Utilization of Aqua Drugs for Fish Health Management by the Fish Farmers: Field Level Analysis

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Abstract

The study was aimed to determine the extent of utilization of aqua drugs for fish health management by the fish farmers. The sample of the study consisted of 92 fish farmers from four villages of Muktagachha *upazila* under Mymensingh district of Bangladesh. Data for the study were collected during 10 January to 13 May, 2017 using interview schedule by personal interviewing of the fish farmers. The findings revealed that 62.0 percent of the fish farmers were accustomed to utilize medium level of aqua drugs, 29.3 percent utilize low level and only 8.7 percent of them utilize high level of aqua drugs. Among six types of aqua drugs: disinfectants were used by 100 percent of the fish farmers, gas reducers were used by 93.47 percent, growth promoters were used by 72.83 percent, oxygen suppliers were used by 85.87 percent, probiotics were used by 65.22 percent and antibiotics were used by 53.26 percent of the fish farmers. Correlation analysis showed that farm size, area under fish farming, annual income, extension media contact and training on aquaculture of the fish farmers had positive and significant relationships with the extent of utilization of aqua drugs by the fish farmers. The study revealed that effective training and motivational programs should be organized by both government and non-government organizations for the fish farmers to enable them taking timely decisions and utilize appropriate dosage of aqua drugs for fish health management which will help the fish farmers to increase their income and also improve their livelihood status.

Keywords: Aqua drugs, utilization, health management, fish farmers, livelihood.

Introduction

Aquaculture has become popular and demandable practices in Bangladesh and its production is increasing day by day. Fish production has been increased from 0.15 million metric ton in the 1980s to 3.68 million metric ton at present. About 11 percent of the population directly or indirectly dependent on the fisheries sector for continuing their livelihood (DoF, 2015). Over last two decades, to meet the increasing foreign demands of fish and fishery product, aquaculture has expanded tremendously (Rana, 2016). Now-a-days, with the expansion of aquaculture in Bangladesh, there has been an increasing trend in using aqua drugs in aquatic animal health management. The farmers utilize various types of aqua drugs at higher level for increasing their fish production. However, it has harmful effect on human body (Rahman, 2011). Aqua drugs are significant components in health management of aquatic animals, pond construction, soil and water management, improve aquatic productivity, feed formulation, manipulation of reproduction, growth promotion and processing and value addition of the final product. In fish health management and disease treatment, the farmers use different aqua drugs such as

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disinfectants (Farmsafe, Aquakleen, Lime, and Zeocare), gas reducers (Ammonil, Green Zeolite, Benzo and Geotox), oxygen suppliers (Oxyflow, Oxypol Tab and Biocare), probiotics (Good Earth and Biofave-Aqua) growth promoters (Aquamin, Vitax-c, Megavit-Aqua and Catamin) and antibiotics (Aquamycine, Captor and Renamycine) (Uddin, 2016). Most of the farmers have poor or little knowledge regarding uses of aqua-drugs. They cannot manage the undesirable condition immediately. Finally, they face huge loses and sometimes all fishes of the same pond are affected by disease. On the other hand, excessive use of aqua-drugs creates environment degradation in some areas making the water quality unsuitable for aquaculture. As a result, it is very important to know the appropriate dosage of aqua drugs by the fish farmers for health management of the fish species. In view of above circumstances, the researchers undertook this research keeping in mind the following objectives: (i) to determine the extent of utilization of aqua drugs for fish health management by the fish farmers; (ii) to describe the selected characteristics of the fish farmers; and (iii) to assess the relationships between the selected characteristics of the fish farmers and their extent of utilization of aqua drugs.

Methodology

Muktagachha *upazila* under Mymensingh district is well communicated and acquainted to the researcher. Four villages of Muktagachha *upazila* were purposively selected as the locations of the study namely Khilgati, Baniakaji, Etigachi and Kheruajani for obtaining a representative sample of the study. The selection was based on an important consideration also i.e. availability of a large number of fish farms in those areas suitable for fish culture where many farmers adopted fish farming through the utilization of aqua drugs. As a result, it was assumed that conducting an empirical research in those four villages of Muktagachha *upazila* would best reflect the reality of the situation. Data were collected during 10 January to 13 May, 2017 using structured interview schedule by personal interviewing from 92 randomly selected (31 percent of total population) fish farmers from a population of 300. The extent of utilization of aqua drugs for fish health management was the focus variable and eleven selected characteristics of the fish farmers were selected as explanatory variables namely age, level of education, household size, farm size, area under fish culture, annual income, extension media contact, training on aquaculture, duration of using aqua drugs, knowledge on fish farming and training need for aquaculture. For clarity of the research, six major categories of aqua drugs were identified such as: disinfectants, gas reducer, oxygen supplier, probiotic, growth promoter and antibiotic. Each respondent was asked to indicate the extent of utilization of aqua drugs for fish health management by using a 4-point rating scale such frequently, occasionally, rarely and not at all and weights were assigned to these responses as 3, 2, 1 and 0, respectively. Thus, aqua drugs utilization score for a respondent could range from 0-18, where 0 indicated no utilization of aqua drugs at all, while 18 indicated highest level of utilization of the drugs for fish health management by fish farmers. Mean value of the extent of utilization of aqua drugs was computed and on the basis of individual mean value a rank order of the extent of utilization of aqua

drugs was prepared. For making rank order Utilization Score (US) was also computed. The US was computed by using the following formula:

$$US = (N_f \times 3) + (N_o \times 2) + (N_r \times 1) + (N_{aa} \times 0)$$

Where,
   US = Utilization Score
   N_f = Number of fish farmers utilized aqua drugs frequently
   N_o = Number of fish farmers utilized aqua drugs occasionally
   N_r = Number of fish farmers utilized aqua drugs rarely
   N_{naa} = Number of fish farmers utilized aqua drugs not at all

Thus, the Utilization Score (US) of individual aqua drugs could range from 0 to 276, where '0' indicating 'no utilization' of aqua drugs and '276' indicating 'frequently utilization' of aqua drugs for fish health management by the fish farmers.

Findings and Discussion

Extent of utilization of aqua drugs for fish health management
The extent of utilization of aqua drugs by the fish farmers ranged from 3 to 16 with an average of 8.34 and standard deviation of 2.97. Based on the observed scores, the distribution of the respondents has been presented in Table 1. The data presented in Table 1 reveal that 62 percent of the fish farmers were accustomed to utilize medium level of aqua drugs, 29.3 percent utilize low level and only 8.7 percent of them utilize high level of aqua drugs. The findings lead to illustrate that the majority of the fish farmers (91.3 percent) utilized low to medium level of aqua drugs for fish health management.

Table 1 Distribution of the fish farmers according to their extent of utilization of aqua drugs

Categories	Respondents (n=92)		Mean	Standard Deviation
	Number	Percent		
Low (up to 6)	27	29.3		
Medium (7-12)	57	62.0	8.34	2.87
High (>12)	8	8.7		
Total	92	100		

For determining the extent of utilization of different categories of aqua drugs, rank order was made computing Utilization Score (US). Data presented in the Table 2 show that 'Disinfectants' (Farmsafe, Aquakleen, Lime, and Zeocare) got the highest utilization score (202) and hence was considered as the 1st ranked aqua drug. All of the fish farmers (92) utilized disinfectants and majority of them (56) utilized disinfectants occasionally. Here, the study revealed that from very beginning of the fish farming, the farmers are familiar with the utilization of disinfectants.
'Gas reducers' (Ammonil, Green Zeolite, Benzo and Geotox) got the utilization score (152) and hence was considered as the 2nd ranked aqua drug. There were 86 fish farmers who utilized gas reducer and most of them (45.65 percent) utilized gas reducer occasionally. 'Growth promoters' (Aquamin, Vitax-c, Megavit-Aqua and

Catamin) got the utilization score (132) and hence was considered as the 3rd ranked aqua drug. There were 67 fish farmers who utilized growth promoter and highest proportion of them (31) utilized growth promoters occasionally. 'Oxygen suppliers' (Oxyflow, Oxypol Tab and Biocare) got the utilization score (128) and hence was considered as the 4th ranked aqua drug. There were 79 fish farmers who utilized oxygen supplier and most of them (38) utilized oxygen supplier rarely. 'Probiotics' (Good Earth and Biofave-Aqua) got the utilization score (82) and hence was considered as the 5th ranked aqua drug. There were 60 fish farmers who utilized probiotics and most of them (42) utilized probiotics rarely. 'Antibiotics' (Aquamycine, Captor and Renamycine) got the utilization score (67) and hence was considered as the 6th ranked aqua drug. There were only 49 fish farmers who utilized antibiotics and none of them utilized probiotics frequently. It might be for the reason that farmers were not more informed about the utilization of antibiotics.

Table 2   Rank order of the extent of utilization of different categories of aqua drugs by the fish farmers

Categories of aqua drugs	Extent of utilization of drugs (n=92)				Total score (US)	Mean	Rank order
	Frequently (3)*	Occasionally (2)*	Rarely (1)*	Not at all (0)*			
Disinfectants	27	56	9	0	202	2.20	1
Gas reducers	12	42	32	6	152	1.65	2
Growth promoters	17	31	19	25	132	1.43	3
Oxygen suppliers	8	33	38	13	128	1.39	4
Probiotics	4	14	42	32	82	0.89	5
Antibiotics	0	18	31	43	67	0.73	6

*Figures in the parentheses indicate weight age of the scale items

Selected characteristics of the fish farmers

The findings of the selected characteristics of the fish farmers have been presented in Table 3. The findings revealed that the majority (87.0 percent) of the fish farmers was young to middle aged and maximum of them (81.5 percent) had primary to secondary education. Most of the fish farmers (94.6 percent) were belong to medium to large sized family and the highest proportions (70.5 percent) of them had medium sized farm. The majority of the fish farmers (70 percent) mainly used their farm area for fish culture and most of them (87.9 percent) had medium to high income. The highest proportions (71.8 percent) of the farmers had medium extension contact and majority of them (81.7 percent) received short to medium duration training on aquaculture. Maximum of the fish farmers (90.2 percent) had been using aqua drugs for short to medium duration of time. The highest proportions of the farmers (95.6 percent) had medium knowledge to high knowledge on fish farming and most of them (98.9 percent) need medium to long duration training on aquaculture for increasing their fish production level.

Table 3 Characteristics profile of the fish farmers (n=92)

Characteristics	Scoring system	Range		Categories	Fish Farmers (N=92)		Mean	SD*
		Possible	Observed		No.	Percent		
Age	Years	Unknown	25–57	Young (up to 35)	37	40.2	38.84	8.74
				Middle aged (36-50)	40	46.8		
				Old (>50)	15	13.0		
Education	Year of schooling	Unknown	0–16	Illiterate (0)	5	5.4	5.92	4.08
				Primary (1-5)	43	46.7		
				Secondary (6-10)	31	34.8		
				Above secondary (>10)	13	13.1		
Household size	Number of members	Unknown	4–12	Small (up to 4)	5	5.4	7.12	1.88
				Medium (5-6)	33	35.8		
				Large (>6)	54	58.8		
Farm size	Hectares	Unknown	0.44-3.37	Small (up to 1.00)	25	27.5	1.25	0.51
				Middle (1.01-3.00)	65	70.5		
				Large (>3.00)	2	2.0		
Area under fish culture	Hectares	Unknown	0.12-3.16	Small (up to 1.00)	64	70.0	0.85	0.46
				Medium (1.01-2.00)	25	27.0		
				Large (>2.00)	3	3.0		
Annual income	`000' TK	Unknown	80-950	Low (up to 120)	11	12.1	352.78	154.48
				Medium (121-360)	47	50.6		
				High (>360)	34	37.3		
Extension media contact	Score	0-33	7-25	Low (up to 11)	23	24.9	14.58	4.05
				Medium (12-22)	66	71.8		
				High (>22)	3	3.3		
Training on aquaculture	Number of days	Unknown	2-25	Short (up to 5)	45	49.0	19.36	32.52
				Medium (6-15)	30	32.7		
				Long (>15)	17	18.3		
Duration of using aqua-drugs	Year	Unknown	1-15	Low (up to 5)	37	40.2	6.70	2.85
				Medium (6-10)	46	50		
				High (>10)	9	9.8		
Knowledge on fish farming	Score	0-30	9-26	Low (up to10)	4	4.4	18.85	4.22
				Medium (11-20)	51	55.3		
				High (>20)	37	40.3		
Training need for aquaculture	Score	0-27	8-26	Short (up to 9)	1	1.1	17.75	3.43
				Medium (10-18)	54	58.7		
				Long (>18)	36	40.2		

SD* stands for Standard Deviation

Relationships between extent of utilization of aqua drugs for fish health management by fish farmers and their selected characteristics

In order to determine the relationships between extent of utilization of aqua drugs for fish health management by fish farmers and their selected characteristics, correlation analysis was conducted. The results of correlation analysis have been shown in Table 4. From Table 4 it could be revealed that there is a positive significant relationship between the farm size of the fish farmers and their extent of utilization of aqua drugs. Here, it obviously indicated that with the increase of the farm size of the fish farmers, the extent of utilization of aqua drugs also increases. As a result, the large fish farmers utilized aqua drugs for commercial fish farming.

Table 4 Result of correlation analysis between explanatory variables and focus variable

Focus variable	Explanatory variables	Correlation coefficient (r) with 90 *df*
Extent of utilization of aqua drugs	Age	0.118
	Level of education	0.135
	Household size	0.152
	Farm size	0.324**
	Area under fish culture	0.283**
	Annual income	0.315**
	Extension media contact	0.406**
	Training on Aquaculture	0.484**
	Duration of using aqua-drugs	0.134
	Knowledge on fish farming	-0.012
	Training need for Aquaculture	0.048

Notes: **: Significant at 1% level of probability

The positive significant correlation of area under fish culture with the extent of utilization of aqua drugs clearly pointed out that the fish farmers had enough opportunity to culture fishes as they have middle to large farm area. The annual income of the fish farmers had positive significant correlation with the extent of utilization of aqua drugs. Thus it could be concluded that the annual income of the fish farmers is an important factor for the utilization of aqua drugs, because the fish farmers who have enough annual income would like to use aqua drugs. There was a positive significant relationship between the extension media contact of the fish farmers and their extent of utilization of aqua drugs which indicated that fish farmers gain necessary knowledge and information on the proper utilization of aqua drugs by contacting with extension media. Training on Aquaculture of the fish farmers had significant positive relationship with extent of utilization of aqua drugs revealed that a good number of training enables the fish farmers to manage undesirable situations and also helps them to take decision towards the utilization of proper aqua drugs.

Conclusions

The aqua drugs are very important for fish culture in Bangladesh. The findings showed that the majority of the fish farmers (91.3 percent) utilized low to medium amount of aqua drugs for fish health management. There were six types of aqua drugs which have been used by the fish farmers at different stages of fish health management in the study area namely disinfectants, gas reducers, oxygen suppliers, growth promoters, probiotics and antibiotics. The study lead to conclude that effective training and motivational programs should be organized by both government and non-government organizations for the fish farmers to enable them taking timely decisions and utilize appropriate dosage of aqua drugs for fish health management.

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