MAJOR TECHNICAL AND DISEASE PROBLEMS OF THE HATCHERY OPERATION IN JESSORE DISTRICT, BANGLADESH

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Abstract

Carp seed production through induced breeding in Jessore region has made a real improvement in inland freshwater aquaculture. An investigation was conducted during the period from May to October, 2012 to know the present condition and find out the problems of the hatcheries in Jessore area. Training status of the hatchery owners shows that they had no training. Funding source was self and loan, land ownership was own and lease. The owner hatchery provides a manager and some assistants but have no skilled person. During the period of survey, the major management problems found in Shamim fish hatchery and major diseases were recorded in hatcheries are fish lice, tail and fin rot, sudden spawn mortality, gill rot, dropsy and argulosis. The highest rate of disease was found 15.5% in Shamim fish hatchery. The hatchery owners did not keep the record of the history of origin of brood and not followed the proper sex ratio for artificial breeding. For these reason, the factors that are liable to create inbreeding or negative selection in the seed produced in the hatchery. Government and Non-government sector can help to make the business more furnished by providing proper training and credit support for the development of this sector and to develop their technical skill.

Keywords: Hatchery Operation, Problems, Diseases, Jessore

Introduction

Aquaculture is a traditional and age-old practice in Bangladesh. It has been given importance in Bangladesh because of its potential for export earnings, generation of employment for the rural sector and its contribution to the supply of animal protein for the population. Fish is an essential daily food item for the people of Bangladesh and as such demand for fish is increasing with the increasing of population (Ali *et al.,* 2014).

This sector directly contribute approximately 4.37% of the country's Gross Domestic Product (GDP), however, the indirect contributions from gross agricultural income are estimated at 23.37%. It contributes 60% of the national animal protein consumption (DoF, 2013). It creates full time of 1.4 million people and part time of nearly 11 million people (Haque, 1992). A total of 2,78,456 kg hatchlings were produced in the country in 2001-2002 of which amount of hatchling from capture from the natural source was 1975 kg and hatchery produced spawn was 2,76,481 kg. The contribution of the private hatchery compared to total hatchling production was 97.5% of which the government hatchery produced only 1.6% and the rest 0.85% from the natural sources (DoF, 2013).

For an aquaculture system to be successful, an uninterrupted, timely supply of high quality fish fry is highly essential. The species that are mostly cultured in fresh water and the seed which being produced are catla, rohu, mrigal, silver carp, grass carp, bighead carp, thai puti etc. (Islam, 1989). From time immemorial, the natural sources of rivers were the major source of carp seed production in Bangladesh. Millions of eggs and spawn were used to be collected from the river during monsoon (May-August). In 1984, the spawn production of Bangladesh was estimated to be 23657 kg from Padma-Brahmaputra River System, 895 kg from Halda River and 625 kg from all hatcheries (Tasi and Ali, 1997). They contributed respectively 93.86%, 3.55% and 2.595 of the total spawn supply (25203 kg) for pond fish culture in the country. However, at present, consequent to the destruction of the natural habitats the natural availability of carp seed has largely gone down and the aquaculture venture are now fully dependent on the hatchery produced fry.

During 1990s there were 5 large hatcheries and 106 fish seed multiplication farms established in public sector. A part from Government hatcheries, a large number of carp hatcheries had been built in the private sector in different parts of Bangladesh. In 1980, the total hatchery produced carp fry was estimated at about 22 million (Chowdhury *et al.,* 1996). In 1984, hatchery produced carp fry was estimated to be about 249 million, which is more than ten times of 1980 production. At present total number of hatcheries in Bangladesh are 936 and their total production are 487498 kg (DoF, 2013)

In the year of 2002, the carp hatchling production from private hatchery was 214,682 kg of which Jessore district contributed 45,000 kg and that was 21% of the total hatchling production of the country (DoF, 2003). Bangladesh has 371309 hactre areas of ponds and ditches all over the country. All these water bodies are very much potential for fish production. In spite of

being high in potential these water bodies are not judiciously used for fish production due to lack of seed supply. Carp seed production through induced breeding in Jessore region has made a real progress in inland closed water aquaculture. However, still now seed production is not sufficient.

With the decline of the natural fish production and increase of demand, aquaculture venture, particularly the Indian major carps, rohu (*labeo rohita)*, mrigal (*Cirrhinus cirrhosus*), catla (*catla catla*) and some Chinese carps has been emerged as a most vital wing of fish production and aquaculture is now fully dependent on hatchery based seed. For an effective development of aquaculture, good quality fish seed is highly essential. If seed that is produced from hatchery are not of good quality, it will create severe problem during culture, such as slow growth rate, poor survivability, poor disease resistant power etc. All these problems occur due to inbreeding and negative selection during hatchery management and production system. Also there are instances of preferential selection of the broods during breeding. All these acts in breeding fishes in the hatchery contribute to the creation of inbreeding and negative selection in the hatchery (Shah, 2004).

Thus, a knowledge on the prevailing hatchery facilities in the greater Jessore area will bring an idea as to the practice of breeding fishes for seed production; the facilities like pond space, brood number, sources of the origin of the broods, periodical brood exchange situation, sex ratios of the breeding individuals, breeding inducing agents used, their doses and time etc. will bring into light as to the fish handling and inbreeding situation in the seed produced and will vindicate the frequently raised claims by the farmers that hatchery produced seed do not grow as faster as the natural origin seed. So the present research aimed to identify existing technical and disease problems of the hatchery operation in the Jessore district, Bangladesh.

Materials & Methods

Study area

The present study was conducted to know the existing problem and future potential for hatchery operation on Jessore Sadar Upazila in Jessore district from May to October, 2012. Jessore Sadar Upazila is the most pioneer and popular for finfish fry production in our country (Fig. 1). Hatcheries were selected randomly for data collection. The full name of these hatcheries Acota Fish Hatchery (AFH), Al Amin Fish Hatchery (AMFH), Chowdhury Fish Hatchery (CFH), Kapotakkho Fish Hatchery (KFH), Madhumoti Fish Hatchery (MFH), Maa Fatema Fish Hatchery (MFFH), Rita Fish Hatchery (RIFH), Rupali Fish Hatchery (RUFH), Sonali Fish Hatchery (SOFH), Suvro Fish Hatchery (SUFH), Shamim Fish Hatchery (SHFH), Rahman Fish Hatchery (RFH).

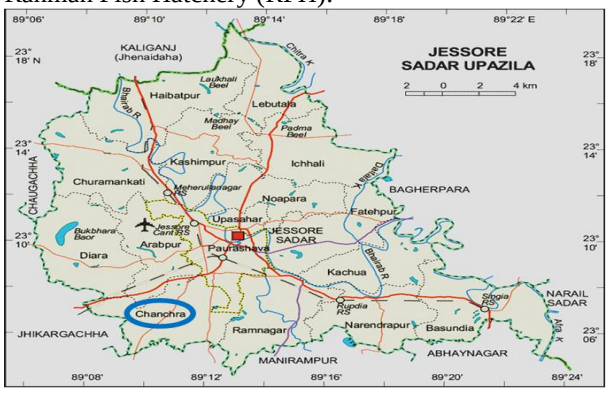

Fig. 1. Map showing the study area of Chanchra area, Jessore District.

Data collection

Data was collected by direct interviewing, FGD (Focus Group Discussion), PRA (participatory Rural Appraisal), RRA (Rapid Rural Appraisal) of the hatchery owners or managers. Prior to collect data a structured questionnaire was prepared. The questionnaire was prepared adhering to the objectives of the study. Secondary data were collected from Fisheries and Marine Resource Technology Discipline, Khulna University and also collected from internet browsing.

Data Analysis

The results obtained in the experiment were subjected to statistical analysis. Qualitative and quantitative analysis of all kinds of data were carried out using MS Excel.

Results

Knowledge on the prevailing hatchery facilities in the Jessore region has brought an idea as to the practice of breeding fishes for seed production. The present information was collected by direct survey and observation method. There were eighty two (82) hatcheries in Jessore Sadar Upazila, among them twelve (12) hatcheries were surveyed.

Problems in Hatchery Operation

Sound health management practice is a key to success in any hatchery operation. In the study areas, hatchery operators mentioned several problems they encountered in their operations. Problem levels in various hatcheries are shown in fig. 2. In comparatively, the highest percentages of problems are faced by SHFH because of their lower management system and their hatchery facilities are not well managed. In case of RUFH, their management systems are well prepared. So, they faced some minor problems.

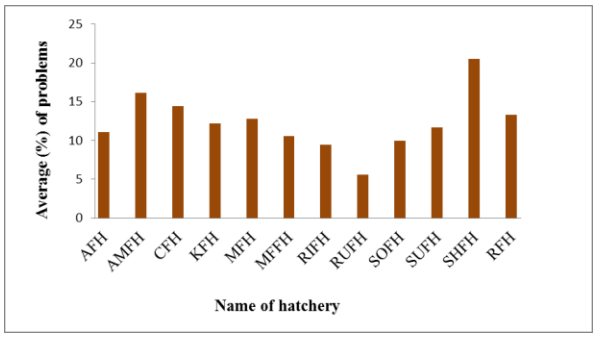

Fig. 2. Comparative study on the problems faced by the hatchery owners

Technical, economic and social problems

Most of the hatchery owners faced some technical, economic and social problems. Lack of skilled person, insufficient water in dry season, drainage system are not well managed, lack of credit, lack of marketing facility, theft of fish, joint partnership, taking lease of pond and flood are the most common problems faced by the hatchery(Table 1)

Occurrence of disease

Disease was reported to be a more of a problem in the hatcheries of the Jessore area. The occurrence of the most common disease in the Jessore regions is fish lice. Now anchor warm is the most common disease in hatcheries and also reported were gill rot, tail and fin rot, fungal infection of carp eggs. The diseases are caused primarily by parasites, fungi, bacteria and nutritional deficiency. Average percentage of disease problems of the hatchery owners are given in Table 2

$$\% \text{ of prevalence} = \frac{\text{No of infected fish}}{\text{Total no of fish}} \times 100$$

Table 1. Problems faced by the private fish hatcheries in the surveyed area

Name of hatchery	Technical Assessment			Economic Assessment		Social Assessment			Natural calamity	Average (%)
	Lack of Skilled person (%)	Insufficient water in dry season (%)	Drainage system (%)	Lack of credit (%)	Lack of marketing facility (%)	Theft (%)	Joint partnership (%)	Taking lease of pond (%)	Flood (%)	
A FH	20	10	0	20	10	10	10	10	10	11.12
AMFH	20	20	15	10	5	10	15	20	20	16.11
CFH	30	10	20	20	0	0	20	30	0	14.44
KFH	20	0	20	10	0	10	0	40	10	12.22
MFH	20	0	10	10	0	20	20	30	5	12.77
MFFH	30	10	0	0	20	10	5	20	0	10.55
RIFH	20	20	10	0	10	10	0	10	5	9.44
RUFH	0	10	20	0	10	5	0	0	5	5.55
SOFH	20	20	10	20	0	0	10	10	0	10.00
SUFH	20	20	10	10	5	10	0	10	20	11.67
SHFH	30	25	20	30	0	20	20	30	10	20.55
RFH	20	20	15	10	5	10	15	15	10	13.33

Table 2. Disease occurred in the surveyed hatchery in Jessore area

Name of hatchery	**Disease investigation**				**Average (%) of disease**
	Fish lice (%)	**Anchor warm (%)**	**Gill rot (%)**	**Tail & fin rot (%)**	
AFH	11.42	18.57	2.86	10	10.71
AAFH	12.94	7.05	10.58	12.29	11.46
CFH	15	15.2	0	13.6	10.95
KFH	13.33	2	17.33	16	12.16
MFH	11	16.4	2.4	8.9	9.67
MFFH	0	21.45	5.6	12.48	9.88
RIFH	12	13.36	16.5	0	10.48
RUFH	9.32	11.18	0	7.62	6.04
SOFH	0	16.45	13.66	12.16	10.56
SUFH	13.48	18.02	6.4	12.18	12.52
SHFH	16.76	21.38	7.21	16.64	15.5
RFH	14.41	13.52	5.6	14.82	12.08

Fig. 3 is showing the intensity or degree of diseases in those hatcheries. But compared with those hatcheries, here in SHFH the intensity of disease is most destructive because of their hatchery management system

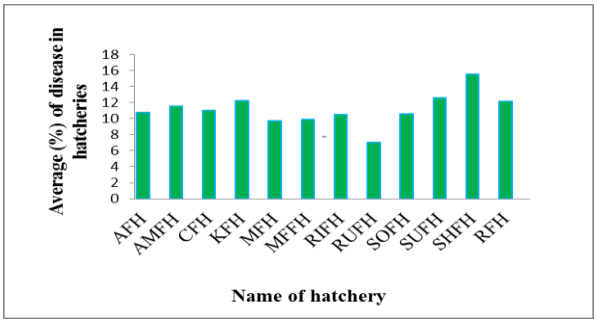

Fig. 3. Comparative study of disease occurred in the hatcheries

are not well prepared and the water quality is not free from iron. But in RUFH the intensity of disease is lowest because of proper management facilities.

Discussion

After conducting the survey, it has been found that the highest number of ponds provided by the RUFH was 11and others hatchery were provided maximum 07 to minimum 04 numbers of brood ponds. These numbers of ponds are not sufficient for stocking large number of brood. This insufficient brood stocking increase the chance of mating of closely related individual. That is the chance of inbreeding (Shah, 2004).

In the study area, major management problems and constraints faced by the hatchery owners are lack of technological knowledge, lack of credit, joint partnership, taking lease of pond, flood and insufficient water in dry season. The present findings more or less similar from the result described by Salam (2008) who mentioned that about 28.57% and 9.52% owners claimed that the production of farms hampered due to lack of technical knowledge and insufficient water in the dry season.

In order to supply adequate water to the tanks or hatching jars, underground water from deep or shallow tube well is necessary. Also adequate temperate, DO, pH and transparency should be maintained in brood fish pond. Most of the hatchery provides one overhead tank to supply water but in RUFH they have two overhead tanks for supplying water into the brood holding tanks and hatching jars.

The success of the hatchery operations depends upon the skilled manpower and other manpower such as hatchery assistant, labor employed in netting and brood selection, brood carrying in the hatchery, brood feeding, pump driver, night guard etc. In RUFH had an average number of 8 people of which 1 was manager, 2 skilled person and 5 assistants. But most of the hatchery provides a manager and some assistants. The number of hatchery assistances varies to maximum 5 to minimum 2 including the night guard. The hatchery operations produce more success with the respect to low genetic error when the broods are handled by more skilled person in the hatchery.

During the investigational period, maximum number of circular tank, rectangular tank and hatching jar were 1, 20 and 30 are present in RUFH. But most of the hatchery provides have no circular tank, rectangular tank ranges from maximum 16 to minimum 12 and the number of jars ranges from maximum 20 to minimum 14. In hatchery, a minimum number of rectangular tank and hatching jar are needed and one circular tank must be needed for quality seed production. Fewer numbers of tanks and jars indicates the lower optima which are important with regard to creating genetic concerns (Shah, 2004).

The hatchery technicians depend on their experience in maintaining breeding protocol for artificial breeding. Sometimes the technicians use the milt of different species due to lack of milt of the species. This unplanned breeding results in generation of genetic underclass carp seeds and produces low quality seeds of slow growth rate, poor survival power etc. (Das, 2000). In the study area, it was recorded that, the occurrence of disease were the most common problems in hatchery. While the major diseases reported in hatcheries were sudden spawn mortality, fish lice, gill rot, fin rot and anchor warm. This findings of the study differ from the study of Hasan and Ahmed (2002) who reported that diseases were less prevalent in hatcheries than in nurseries and the economic loss due to disease was about 7.6% of the profit.

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