

*Research Article***Innovation of low cost "Auto feeder" for effective feed management in fish farm****Nahid, S.A.A.* and Shimul, S.A**^{1,2} Department of Fisheries Resource Management, Chattogram Veterinary and Animal Sciences University, Chattogram-4225, Bangladesh**ARTICLE INFO***Article history :*

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Email: nahid83bau@gmail.com;**ABSTRACT**

Aquaculture is a thriving industry leading the contribution of country's total fish requirement. The feeding system is an important aspect of this sector. Broadcasting method of feeding system, usually practiced in Bangladesh, has some drawbacks such as labor-intensive, time consuming, water quality deterioration etc. To overcome these problems, cost-effective auto feeder was designed, and developed. The aim was to innovate low cost auto feeder by using solar panel acting as a renewable energy source, so that farmers can use modern aquaculture equipment for their economic viability. Whereas solar energy can be an alternative solution in energy crisis condition and run in an automatically reducing manpower. The newly designed auto feeder prevented overeating by releasing the fixed quantity of feed, at predetermined times and assured well fed healthy fish. It prevented water quality deterioration by minimizing overfeeding and assured better feeding. Experimental result showed, the newly designed auto feeder needed only 10 minutes to dispense the feed in one acre pond which was 10% more efficient than broadcasting method in aspect of time and labor cost. The innovated low cost auto feeder might be helpful to overcome the emerging problems of broadcasting methods and will assure better management of feeding system in Bangladesh.

Keyword: Auto feeder, aquaculture, feeding.

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1. INTRODUCTION

Growth and production of aquaculture sector has two fundamental such as food and feeding. Aquaculture development, survivability, maintenance and sustainability, their management is considered as main challenges (Nasir *et al.* 2016). Aquaculture feed management strategies control how farmers feed their fish and thus have a considerable influence upon the economic and environmental sustainability of the

enterprises (Cho and Bureau, 1998). Overfeeding results in the accumulation of waste due to uneaten food and increased amounts of waste produced by the fish eating more than they really need. Underfeeding has detrimental effects on production efficiency (Bureau *et al.* 2006), and overfeeding typically increases feed wastage (Thorpe and Cho, 1995), which leads to poor FCR (Talbot, Corneillie and Korsoen, 1999) and the wastage of excess feeds, thus

contributing to environmental degradation in fish culture. Feed costs account for up to 60 percent of total production costs, and inappropriate feeding and feed management can therefore be detrimental to the profits of farmers (White 2013). Optimal growth of fish and optimal use of feed is only possible with exact rationing of feed, waste-free feeding and multiple daily feeds. It is difficult and expensive to achieve these objectives with manual feeding. In addition, automatic feeding considerably reduces working hours and it makes the work easier. With auto feeder it is possible to spread the feed into the pond without waste. Auto feeder can ensure rapid and positive consumption of feed by fish; minimal metabolic energy expenditure associated with feeding, and ensures all the fish have equal access to the feed. Automatic feeders save time, labor and money (Craig and Helfrich, 2002). The cost-effective feeding management has significant economic benefit for the aqua-culturists. The auto feeder available in the market is too expensive to use the poor farmers. For this, if low cost auto feeder can be innovated, it can generate substantial benefits to the fish farmers in Bangladesh. The aim of this experiment is to innovate low cost auto feeder so that poor farmers capable to use modern aquaculture equipment for their economic viability. The objectives of this research work are:

- Rapid and positive consumption of feed by the fish.
- To ensure all the fish have equal access to the feed.
- To improve soil and water quality, deteriorated by overfeeding.
- Reduction of labour cost associated with feeding in fish farm.

2. MATERIALS AND METHODS

Study area

The present study was carried out to 'Halda Fisheries Ltd., Potenga, Chattogram' in Bangladesh by providing facility and maintaining optimum conditions for experimental procedures during the period of January to September, 2017.

Collection of raw materials

The materials such as Plastic sheet, aluminum sheet,

SS sheet, and engineering tool box, motor were collected from local market for preparing auto feeder.

Construction of experimental auto feeder

After that cost-effective manual and mechanical auto feeder were constructed for fish culture by using collected raw materials.

Field trial of the efficacy of the constructed auto feeder

Then the next step was field trial of the efficacy of the constructed auto feeder to observe the constructed auto feeder is effective or fish culture or not. Constructed auto feeder was compared broadcasting method by visual observation. Some parameters were considered in this step such as turbidity, feed loss, operation time, labor cost, efficiency, time and water quality deterioration.

To evaluate the performance of constructed auto feeder, it must meet the following basic requirements:

- I. First basic requirement are the individual parts of constructed auto feeder are carefully checked to verify each of the parts functioned properly.
- II. The voltage of the solar panel in full view of the sun is tested which will help to make difference in output.
- III. The main controller is switched on and checked if the units functioned as operated automatically.

3. RESULTS AND DISCUSSIONS

Experimental auto feeder

Cost-effective manual and mechanical auto feeder has been constructed for fish culture by using raw materials (Figure 1). A stand was constructed for holding the container where drum are used as float. Solar panel was used for the purpose of a source of energy. Auto feeder consists of two parts. Such as:

Hopper: Also called holding drum which made from plastic with lid which stores and keeps the feed.

Conical shaped opening: This controls amount of feed to let the machine.

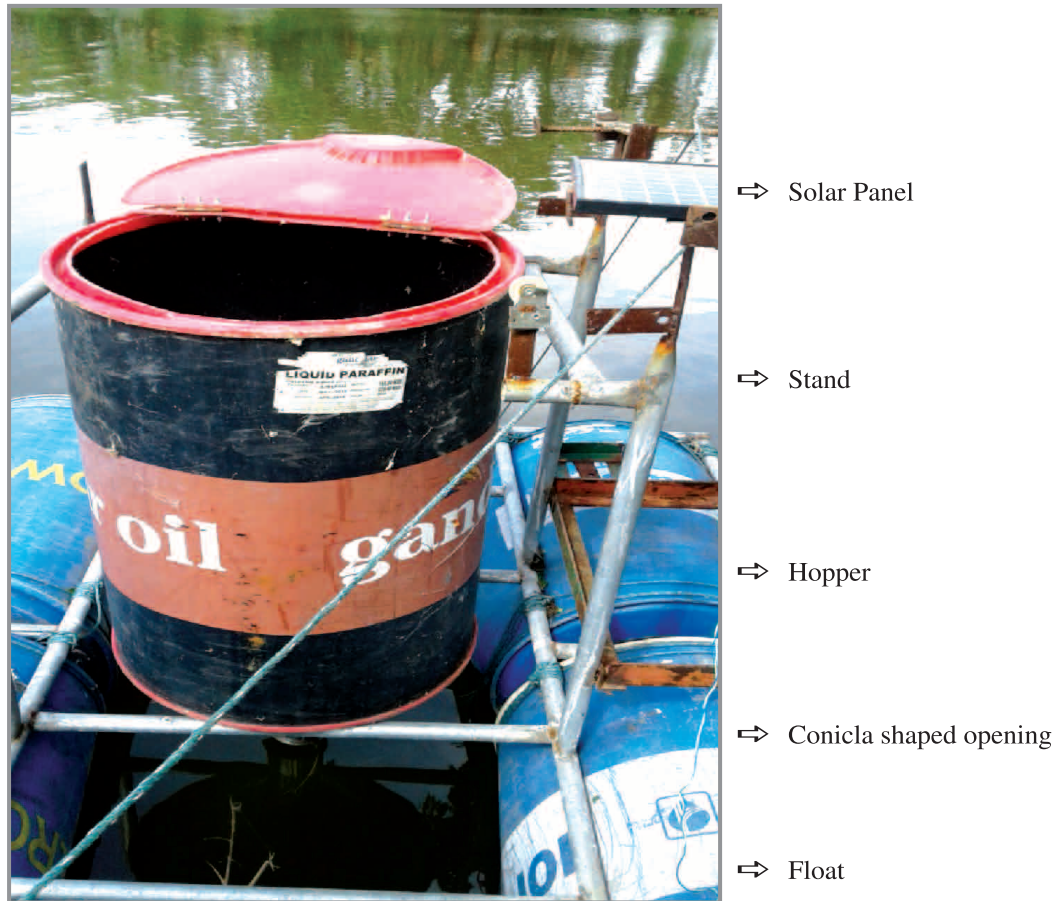


Figure 1: Structure of constructed auto feeder

The performance of experimental auto feeder was evaluated by comparing broadcasting methods based on some criteria by visual observation. Comparison

between experimental auto feeder and broadcasting methods are shown in Table 1.

Table 1: Comparison between experimental auto feeder and broadcasting methods

Features	Experimental auto feeder	Broadcasting methods
1. Turbidity	Are not found	Turbid pond water are found
2. Feed loss	Only few feed are loss	10% feed are loss during this method
3. Operation time	Needs only 10 minutes to dispense the feed in 1 acre pond	Needs 2 man hours per acre
4. Labor cost	Helps to reduce labor cost	Increase labor cost
5. Efficiency	10% more efficient than broadcasting methods	It is not more efficient than auto feeder
6. Time	Saves time	Time consuming method
7. Deterioration of water quality	Less water quality are found due to even distribution of feed and overfeeding are not happen	Water quality are deteriorated by overfeeding

Note: There are missing values as the respondents didn't answer the open ended questions.

4. CONCLUSION

While all animals need to eat and all farmed animals need to be fed, aquaculture represents the most efficient method by which to convert feed to edible protein. Feed is the greatest single cost in fish farming, and as efficiency increases, feed costs become even more important. Commercial fish farmers must address each of these factors when designing economically and environmentally sustainable feed management strategies. Fish feeding is done inefficiently by laborers, and farmers in Bangladesh don't have cost effective technology to control the feeding yet. Construction of low cost auto feeder helps to overcome these problems and assure better management of feeding system.

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