৩	পোনা অভ্যস্তকরণ				

ক্রমিক নং	নির্দেশক	পোনার ওজনের আনুপাতিক হারে (৩-৫%) (৫)	পোনার ওজনের আনুপাতিক হারে নয় (৪)	বেশি বা কম হয়েছে (২)	মোট
৬.১	খাদ্য প্রয়োগ (মাত্রা)				

ক্রমিক নং	নির্দেশক	২বার ও নিদৃষ্ট স্থানে (৫)	২ বার তবে বিক্ষিপ্ত স্থানে (৪)	১ বার ও বিক্ষিপ্ত ভাবে (২)	মোট
৬.২	সময় ও পদ্ধতি				

ক্রমিক নং	নির্দেশক	৬.৫-৮ (৫)	৫-৬ (৪)	৮.৫-৯.৫ (২)	মোট
৭.১	পানির গুনাগুন পরীক্ষা (পিএইচ)				

ক্রমিক নং	নির্দেশক	সঠিক পদ্ধতিতে পরিমাপ করতে পেরেছে (৫)	আংশিক সঠিক পদ্ধতিতে পরিমাপ করতে পেরেছে (৪)	সঠিক পদ্ধতিতে পরিমাপ করতে পারে নাই (২)	মোট
৭.২	দ্রবীভূত অক্সিজেন				
৭.৩	অ্যামোনিয়া				

ক্রমিক নং	নির্দেশক	সেকি ডিস্কের গভীরতা (২০-২৫ সেমি) (৫)	সেকি ডিস্কের গভীরতা (২৬-৩০ সেমি) (৪)	সেকি ডিস্কের গভীরতা (৩১ সেমি থেকে বেশি (২)	মোট
৮.	প্রাকৃতিক খাদ্য				

	নির্দেশক	৭ দিন পর (৫)	১৫ দিন পর (৪)	২১ দিন পর (৩)	মোট
৯.	নমুনা সংগ্রহ				

ক্রমিক নং	নির্দেশক	রোগ হয় নাই (৫)	রোগ হয়েছে ও চিকিৎসা করা হয়েছে (৪)	রোগ হয়েছে কিন্তু চিকিৎসা করা হয় নাই (২)	মোট
১০.	রোগ ও চিকিৎসা				

ক্রমিক নং	নির্দেশক	পুকুর শুকিয়ে (৫)	জাল টেনে (৪)	রোটেনন প্রয়োগ করে (২)	মোট
১১.	মাছ আহরণ				

ক্রমিক নং	নির্দেশক	ধারাবাহিক ভাবে করা হয়েছে (৫)	ধারাবাহিক ভাবে করা হয় নাই (৪)	হিসাব সংরক্ষণ করা হয় নাই (২)	মোট
১২.	আয়-ব্যয়ের হিসাব সংরক্ষণ				