Fish health management practices of aquafarms in Cumilla district

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Abstract. A study was conducted to determine the existing health management practices of 24 aqua farms of three upazilas *viz.*, Chandina, Barura, and Laksham under Cumilla district. Data were collected through a questionnaire survey and PRA tools. The results showed that most of the farmers did not have enough knowledge regarding biosecurity. However, maximum selected farms (80%) had little scope of pollutant entrance as they used groundwater, stocked disease free fry (95%), removed pond bottom waste at the end of production (66.67%) and checked water quality parameters (53.33%). Other biosecurity measures like the restriction of visitor's movement, control of rodents and insects in feed storage, keep domestic animals confined, disinfection of equipments and control of predator/ pest in the farms were also limited (25%). Few farms (30%) started using probiotics. The collected data would be used as the preliminary study and further improvement of the overall biosecurity status in the investigated aqua farms is necessary.

Keywords: Aquafarms, Health Management, Biosecurity, Cumilla

Introduction

Bangladesh is one of the world's leading fish producing countries with a total production of 42.77 lakh MT in FY 2017-18. Bangladesh becomes a self-sufficient country in fish production, with per capita fish consumption of 62.58 g/day against the set target of 60 g/day. According to FAO (2018) Bangladesh ranked 3rd in inland open water capture production and 5th in world aquaculture production. With the rising commercialization and rapid intensification of aquaculture activities, diseases and deterioration of the environment are causing major problems in fish farming and the industry facing massive economic challenges. For the prevention and control of diseases, proper biosecurity measures are not following while it is alarming that various chemicals are being used indiscriminately in the aqua farms of Bangladesh. Biosecurity implies the process of taking precautions to minimize the risk of diseases introduction as well as the spread of infectious organisms into or between populations. Faruk et al. (2004) reported the average economic loss of BDT 20,615/ha/year (equal to US\$ 344) to rural freshwater fish farmers due to fish disease in Bangladesh. The disease is also considered as one of the important factors to decrease in fish production both in farming systems and in wild conditions. Largescale mortality of fish often occurs in ponds due to environmental stress followed by parasitic invasions and bacterial, fungal, protozoan and monogenic infections (Hossain et al. 2011).

The aquaculture production of Cumilla is increasing day by day but facing severe problems of fish diseases, particularly bacterial disease. It causes severe damage and mortality of fish

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every year. Many commercial fish farmers do not have a good understanding of fish health and biosecurity issues in rural aquacultures, such as lack of assistance, poor technical knowledge and lack of suitable therapeutics and their proper uses (Faruk et al. 2004). Considering the situation, a detailed study was conducted to determine the existing health management practices and biosecurity measures of the commercial aqua farms located in some selected upazilas under Cumilla district.

Materials and Methods

Study area and select farmers: Field data on the status of biosecurity, probiotics use and overall fish health management strategy were collected from twenty-four aqua farms (twelve selected and twelve non-selected) of three upazilas viz., Chandina, Baruraand Laksham of Cumilla district. Farmers were categorized into two groups; selected and non-selected. Selected farmers were very little conscious on health management strategy and non-selected farmers were not at all. Necessary data were collected from fish farms by frequent field visits and interviews.

Data collection and analysis: Data were collected using PRA tools by several FGD and crosscheck interviews with different key informants like District Fisheries Officer (DFO), Upazila Fisheries Officer (UFO), Fisheries Extension officer (FEO) and representatives of some commercial feed company. All collected data were analyzed using "Microsoft Excel 2010".

Results

Physical description of farms: In the selected farms the lowest and highest pond area was 1.7 and 8.5 hectare in Chandina and Laksham upazilas respectively. The range of pond area in Laksham upazila was found bigger (2-8.5ha) with average 2.65 ± 0.78 ha than Chandina upazila (comparatively smaller: 1.7-3.7 ha with an average of 2.0 ± 0.67 ha). The highest pond depth was ranged from 1.82 to 2.35 m with an average 1.60 ± 0.42 m at Chandina upazila whereas in Barura upazila it was 1.20-1.83 m with an average of 1.35 ± 0.22 m (Table I). On the other hand, in the non-selected farms the highest pond area was 1.8-7.9 ha with an average of 2.7+0.65 ha at Laksham upazila and the lowest pond area was 1.7-3.4 ha (average 2.0+0.78 ha) at Chandina upazila. The highest pond depths in non-selected farms were ranged from 1.20 to 2.20 m (average: 1.40 ± 0.25 m) and the lowest depth were ranged from 1.10-1.70 m with an average of 1.20 ± 0.51 m (Table I).

Description	scription Farms of Laksham upazila		Farms of B	arura upazila	Farms of Chandina upazila		
	Selected	Non	Selected	Non selected	Selected	Non selected	
		selected					
Area (ha.)	2-8.5	1.8-7.9	2.2-3.6	2.6-3.4	1.7-3.6	1.8-3.4	
Average (ha)	2.65 ± 0.78	2.70 ± 0.65	2.60 ± 0.78	2.80 ± 0.54	1.70 ± 0.44	2.00 ± 0.78	
Depth (m)	1.22-2.1	1.20-2.20	1.20-1.83	1.10-1.70	1.82-2.35	1.60-1.80	
Average (m)	1.50 ± 0.24	1.40 ± 0.25	1.35 ± 0.22	1.20 ± 0.51	1.60 ± 0.42	1.35 ± 0.22	

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Both polyculture (Tilapia, Pangus and carp) and monoculture (Pangus or Tilapia separately) systems were practiced in the selected and non-selected farms of the study area. It was observed that monoculture was practiced by majority farmers in Chandina (84%) practiced whereas by only 34% in Barura. Polyculture was practiced more in Barura upazila (66%) than in Chandina (16%) (Fig. 1).



Fig. 1. Culture type in different aqua farms of three different upazila of Cumilla district.

Pre-stocking biosecurity issues: Few selected farms followed pre-stocking biosecurity measures such as boundary fences, pond preparation, protected dikes and driveways, soil and water management, foot or tire bath facilities, showers and cloth changing areas, limited access of unwanted people, domestic animals presence, scope to enter wild fish, control predator/pest animal, pollutants, seed stock management and disposal of diseased fish. On the other hand, non-selected farmers had no clear idea about these protection utilities. It was observed that 70% farmers (both selected and non-selected) of each upazilas were conscious about contaminated water, used groundwater by shallow/deep tube wells and measured temperature, dissolved oxygen, pH, alkalinity and ammonia. 80% selected farmers of Chandina upazila stocked diseased free fry and 90% farmers of Laksham acclimatized before stocking to the ponds. Fifty five percent selected and 20% non-selected farmers of each upazilas removed pond bottom waste and dried their culture ponds at the end of production except in Laksham upazila (25%) due to the large in ponds size (Table II).

Idea about		Lakshar	n upazil	la		Barura	a upazila	L		Chandi	na upazila	a
biosecurity	Sele	ected	N	on	Sele	cted	Non se	elected	Sele	ected	Non se	elected
measures			sele	cted								
	No	%	No	%	No	%	No	%	No	%	No	%
Yes	2	50	3	75	3	75	4	100	3	75	3	75
No	2	50	1	25	1	25	0	0	1	25	1	25
Total	4	100	4	100	4	100	4	100	4	100	4	100

Table II. Farmer's knowledge regarding biosecurity measures

Post-stocking biosecurity issues: In the present study, only 60% selected farmers of Chandina upazila disinfected water distribution channel through earthen drains, plastic or polythene pipes using potassium permanganate which was only 13.33% for the non-selected farmers of Laksham

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upazila. Most of the selected and non-selected farms (80%) of each upazila had no facility of sprays, footbath to disinfect boots, vehicles and sanitary latrine facilities. Some selected farmers (30%) of Barura upazila used protective cloth where most of the selected and non-selected farmers (80%) of every upazila did not use it for visitors and their staffs before entering into the farm. Only 5% of selected farmers of Barura upazila used potassium permanganate to disinfect plastic baskets, aluminum pots, plastic drums during harvesting and none of the selected and non-selected farmers of each upazila disinfected the transporting vehicles used during marketing (Fig. 2).



Fig. 2. Disinfection facilities practiced in the selected farm areas.

Disease and fish health management issues: It was observed that checking tendency of fish diseases of studied farms differed from upazila to upazila. Maximum 84% selected farmers of Barura upazila and a minimum 16.6% farmers checked fish disease in Chandina upazila. Nearly 66.67% of selected farms of each upazila were not conscious about fish disease. Only 20% of farms were very concerned about fish disease and they tried to communicate concerning UFOs. The current study showed that bacterial diseases like hemorrhages, dropsy, tail and fin rot disease, gill rot disease and epizootic ulcerative syndrome (EUS) were common. In the study area, a parasitic disease, Argulosis was also common which could easily be identified by naked eye. Comparatively, the non-selected farms (90%) of each upazila were not conscious about fish disease and its particular treatment. Only 5% selected farmers of each upazila familiar with viral diseases (Fig. 3).

The study showed that the nearly 50% of the selected farmers regularly checked fish health, 44% always dried their ponds, 80% used lime, 84% weeded the pond and 50-60% farmers exchanged water. On the other hand, only 10% non-selected farmers regularly checked fish health, 20% always dried their ponds, 60% farmers used lime, 40% farmers weeded their pond and only 20-30% farmers exchanged water. All farmers from selected and non-selected farms did not use vaccins.

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Fig. 3. Status of different type of diseases in selected upazila.

Use of antibiotics and chemicals: From the study it was found that 66.67% of both selected and non-selected farmers used different types of antibiotics and chemicals like Timsen, Bio-Oxy, Cipro plus, Aqua Magic, Ranaquin, Biotax, Quinex, Oxylife, Bio-aqua, Sumithion, Gastrap, Zeolite, Virex, Aquamin, Oxy A, Oxymax, Argulex, Spa, Eon Fish Grower to control diseases. Only 33.33% farmers were not interested on using any types of chemicals rather, they used lime and salt for the treatment of diseased fish.

Use of probiotics: During the study, it was observed that only 30% of farmers of both selected and non-selected farms of each upazila started to use probiotics. Few company's representatives introduced their probiotics. Farmers used water, soil and gut probiotics separately and also in combination. Most of the farmers did not know the particular benefits of probiotics and just answered that probiotics enhanced their fish production. In a selected polyculture farm of Barura upazila, production of Tilapia, Pangus and Carps increased significantly using combined probiotics. In another selected farm at Chandina upazila, better food conversion ratio (FCR), average daily growth (ADG) and overall Tilapia production was found where fish were supplemented with water and gut probiotics. In addition, there was no disease outbreak and needed no extra medicinal cost for disease treatment during these probiotic supplementation. Also, probiotics showed better growth performance and overall production in the selected farms than in the non-selected farms of each upazila by reducing feed cost, labor cost and overall maintenance cost. The data showed that, the overall production increased 15-20 kg/ decimal and reduced maintenance cost to 20000 -30000 Tk/ ton in a production cycle in the probiotics supplemented farms.

Disease treatment: The study showed that maximum farmers tried to treat fish using salt for hemorrhagic diseases, lime for tail and fin root, KMnO₄ for gill rot, formalin for white spot, Malachite green for EUS and dipterex for Argulosis (Fig. 4).

			_ C			
	Salt	Lime	KMnO4	ormalir	Malachii e green	Diptere:
■ Usually	MASTa 40%	il & fin r 30%	∞≣ill rot∕ 30%	/ hite spc 5%	t EUS 5%	Argulosi 30%
Always	20%	60%	50%	10%	12%	50%
Never	40%	10%	20%	85%	88%	20%

Fig. 4. The treatment practiced for different diseases in the selected area.

It was observed that 60% of the selected farmers disposed the dead or moribund fish where non selected farmers were not conscious about dispose of dead fish. Some farmers buried under soil after collecting dead or moribund fish. About 90% of selected and non-selected farmers were not aware of the disposal of diseased fish. It was observed that farmers did not get proper assistance on disease control and health management from NGOs and government officers. Only 42.33% of farmers would avail advice either from GO or NGOs.

Discussion

The pre-requisite of healthy farms is to follow proper biosecurity measures on pre-stocking and post-stocking management during production and going through healthy procedure up to the marketing of fishes. In the present study, biosecurity status of commercial fish farms was evaluated through some general measures. Most of the farmers did not have good understanding of biosecurity measures and accordingly could not follow in their farms. The pre-stocking biosecurity measures such as protected dikes, driveways and presence of boundary fences were found very limited in the study area. However, majority of the farms in Khartoum, Khartoum North and Omdurman in the Sudan have a secure boundary fence that is able to stop people and animals entering the farm (Ali et al., 2014). In the present study, it was observed that most of the farmers of the study area were very much aware about the water sources for aquaculture activities and used underground water during pre-stocking and culture period but did not exchange the pond water properly. In addition, very few of them removed pond mud after end of culture period which was predicted for the deterioration of pond water quality followed by welcoming for unexpected diseases. Similar finding was also reported by Islam (2018) who observed that huge amount of decomposed bottom mud often deteriorated the water quality and became stressful for the fish and hence, fish became susceptible to diseases in some commercial aquafarms of Kishoreganj and Mymensingh. Another important pre-stocking biosecurity issue was wearing of disinfected clothing and boots by visitors and employees which was totally absent in the investigated farms. Most fish farmers of Kishoreganj and Mymensingh also did not provide protective clothing and boots for visitors and their staffs before entering into the farm (Islam, 2018). Although disinfected clothing and boots by visitors and employees can prevent the horizontal transmission of infection (FAO 2007), most farmers related to the freshwater

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aquaculture activities in Bangladesh are not usually conscious regarding this issue which must be taken into the consideration with highest priority.

From the present study, the post-stocking issues *i.e.*, the facility of providing protective clothing for visitors, disinfection of transport equipment, facility of sprays, footbaths to disinfection of boots and vehicles, disinfection of the lories or tanks used to transport fish were found absent or very low which might help to transmit infectious diseases. Sadler and Goodwin (2007) mentioned that one must clean, disinfect and dry the equipments to kill pathogens before it is used for aquaculture activities elsewhere on or off the farm. Pollard et al. (2008) observed that disinfection of protective clothing and boots, and the use of footbaths and hand sanitation are effective personal biosecurity measures that considerably reduce the transmission of pathogens. Effective trainings regarding these issues may help fish farmers of Cumilla for sustainable production. Disease monitoring is one of the most important biosecurity measures in fish farms. In the present study, almost all the farmers monitored fish disease condition in their ponds. The current study also showed that some bacterial infections and parasitic disease like Argulosis were common which could easily be identified by naked eye. Comparatively, the nonselected farmers of each upazila were not conscious about fish diseases and it's particular treatment. Again, most of the commercial farmers of the study area mentioned that it was very difficult to search and collect the dead or moribund fishes that were also labor intensive and expensive. Delabbio et al. (2004) reported that routine collection of dead fish should be one of the most commonly used biosecurity measures in aquaculture. Fish farmers of Cumilla must be aware of fish diseases, their treatment procedures as well as the effective management of the dead fish which is also one of the most important biosecurity issues.

From the survey it was found that farmers used chemicals indiscriminately without knowing appropriate doses and actual method of applications. Faruk *et al.* (2008) reported that farmers do not conscious about the residual effect of these synthetic medicines. Few farmers of the studied areas were not interested on the use of any type of chemical, rather than they used lime and salt for the treatment of diseased fish. In a study, Ahmed *et al.* (2015) also suggested to take some preventive measures at the beginning of the winter season which included application of lime and salt, disinfect equipment and addition of water. It was also found that many farmers used probiotics in their ponds for beneficial purposes such as growth enhancement, disease resistance and water quality improvements. Different types of probiotics on cultured aquatic animals have emphasized a reduction in mortality or conversely, increased survival (Change and Liu, 2002), improved resistance against diseases (Villamil *et al.*, 2003), enhanced ability of beneficial microbes to adhere and colonize in the gut to antagonize harmful organisms. It is opined that appropriate use of good quality probiotics may enhance fish production in sustainable way without causing any harm to the aquatic water bodies.

Farmers of Cumilla did not get proper assistance on disease control and health management from non-governmental organization and government extension officers. Delabbio *et al.* (2005) reported that fish health specialists and extension agents working on farm should increase the awareness of farmer's perceptions of disease risk, biosecurity and must work effectively with them to achieving biosecurity objectives and fish health management. From the present study it was observed that most of the farmers were illiterate having lack of exact knowledge about the biosecurity issues and were not willing to go to the experts for proper advices which is obviously necessary to upgrade the existing fish farming practices through institutional and organizational initiatives

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