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Knowledge of labors on hatchery management

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ABSTRACT

Bangladesh has an excellent environment for artificial fish seed production. But people don't utilize it properly because of their lack of knowledge on using hatchery management practices. The main purposes of the study were to determine the knowledge of the labours on hatchery management practices, to explore the relationships between the extent of knowledge of the labours and their selected characteristics and to identify the problems faced by the labours during hatchery management. Data were collected from purposively selected three villages (Raghabpur, Roghurampur, Char Puliamari) of 7 no. Char Nilaksmia in Sadar upazila under Mymensingh district, during April-May, 2014. The sample size of the study was 69 labours from a population of 80 using simple random sampling technique. A mixed-method research design was followed, that means, both qualitative and quantitative methods were used. In this connection, both structured and semi-structured questionnaires were prepared for collection of data. To measure the knowledge level, six levels of cognitive domain of Bloom's revised taxonomy were used. Majority (76.8%) of the labours had high knowledge and 23.2% had medium and there is no labours who had low level of knowledge on hatchery management. Among eight selected characteristics of the labours namely age, annual income, experience in hatchery management, training exposure, organizational participation had positive and significant relationship and three characteristics namely level of education and extension media contact had no relationship to the farm labours knowledge on hatchery management. The high price of artificial fish feed is the main problem of hatchery management identifying by the farm labours. Therefore, it can be suggested that a range of viable policy interventions for the labours, such as providing scientific information and technical supports, massive and relevant training could improve hatchery management practices.

INTRODUCTION

Bangladesh is an agricultural country with full of natural resources. For this reason, fish culture plays a vital role in the national economy as well as fulfillment of the animal protein demand, opportunity for employment, poverty alleviation and earning foreign currency for the country. The population increases day by day as a result the demand of fish is increasing. Annual total fish demand is 32.72lac MT and per capita fish requirement is 20.44 Kg per year. But the current consumption is 16.69 kg this has got a negative impact on the health condition of the people (DoF, 2010). To meet the increasing demand for animal protein in Bangladesh, adoption of intensive and extensive culture practices on certain selective species for fishes is very important.

Induced spawning has opened the door of new era in the production of fish throughout the world for intensive and extensive fish culture it is necessary to ensure the supply of suitable sized good quality fish seed in sufficient quantities. The main source of fish seeds in Bangladesh are spawning produced in government and private hatcheries, and some collected from rivers (Halda, Meghna, Jamuna, Padma). The seed collected from natural breeding grounds have many problems such as the inclusion of seed of predatory fishes or diseases. Wild seed is collected and handled in crude and unscientific methods that can potentially lead to large scale mortality during transportation from collection centers to nursery ponds and also in the nursery ponds after release. Therefore, emphasis should be placed on expansion of hatchery facilities to supply high-quality fish seed required to support aquaculture development. However, collection of seed from natural water has declined dramatically

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in recent years due to consequences destruction of natural habitat and the fish culture venture are now almost totally dependent on the hatchery produced fry. During 1980's about 95% fish was produced in the hatchery and currently 98.41% fish spawn is produced in the hatchery. As against an estimated collection of 12,533 kg seed during 1980, the fish seed collection during 2009-2010 was only 2,200 kg (FSYB 2008-09, DoF, 2010). As Bangladesh achieved the sixth highest position in total inland fish production of the world, this trend will greatly influence the fry and broodstock management practices here, (FAO, 2008). About 1.25 crore people of the country depend directly and indirectly, on fishing and ancillary occupation (DoF, 2009).

The large quantity of fish seed are collected from rivers that affecting natural recruitment to riverine fisheries. In view of this, Department of Fisheries (DoF) Bangladesh is encouraging people to increase fish seed production by establishing hatcheries and nurseries. For this purpose, DoF established more than one hundred Fish Seed Multiplication Farms (FSMFs) covering almost all the districts of Bangladesh to supply spawn, fry and fingerlings to the farmers. Many private entrepreneurs have also established the FSMFs. They also have established the fish seed and fingerling nursery. At present the total number of private fish hatchery in Bangladesh is 892, fish nursery 10,802 and hatchery seed production is 660,804 kg. (FSYB, 2009-2010).

In Mymensingh district the number of total hatchery was 86, among them 7 were government and 79 were private hatcheries, the total fish seed production were 74,207 kg in 2010 (DoF, 2010). In 2012, the number of total hatchery in Mymensingh districts 89, among them 7 were government and 82 were private hatcheries (DoF, 2012). In Mymensingh sadar the number of private hatchery is 20 and public hatchery is 7 (UFO, Mymensingh, 20012-2013). In 2010-2011 the total fish production is 30.62 lack MT average annual growth rate of fish production is 6.11% (DoF, 2010-2011).

The information of above Table revealed that the spawn and fingerlings production have been increasing both at private and public sectors. For proper planning, management and sustainable development of hatcheries it is necessary to identify the specific problems and requirements of an area. So, it is need of the time to collect information on hatchery management and hatchery management practices examine pros and cons of hatchery management practices which will be helpful to fish culturists, farm managers, production specialists, policy makers and extension workers.

It is possible to develop the knowledge on hatchery management of this group of population then it is possible to improve the fish production that it is ultimately increasing their economic status. The present study is very important to improve knowledge of labours on fish hatchery management which can be an important strategy as most of them are poor and have no own resources.

Fish is considered very valuable from the view point of nutritional requirement as the supplier of high quality protein. For the growth and development, fish protein is very essential. For meet this demand production of fry and fingerlings increasing day by day through increasing hatchery also increasing adoption of modern technology. But most of labours are uneducated or little educated, so they do not have improved their knowledge about management technology. There is a great need to develop sound plays and producers for improving knowledge of labours in different hatchery management. In hatchery fry and fingerlings production is important for its popularity among the country. But if country reach the production above desirable level there must be improve knowledge of labour. . Most of the labours have little knowledge about the scientific information on hatchery activities. At present the Department of Fisheries (DoF), National Agricultural Technology Project (NATP), Upazila fisheries Officer (UFO) and various NGOs have been working to solve the problems of labours and to diffuse scientific practices among them. It is unnecessary to point out that there exist some constrains in developing knowledge about hatchery activities. This could be possible by adopting scientific knowledge and proper management can increase the knowledge of labours and thus production and profit also increase.

Considering the above factors, it was an interest for conduction of the research in a planned and appropriate way the researcher put forwarded the following research questions:

1. To what extent the farm labours have knowledge on hatchery management?
2. What are the factors those influence the knowledge on hatchery management practices of the farm labours?
3. What relationship exists between the selected characteristics of the fish labours and their knowledge on hatchery management?
4. What are the problems confronted by the labours during hatchery management?

In view of considerations stated above the following specific objectives were studied:

1. To determine the knowledge of the farm labours on fish hatchery management practices.
2. To explore the relationship between the selected characteristics of the farm labours and their level of knowledge on fish hatchery management. The characteristics are age, level of education, farm size, annual income, hatchery management experience, training exposure, extension media contact and organizational participation of the farm labours.
3. To identify the problems faced by the farm labours during hatchery management practices.

The findings would be helpful for the fish hatchery management personnel in accordance with the performance of farm labours. The results of the present study would also provide valuable information to researchers who are interested to conduct similar type of study in future.

METHODOLOGY

Design of the Study

This study contained qualitative research approaches in order to get a comprehensive view of labours knowledge on fish hatchery management. For this study, data were collected through personal interviewing with sample labours who are engaged in hatchery management by the researcher herself. After completing primary data collection using Rapid Rural Appraisal (RRA), another qualitative method such as Focus Group Discussion (FGDs) with the labours were used to get a background idea about the study area, refine the survey results and formulate general recommendations according to this study.

Study Area

The locale of the study was 3 villages (Roghurampur, Raghabpur and Chor puliamari) of 7 no Chor nilakshmiya Union of Mymensingh Sadar under Mymensingh district. The labours who are engaged in hatchery management practices in the study area were the population of this study. The list of labour comprised of 80 respondents among the list of the labours, a total of 69 respondents were randomly selected to have ultimate sample size for conducting the study.

Data Collection

Focus Group Discussions (FGDs)

One session was conducted in hatchery. Almost three FGDs were conducted by the researcher herself with the help of Upazila Fisheries Officer (UFO). One session was conducted in hatchery. A hatchery management questionnaire was used to conduct FGDs. In FGD sessions, the researcher acted as facilitator. The additional information gathered from the FGDs was used for interrupting the result of the survey. The FGDs were carried out during April 2014.

Rapid Rural Appraisal (RRA)

The researcher conducted RRA through informal discussion with local people, local elite, personnel of different organization working in the locality to get first hand idea and information about villages, local people, resources, institutions, infrastructure etc. the rural appraisal was conducted on April 2014

Survey

In the survey, researcher herself collected data from 69 labours through face to face interview by using interview schedule. The researcher first established rapport with the respondents and clearly explained the objectives of the study using

local language. The survey was conducted during May 2014.

Statistical Analysis

The statistical analysis was performed by using SPSS (Statistical Package for Social Sciences) computer package. Descriptive analysis such as range, number and percentage, mean, standard deviation and rank order were used wherever possible. Pearson' Product Moment co-efficient of correlation (r) and the analysis of variance (ANOVA) was used in order to explore the relationship between the concerned variables.

Variables and their measurement

Independent variables

The independent variables of this study were the 8 selected characteristics of the labours namely: age, level of education, farm size, annual income, experience in hatchery management, training exposure, organizational participation, extension media contact.

Age

The age of a respondent was measured in terms of years from his birth to the time of interview on the basis of his response. A unit score was assigned for each year of one's age (Akter, 2003).

Level of education

Level of education of a respondent was measured by the number of years of schooling. A score of one (1) was assigned for each year of formal schooling completed by a respondent (Sharmin, 2005). For example, if the respondent passed the SSC examination, he was given a score of 10.

Farm size

Farm is the most important capital of a labour and farm size has influence on many personal characteristics of the labours. Farm size of a respondent was measured in terms of decimals using the following formula.

Farm size = $A_1 + A_2 + ½ (A_3+A_4) + A_5 + A_6$

Where,

A_1 = Homestead area
A_2 = Pond for fishery
A_3 = Own land under own cultivation
A_4 = Pond taken from others as lease
A_5 = Land taken from other as lease
A_6 = others

Annual income

Annual income was measured on the basis of total yearly earning by the respondent himself from agricultural sources, fishery, and work as a labourer in hatchery. However, unit score of one (1) was taken for every Tk. 1000/- of annual income.

Experience in hatchery management

Experience in hatchery management of a respondent was determined on the basis of the length of the time of a farm labour spent directly in hatchery activities. Experience in hatchery work of a respondent either in present farm or others in terms of year.

Training exposure

Training exposure was measured by the total number of days that a respondent has undertaken training on management practices of larvae, egg, brood or others related on hatchery management. If a respondent took 3 days training on any aspect from GO's or NGO's or any other organization then his training received score was 3 and so on.

Extension media contact

An extension media contact score was computed for each respondent on the basis of his extent of contact with eleven selected extension media. Each respondent was asked to indicate the frequency of his contact with each of the eight selected media. The extension media contact was determined against a four-point scale such as, 'not at all', 'rarely', 'occasionally' and 'frequently' and the weight were arranged as 0, 1, 2 and 3 respectively. The procedure of assigning scores for each medium on a four-point rating scale is presented in Table 1.

Table 1
Scoring system for extension media contact.

Sl no.	Communication media and mode of contact	Extent of use/contact	Weight assigned
Individual Contact			
1.	Upazila Fisheries officer (UFO)	Not even once per year	0
		1-2 times per year	1
		3-4 times per year	2
		5 times per year	3
2.	Local Extension Agent for Fisheries (LEAF**)**	Not even once per 3 month	0
		1-2 times per month	1
		3 times per month	2
		5 times per month	3
3.	NGO workers	Not even once per month	0
		1-2 times per month	1
		4-5 times per months month	2
		6-8 times per month	3
Group contract			
4.	Group discussion with change agent	Not even once per 3 month	0
		1 times per 3 month	1
		3-4 times per 3 month	2
		5 times per 3 month	3
5	Participation in training	Not even once per year	0
		1 times per year	1
		2 times per year	2
		4 times per year	3
Mass contract			
6.	Listening to development programs over Radio	Not even once per month	0
		4-5 times per month	1
		10-15 times per month	2
		Almost everyday	3
7.	Watching TV for development programs	Not even once per month	0
		2 times per month	1
		8 times per month	2
		Almost everyday	3
8.	Reading newspaper	Not even once per month	0
		2-3 times per month	1
		4-5 times per month	2
		6-8 times per month	3

Total extension media contract score of a respondent was measured by summing of all individual scores against each medium of communication. Possible score range varied from 0 to 24. Zero indicated no extension media contract and 24 indicated the highest level of extension media contract of a respondent.

Organizational participation

Organizational participation of a respondent was measured on the basis of three dimensions viz. nature of involvement, duration of participation and number of organization in which a respondent was involved.

Organizational participation score of a respondent was computed by using the following formula:

$OP = P_{om} \times N_1 \times Y_1 + P_{em} \times N_2 \times Y_2 + P_{eu} \times N_3 \times Y_3$

Where,
OP= Organizational participation score
P_{om} =Ordinary member (wight=1)
P_{em} = Executive member (wight=2)
P_{eu} = President or secretary (wight=3)
Y_i =Year of participation (i= 1, 2, 3……..n)
N_i=Number of organization (s) (i= 1, 2, 3……..n)

Measurement of dependent variable

Knowledge of the farm labours on hatchery management

The dependent variable of the study was hatchery management knowledge of farm labours. It was measured on the basis of their response to the questions in the interview schedule. Questions for six dimensions were developed in according with the requirements of six levels of cognitive domain for measuring knowledge as postulated by Bloom (1956) and revised by Andersion and Karthwoth (2001). These six Levels were: Remembering, Understanding, Applying, Analyzing, Evaluating and Creating.

There were three to four closed types of questions for each levels and score was assigned based on the importance, difficulty and depth of knowledge in each level. For correct response distribution for each of the questions were 4, 3, 2, 1, and 0 respectively. Each respondent was asked to answer 22 questions. Each questions for remembering and understanding levels were assigned to 2 score, applying and analyzing levels were assigned to 3 score, evaluating and creating levels assigned to 4 score. Thereby, total knowledge score for all dimensions could range from 0 to 65. Here 0 indicates no knowledge and 65 indicate highest level of knowledge.

Management practices by the labour

Pre-stocking management

Water quality monitoring, Maintain O_2 level, Maintain temperature, Control measure (heavy blooming, bottom gases) and Maintain pH (alkalinity, acidity).

Post-stocking management

Brood selection, Injection in brood, Fertilization, Incubation, Nursing, Feed the larvae and Transportation.

Measurement of problems confrontation of hatchery management

Problems were measured by using closed-form of question of a interview schedule. The labours were asked to give their opinion on selected problems which were identified during pre-testing of the questionnaire. As many problems in connection with knowledge of hatchery management were included in problem confrontation scale. Labours gave their responses as high, medium, low and not at all for each problem included in problem confrontation scale based on their extent of problem confrontation in knowledge on hatchery management. The score for ‘high’, ‘medium’, low’ and ‘not at all’ responses were 3, 2, 1 and 0, respectively. To ascertain the extent of seriousness of problems, mean value for each of the problem was computed. Problems were then ranked according to their mean value.

FINDINGS AND DISCUSSION

Selected characteristics of the hatchery labours

Age

Age of the labours in the study area ranged from 12 to 54 years. The mean age was 28.55 years and standard deviation was 11.309 years. The respondents were classified into three categories, such as ‘young’, ‘middle’ and ‘old’ age on the basis of their age which has been presented in table 2. The findings indicate that the highest proportion of the labours (72.5%) was young age category compared to 5.8% old age category and 21.7% belonged to middle age category. Thus, the large proportion of the labours (72.5%) was young age category. And then middle age (21.7%). Middle and Young labours might have valuable opinions in management practices. Moreover young people are generally receptive to new ideas

and thought. They would have possessed high knowledge on hatchery management if necessary step are taken to dissemination new technologies and practices by the extension personnel. Almost similar findings were found by Kausar (2009), Akter (2009), Shorif (2011) and Dhali (2013) in the respective studies.

Level of education

The level of formal education of farmers ranged from 0 to 16. The mean was 3.07 and standard deviation was 3.907. The level of education of the labours was classified into four categories based on schooling, primary, secondary and above higher secondary. The distribution of the labours education level is presented in table 2. Data presented in table 2 shows that 55.1% of the respondents had no schooling, 24.6% received primary, 18.9% had secondary and only 1.4% respondents received above higher secondary level of education. Compare to national average literacy rate (53%) (BBS, 2010) it is visible that the labours education level is not acceptable because the literacy rate seems to be higher than that of national average. So, from the findings it can be mentioned that the educational status of labours was not better due to lack of awareness. Similar findings were reported by Farhana (2013), Akhter (2011), and Hossain (2010) respectively in their studies.

Farm size

The farm size of labours in the study area varied from 0 to 3600 decimals with mean of 163.826 decimals and standard deviation 467.729 decimals are represented in table 2. Table 2 reveals that the highest proportion of the respondents (73.9%) possessed small farm while 13% and 7.3% possessed large and medium farm, respectively, where 5.8% of the labours had no farm size. The average farm size of the respondents was 163.826 decimal, which is lower than the national average (275 decimal) (Table 2). This may indicate that the socio-economic status of the labours in the study areas is not better than a typical community of Bangladesh.

Annual income

Annual income in the study was determined by adding income from fisheries, livestock, and crops sectors and hatchery. The score was expressed in thousand Tk. Income scores in the study was found to vary from Tk. 4 to Tk. 640 thousand. The average score was 113.313 thousand and standard deviation of 80.014 thousand (Table 2). Table 2 shows that the highest proportion of labours (In this Chapter, the findings of the study and its interpretation are presented in three sections in accordance with the objectives of the study. The first section deals with the individual characteristics of the labours. The second section deals with their relationships between the selected characteristics of the labours and their knowledge on hatchery management and the third section deals with the problem confrontation of labours on hatchery activities.

Experience in hatchery management

Experience in hatchery management of the respondents ranged from 0 to 27 years. The average and standard deviation were 7.01 and 5.799 years, respectively (Table 2). The highest proportion of the labours (39.2%) had mid-term experience compare to 34.8% short-term and 24.6% high-term experience and 1.4% had no experience on hatchery management. The overall experience of the labours as regarding hatchery management experience was not at all satisfactory. Similar findings were reported by Farhana (2013), Akhter (2011) and Salam (2013) in their studies respectively.

Training Exposure

Training exposure of the respondents ranged from 0 to 40 days. The average and standard deviation were 0.62 and 4824 days respectively (Table 2). The highest proportion of labours (97.1%) had no training exposure compared to 1.5% short-term and 1.4%s medium-term training exposure. Training exposure directly related with organizational affiliation. Most of the respondents had no participation in different organization and their training exposure was short. Training exposure is an important factor, which enhance the level of knowledge and improve skills on various aspects of agricultural technologies

Table 2
Salient features of the individual characteristics of the labours (n= 69).

Characteristics	Scoring system	Observed Range	Categories	Respondents		Mean	SD*
				Total	%		
Age	Actual years	12-54	Young (up to 30)	50	72.5	28.55	11.31
			Middle age (30 to 50)	15	21.7		
			Old (>50)	4	5.8		
Level of Education	Years of schooling	0-16	Illiterate (0)	38	55.1	3.07	3.91
			Primary (0-5)	17	24.6		
			Secondary (5-10)	13	18.9		
			Above secondary (>10)	1	1.4		
Farm size	Decimal	0-3600	No farm (0)	4	5.8	163.83	467.73
			Small (up to 150)	51	73.9		
			Medium (150-300)	5	7.3		
			Large (>300)	9	13		
Annual income	'000 Tk.	4-640	Low (up to 90)	27	39.1	113.31	80.014
			Medium (85-200)	38	55.1		
			High (>200)	4	5.8		
Experienced in Hatchery Management	Years of involvement	0-27	No experience (0)	1	1.4	7.01	5.799
			Short-term (up to 3)	24	34.8		
			Mid-term (3-10)	27	39.2		
			Long-term (>10)	17	24.6		
Training exposure	Days	0-40	No participation (0)	67	97.1	0.62	4.824
			Short-term (up to 12)	1	1.5		
			Mid-term (>12)	1	1.4		
Extension media contact	Scale	0-12	Low (up to 6)	11	15.9	8.67	1.755
			Medium (6-10)	52	75.4		
			High (>10)	6	8.7		
Organizational participation	Years of participation	0-13	No participation (0)	62	89.9	0.49	1.884
			Low (up to 6)	6	8.7		
			Medium (>6)	1	1.4		

*SD stands for Standard deviation

Extension media contact

The extension media contact score of the labours ranged from 0 to 12 against the possible score 0 to 24. The mean was 8.67 and standard deviation was 1.755 (Table 2). According to this score, the respondents were classified into three categories such as no contact, low contact and medium as shown in table 2. Study shows that, the highest proportion of labours on extension media contact was 75.4% mid-term compared to 15.9% low-term and 8.7% had long-term extension media contact. The findings clearly indicate that most of the labours had medium extension media contact categories, because they do not get satisfactory support from various media and information providers.

The findings from data analysis indicate that the labours made contact with Upazila Fisheries Officer, LEAF, Group discussions, agricultural TV programme, reading Agricultural topics on news paper. It is interesting that labours were getting contact and arrange group discussion of UFO, LEAF frequently better than the other extension media. So, it indicates that UFO, LEAF, is playing

a vital role in disseminating various new ideas, information and technologies to the hatchery labours of the study area.

Organizational participation

Organizational participation score of the respondents ranged from 0 to 13. The average and standard deviation were 0.49 and 1.884, respectively as shown in Table 2. Data presented in table 2 indicate that majority of the labours (89.9%) had no participation compared to 8.7% low and 1.4% medium organizational participation This may be due to lack of willingness, motivation, and other social factors. When an individual comes in contact with organization he/she learns new ideas and new ways of doing things due to interaction with other members of the organization.

Knowledge of labours on hatchery management

Knowledge level of at cognitive domain of the labours

The score of hatchery management knowledge of the labours ranged from 39 to 58, against a possible range of 0 of 65 and mean is 47.96 and standard deviation 4.670. On the basis hatchery management knowledge score the knowledge level of cognitive domain distributes into six steps shows in Table 3.

Table 3
Knowledge level of at cognitive domain.

Knowledge	Possible range	Observed range	Mean	SD
Remembering	0-8	3-8	6.35	0.983
Understanding	0-8	3-8	6.22	1.110
Applying	0-12	4-12	8.72	1.806
Analyzing	0-9	5-9	6.83	1.070
Evaluating	0-16	7-15	11.36	2.036
Creating	0-12	6-12	8.25	1.408

*SD stands for Standard deviation

Knowledge of remembering of the respondent's ranged from 3-8. The mean was 6.35 and standard deviation 0.983 against the possible score 0-8. Knowledge of understanding of the respondent's ranged from 3-8 against the possible score 0-8. The mean was 6.22 and standard deviation 1.110. Knowledge of applying of the respondent's ranged from 4-12 against the possible score 0-12.The mean was 8.72 and standard deviation 1.806. Knowledge of analyzing of the respondent's ranged from 5-9 against the possible score 0-9. The mean was 6.83 and standard deviation 1.070. Knowledge of evaluating of the respondent's ranged from 7-15 against the possible score 0-16. The mean was 11.36 and standard deviation 2.036. Knowledge of analyzing of the respondent's ranged from 6-12 against the possible score 0-12. The mean was 8.25 and standard deviation 1.408. From the Table 3, it was found that evaluating (mean 11.36) capacity of labours is high comparatively medium level of applying (mean 8.72) and creating (mean 8.25) and low level of understanding (mean 6.22) , analyzing (mean 6.83) and remembering (mean 6.35) respectively.

Knowledge on hatchery management

On the basis of hatchery management knowledge score the labours were classified into three categories: "low knowledge medium knowledge and high knowledge with mean value 47.96 and standard deviation 4.670. The distribution of the labour according to their knowledge about hatchery activities is shown in table 4.

Table 4
Distribution of the labours according to their knowledge level on hatchery management.

Categories	Respondents		Mean	SD*
	Number	Percent		
Low (up to 22)	0	0	47.96	4.670
Medium (22-44)	16	23.2		
High (>44)	53	76.8		
Total	69	100		

*SD stands for Standard deviation

The data indicated that the majority of the labours (76.8%) had high knowledge because of their scope, technical knowledge about hatchery activities and gain knowledge from reputed source like UFO, LEAF where 23.2% having medium and no low level of knowledge of the respondents. The

level of knowledge is high because of good communication system, transportation system, regular visit by the UFO, LEAF. Salam (2013) found that the majority (55%) of the farmers had moderate knowledge while 45% had high knowledge and no farmer had low level of knowledge on using artificial feed for carp culture. Ali (2012) found that the majority of the farmers (87.75%) had moderate knowledge while 11.25% had high and there is no farmer who had low level of knowledge on health and environmental perspectives of pesticides exposure. This findings also supported by Sarker (2002) and Khan (1996) respectively in their studies.

Knowledge of the farmers at different cognitive level followed different methodological approach and such a comparison of these findings in precise term in different. Thus, the means of knowledge score were compared in relation to theoretical range of the tests concerned. The means of Kausar (2009), Rahman (2009), Shorif (2011) and Dhali (2013) were 15.94, 28.12, 28.12, 31.66, 40.59 and 46.89 respectively. The test items of Kausar (2009), Rahman (2009) of the present study were 18, 29. All the studies were done in Bangladesh (the former two in fisheries knowledge, pond fish farming). Shorif (2011) and Dhali (2013) found that the majority of the farmers had medium knowledge in their respective studies.

Relationship between the selected characteristics of the labours and their knowledge on hatchery management

Pearson's product moment correlation coefficient (r) was used to ascertain the relationship between the variables. The summery of the results of the correlation analysis between the selected characteristics of the respondents and their knowledge in hatchery management has been shown in Table 5.

Table 5
Relationship between the selected characteristics of the labours and their knowledge on hatchery management (n =69).

	Characteristics of labours	Computed 'r' values at 67 df	Table value of 'r' at 67 df	
			.05	.01
Knowledge of labours on hatchery management	Age	0.267*	0.237	0.308
	Level of education	0.162		
	Farm size	-0.019		
	Annual income	0.258*		
	Experience in hatchery management	0.368**		
	Training exposure	0.246*		
	Extension media contact	0.137		
	Organizational participation	0.250*		

*Correlation is significant at 0.05 level of probability (2-tailed test)
**Correlation is significant at 0.01 level of probability (2-tailed test)

Relationship between age and knowledge on hatchery management

The relationship between age of the labours and their knowledge on hatchery management showed a significant positive direction ('r'= 0.267, $p \leq 0.05$). Thus, with the increase of age of the respondents, their knowledge on hatchery management tended to be increased. Shorif (2011) and Nuruzzaman (2000) found similar findings respectively.

Relationship between level of education and their knowledge on hatchery management

The relationship between the level of education and their knowledge on hatchery management was not directly related to their knowledge on hatchery management ('r'= 0.162, $p > 0.05$). The finding

indicate that high educational level of responded can increase their knowledge on hatchery management. Similar findings were also found by Burhan (2009) and Salam (2013) in their studies respectively.

Relationship between farm size and their knowledge on hatchery management

The finding revealed that the computed value of 'r' was (-0.019) is smaller than the table value 0.237 at 67 df. The finding indicates that the farm size of the respondent had negative insignificant ($p > 0.05$) relationship with the knowledge on hatchery management. The relationship showed a negative direction ('r' = -0.019) between concerned variable. This meant that farm size of the labours was not an important factor for their hatchery management knowledge.

Relationship between annual income and their knowledge on hatchery management

It was found that there was a positive significant relationship ('r'= 0.258, $p \leq 0.05$) between annual income and their knowledge on Hatchery Management at 5% level. The findings are quite logical because in hatchery there are a large number of labours on hatchery activities. High annual income of the respondents make high strong economic base. Thus, with the increase of annual income of the respondents, their knowledge on hatchery management tended to be increased. Similar findings found in Burhan (2009), Shorif (2011), Farhana (2013) and Salam (2013) in their studies respectively.

Relationship between experienced in hatchery management and their knowledge on hatchery management

The relationship between the labour experience on hatchery activities and their knowledge on hatchery management was significant and followed a positive trend ('r'= 0.368, $p \leq 0.01$). The labours having more experience can provide experience in hatchery activities. Thus, with the increase of experience on hatchery activities of the respondents, their knowledge on hatchery management tended to be increased. Sharif (2011), Salam (2013) and Rahman (2006) found similar findings in their studies respectively.

Relationship between training exposure and their knowledge on hatchery management

The relationship between the labour experience on hatchery activities and their knowledge on hatchery management was significant and followed a positive trend ('r'= 0.246, $p \leq 0.05$). Training cans direction how to work (Feed, breed, hatching, fertilizing etc.) correctly. With the increase of training exposure on hatchery activities of the respondents, their knowledge on hatchery management tended to be increased. Dhali (2013), Salam (2013), Sharif (2013), Rahman (2009) and Sana (2003) found similar result in their studies respectively.

Relationship between extension media contact and their knowledge on hatchery management

The finding indicates that the contact of the respondent had insignificant relationship with the knowledge on hatchery management ('r'= 0.137, $p > 0.05$) . Extension media contact help labour about their lacking, highlight their problem. These finding indicate that the labours having more extension media contact. Thus, with the increase of media contact, their knowledge on hatchery management tended to be increased. Similar result was observed by Nurzaman (2000) and Siddique (2001) in their respective studies.

Relationship between organizational participation and knowledge on hatchery management

It was found that there was a positive significant relationship between organizational participation and their knowledge on Hatchery Management ('r'= 0.250, $p \leq 0.05$). Similar findings found in Shorif (2011), Kawsar (2009), Rahman (2006), Roy (2006), Hossain (2006), Saha (2001) in their respective studies.

Problem confrontation on hatchery management

The possible problem confrontation score on hatchery management could range 0 to 24, while

the observed range was 1-10. The mean and standard deviation was 6.82 and 2.337, respectively. The considered problem along with their frequency across extent, mean and standard deviation have been shown in Table 6. According to mean value From Table 6 it is found that high price of artificial fish feeding problem (1.96) is major problem comparatively medium problem of inbreeding of brood (1.111) and low problem of Problem of technical knowledge on feed application (0.758), Problem of water turbidity (0.80), Problem of mortality of fish fry (0.72), Problem of inadequate knowledge of labours on hatchery management (0.47), Problem of good quality seed (0.43) and Problem of lack of brood fish (0.13).

Table 6
Extent of problem confrontation.

Problem items	Observed Ranged	Extent of problem				Mean	Standard deviation
		H	M	L	N		
Problem of high price of artificial fish feed	0-9	4	55	4	5	1.96	1.063
Problem of inbreeding of brood	0-3	8	25	7	29	1.17	1.111
Problem of technical knowledge on feed application	0-3	2	10	35	22	0.88	0.758
Problem of water turbidity	0-2	-	6	43	20	0.80	0.584
Problem of mortality of fish fry	0-2	-	6	38	25	0.72	0.616
Problem of inadequate knowledge of labours on hatchery management	0-3	3	1	49	16	0.47	0.640
Problem of good quality seed	0-2	-	10	10	49	0.43	0.737
Problem of lack of brood fish	0-3	1	-	6	62	0.13	0.451

Note: H = High, M =Medium, L =low, N =Not at all.

On the basis of observed value the problem confrontation score, problem of labour on hatchery management were classified into two categories shown in Table 7.

Table 7
Distribution of labours according to their problem confrontation score.

Categories	Respondents Percentage	Mean	SD*
Low (up to 8)	69.1	6.82	2.337
Medium (6-10)	30.9		

*SD stands for Standard deviation

About 69.1% of the respondents had low problem confrontation on hatchery management compared to 30.9% of them having medium problem confrontation. Findings clearly indicate that most of the labours faced low problem in using hatchery management practices. On the basis of low problem confrontation score, it was found that the study areas were more favorable condition for hatchery.

CONCLUSION

There is an ample scope to increase the knowledge level of the labours on hatchery management which is necessary to improve fry quality. Knowledge on hatchery management of the fish farm labours gradually increase with the increase of their age. Moreover, young aged labours are more potential to increase their knowledge on hatchery management. The characteristics of the labours should be considered in planning programme related to improve fry and brood rearing, fertilizing, feeding and in rearing good quality seed. Respondents could not get proper opportunity for training. Thus, they do not develop their knowledge on hatchery activities. There is an opportunity to increase hatchery management knowledge if they are motivated to have more extension media contact. The extension personnel of DoF could make frequent visit to hatchery and provide information to the farm labours. Experience in hatchery management of the labours is more important to improve knowledge on hatchery management of the farm labours.

Experience help labours to give large amount of quality seed and prevent mortality of fingerling. A good number of problems related to hatchery management were identified by the labours. The problems should be addressed by concern person on priority basis. These problems were almost common for resource poor labours might discourage other labours to hatchery activities.

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