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Article

Bio-security in small scale poultry farms against avian influenza: knowledge, attitude and practices

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Abstract: Avian influenza (AI) is considered as one of the greatest global threat for the poultry industry that the animal health sector has ever had to face. It is primarily an infectious disease of birds caused by influenza virus Type A strain. The major concern now is that a highly pathogenic strain (H5N1) has also been shown to transmit to humans and has the potential to be fatal. Since March 2007, outbreaks of highly pathogenic avian influenza (HPAI) have been occurring in commercial and backyard poultry in Bangladesh. Good bio-security practices can help reducing the risk of spreading and controlling the disease. This investigation describes the bio-security practices of small scale poultry holders (500-2000 birds/ farm) of Gazipur district, their knowledge and attitude in prevention and control of avian influenza. This was assessed using prescribed questionnaire. This study has been conducted on 100 poultry raising farmers through household-based individual interviews. Though respondents had different opinions on the magnitude of AI in their respective area, almost everyone realized AI is a big problem for Bangladesh. Generally, the respondents were not aware of the common infection sources such as, sick poultry, their pens, cages, backyard poultry, wild animals, migratory birds etc. Most of the interviewed small scale farmers in this area were not aware about the strict bio-security process like segregation of diseased birds, cleaning and disinfection of premises to prevent AI. Although there was a basic knowledge about the dangers and economic consequences of AI, there needs to be an updating of information on sources of infection, symptoms and prevention techniques, as well as an understanding of the cross species dangers of the infection. The study has, to a large extent, successfully drawn up a picture of how Bangladeshi small holder farmers have perceived and responded to AI and what they have understood and what practices they are taking against AI in their respective areas.

Keywords: avian influenza; bio-security; small scale poultry farmers

1. Introduction

Bangladesh is one of the most densely populated countries in the world. Its total area is about 1, 47,570 square kilometers and population of about 140 million (BBS, 2003). The most of the people have been living at a low nutritional status. Poultry meat and egg production account for more than 30% of all animal protein worldwide. By 2015, poultry will account for 40% of all animal protein (ILRI, 2007). Poultry meat and eggs provide approximately 38% of total animal protein in Bangladesh (FAO, 1999). Bangladesh has about 150,000 poultry farms with an annual turnover of $750 million dollars (BRAC, 2006). Therefore, this sector has already proved that if required support is provided, it along could bring animal proteins within the reach of the mass consumers at a reasonable price (Samad, 2005).

The economy of Bangladesh is heavily dependent on mixed agriculture that includes crops, livestock and poultry. The contribution of agriculture to GDP is 17.68% and share of livestock to agricultural GDP is 16.42%. The livestock sectors' share of employment in the agriculture sector is 39%. Small-scale livestock

farming, particularly poultry, has provided self-employment to approximately three million poor women during 1993-2002 (National Avian Influenza and Human Pandemic Influenza Preparedness and Response Plan Bangladesh, 2006).The commercial poultry sector has recently emerged as one of the fastest growing industries with an average growth rate of 20% (FAO, 2006). Raising poultry has also become a poverty reduction tool in Bangladesh with over 100 NGOs currently involved in promoting poultry as well as a tool for women's empowerment (FAO, 2006). The commercial poultry sector employs approximately five million people and the total national investment in the poultry sector is estimated to be between US$ 1- US$ 2 billion (FAO, 2006 and Samad, 2005). But a loss of confidence in the poultry industry in the event of an HPAI/H5N1 outbreak, with a looming threat of infections in humans, may affect various poultry business sectors, including domestic, regional and international trade and industry resulting in scaling downs the national economy (FAO, 2006) . Avian influenza is an infectious disease of birds caused by influenza virus type A (Ergin, 2006). It belongs to the Orthomyxoviridae family and is classified into types A, B or C based on antigenic differences of their nucleo- and matrix proteins (Sidoronko and Reichl, 2005).

Now a days, Avian Influenza (Bird Flu) has become the greatest global threat for the poultry industry that livestock sector had ever face. The major concern now is that the highly pathogenic strain (H5N1) has also been shown to transmit to humans and has the potential to be fatal. Good bio-security practices can help reduce the risk of spreading of virus and thus in the control of the disease (Firman, 2008). The H5N1 HPAI is of concern not only because it is highly lethal to birds but also because it has also infected humans. Human infection has mainly occurred in Asian regions where people live in close proximity with poultry. To impede this alarming threat, strict biosecurity practice is the crucial issue at the moment (Grain *et al.*, 2006).The avian influenza outbreak in Bangladesh emerged in March 2007, causing great concern in regards to public health and the serious impacts on income of poultry-based farmers in whole country. The knowledge about bio-security in our poultry farmers assumed to be ambiguous. However, the large scale poultry farmers practice biosecurity in their farms but not the small scale poultry farmers. This is due to the fact that, small poultry farmers may have poor knowledge about bio-security. Therefore, this study was undertaken to investigate the current status of bio-security practices of small scale poultry farmers and their knowledge and attitudes mainly on poultry rearing in response to AI in Gazipur region of Bangladesh.

2. Materials and Methods

The study has been conducted in Gazipur region from 5th August to 15th September 2008. The area was selected for three main reasons: (1) This region is affected and threatened by AI. (2) This is the largest and most important poultry zone in Bangladesh where a large number of birds and a lot of farms present and (3) The farms of this area are densely populated by poultry. The data were collected from Gazipursadar; Mouna, Sreepur and Salnaupazilla; Amtali, Harinal, Deshipara and Etahata union of Gazipur district where most of the farms are situated.

The study applied quantitative qualitative methods by using a structured questionnaire developed for household-based individual interviews. A total of 100 small scale farms (50 broilers and 50 layer farms, 500-2000 birds/ farm) in Gazipur district. Collected data from the respondents were analyzed and interpreted by using simple statistical techniques such as frequency distribution, percentage distribution.

For collection of valid information, an interview schedule was prepared in English and it was converted into Bengali. Necessary modifications and corrections made in the schedule on the basis of the farmers' arguments during collection of data. The researcher visit farms to farms randomly in an area and interviews were undertaken with the availability of the farmers. The satisfactory cooperation was obtained from all concerned during interviews.

This survey was arranged in a different way about parcipicipants' demographic and socioeconomic characteristics, knowledge of the definition, disease transmission, risk groups and preventive measures about avian influenza, attitudes towards avian influenza regarding use of preventive measures and food-handling practices, whether they had ever received information about avian influenza and, if so, the sources. The respondent choices for all questions, various points like-''Yes","No","Do not Know" and also a variety of answers/options supplied for the modes and the measures concerning the preventive response against avian influenza. We also asked whether the respondent and / or the members of his family in preceding the survey, have modified the habits in buying foods or in dietary habits for avian influenza.

3. Results

The knowledge areas were assessed using prescribed questionnaire. The average distance of poultry farms from other poultry farm, main roads and market are not in standard position. Table 1 shows the location of farms in relation to the different public place of farmers about bio-security in different small scale poultry farms of Gazipur.

The farmers of Gazipur do not maintain the actual structural bio-security system during building their farms. Only 16% farmers make fence around the farms to protect poultry from wild animals and birds but the rest of the number of farmers do not make any fence. In 88% farms have easy accessibility of free ranging poultry. Conditions of the structural bio-security in interviewed farms are shown in Table 2.

The disease causing organism could be transported by people's hand and hair, shoes and clothing to the farm. In case of layer farms, 58% farmers are very sensitive in entry of people but in case of broiler farms, 40% farmers are sensitive in case of entry of people in the farms (Table 3).

In Bangladesh, carcass disposal system is not yet modernized. Seventy four percent (74%) farmers bury their dead birds (Table 4) but in case of litter management of poultry, different farmers use different way (Table 5)

Cleaning of farm premises and surroundings are very important factor for bio-security practice because waste feeds and garbage attracts the wild animals and birds. Only 36% farmers clean their premises on regular basis, in layer and broiler farms, 92% farmers wash their hands after handling birds and feed (Table 6). In layer farms 6% farmers use footbath. But it is not regularly cleaned and refilled and 72% farmers use both footbath and spray.

Vehicles act as a mechanical carrier that can transport organisms in between poultry operations and farms and also in the surrounding areas (Table 7).

Farmers use different company's vaccines. In layer farms, 46% farmers use vaccines of Intervet company, 44% farmers use vaccines of Novartis company. In broiler farms, 40% farmers use vaccines of Novartis company, 46% farmers use vaccines of ACI company.

The knowledge of farmers about bio-security is very poor. Sixty two percent (62%) farmers believe that bird gets bird flu from other birds but the rest 38% farmers have no idea about transmission of bird flu. Twenty six percent (26%) farmers believe from eating raw and undercooked meat of poultry but rest 58% farmers do not know how people can get bird flu from birds. They are confused and they do not have the real information. When this survey was conducted, 34% farmers said that there is sudden death of birds in a large no. looks weak, reduce egg production. Some layer farmers said that this disease attack the poultry when they are in peak production. There were some farmers (8%) whose farms were affected with AI. They know the actual signs and symptoms of this disease. They said that when this disease occur, there is loss of production, weak, ruffled feathers, especially redden and bluish comb, wattle and shank and sudden onset of death in very large number at a time.

Table 1. Distance of farm to farms, main roads and poultry market.

Distance	Layer farms (km)	Broiler farms (km)
From main roads	2.89 ± 2.40	2.15 ± 2.03
From markets	4.86 ±4.375	3.06 ± 2.90
From water bodies	0.285 ± 0.092	0.081 ± 0.051
From other poultry farms	0.376 ± 0.294	0.27 ± 0.21
From parent stock	13.22 ± 7.345	13.42 ± 7.345

Table 2. Condition of the structural bio-security in interviewed farms.

Events	Percentage
Presence of strong wall and fence around	16
Absence of "No admittance prominently posted and restricted entry"	100
Having easy accessibility of free ranging poultry	88
Presence of nests of birds within the farm premises	86

Table 3. Condition of accessibility of people in the interviewed farms.

Events	In layer farms (%)	In broiler farms (%)
Do not allow people in entry of people	58	40
Allow people in farm after enquire	30	32
Do not take any precaution	12	28

Table 4. Methods of disposal of carcasses in interviewed farms.

Events	Percentage
Bury	74
Throw birds in open field	24
Give the bird in fish pond	2

Table 5. System of litter management in interviewed farms.

Events	Percentage
Sell to fish farmers	82
Use as manure	16
Use in own fish farm	2

Table 6. Condition of cleaning and hygiene practices in the interviewed farms.

Events	Type of farms Broiler/ Layer/ Both	Practices (%)
Regular cleaning the farm premises	Both (Overall)	36
Farmers wash their hands after handling feed and bird	Both (Overall)	92
Use footbath(do not clean and refill regularly)	Layer	6
Use spray	Layer	18
Use spray and footbath	Layer	72
Use spray and gumboot	Layer	4
Use footbath(regularly clean and refill)	Broiler	8
Footbath present but not use properly	Broiler	92
Use spray (not always)	Broiler	4

Table 7. Information regarding transportation system and related materials.

Events	In layer farms (%)	In broiler farms (%)
Day Old Chicks transported by suppliers vehicle	100	100
Eggs are transported by buyers vehicle	100	-
Feed and litter are transported by rickshaw van	100	100
Live birds are loaded outside of the farms	100	100
Eggs are loaded outside of the farms	100	-
Vehicles clean seldomly	78	72
Farmers do not know about vehicle cleaning	22	28

Table 8. Knowledge and awareness of interviewed farmers about avian influenza.

Question	Knowledge	Percentage
Where from bird gets bird flu?	From other birds	62
	No idea	38
Where form people can get bird flu?	Eating raw and undercooked poultry, infected birds and their eggs	10
	Directly from infected birds and their eggs	6
	Eating raw and undercooked poultry meat	26
	Do not know	58
How people can protect themselves from bird flu?	Do not know	64
	Burning the affected birds	36
	Not aware	100
Whether they are aware about the personal risk of getting bird flue	Not aware	100
Knowledge on symptoms of AI	Sudden death of bird in a large number, looks weak and in layer farms reduce egg production	34
	Sudden death in a large no.	25
	Loss of production, weak, ruffled feathers, especially redden and bluish comb, wattle and shank and sudden onset of death in very large number at a time	8
	Reduce production and weak bird	9
	Do not know	24

4. Discussion

The bio-security situation and other farm practices in different small scale poultry farms in Gazipur area were not desirable. Table 1 show that most of the layer farms (2.89 km) and broiler farms (2.15 km) are very close to the main road. Unlike the avian influenza, some of other infectious diseases may spread via air from the bird carrying vehicles to the farms and eventually these can be spread to the poultry operation. The average distance of layer farms from market are 4.86 km and 3.06 km from broiler farms indicating that some of the farm is also closer to the market. Market is a place where there is every chance of mixing healthy and sick birds. In case of avian influenza, the affected birds may excrete virus even three days before they show clinical signs. These apparently healthy birds are carried to the market that acts as a source of infection and spread infectious agents in the market place and neighboring area along with the road. Bangladesh is the place where in winter more than 244 species of migratory birds visit every year (National Avian Influenza and Human Pandemic Influenza Preparedness and Response Plan Bangladesh, 2008). These migratory birds are the source of AI. Therefore, farms those are near to the water bodies are in always at risk particularly for the avian influenza. But according to PFDG (Poultry Farm Development Guidelines2001), at least distance of both layer and broiler farms from other poultry farms are 5 km and from water bodies are 150 m. The standard distance from nearest breeder farm about are 3 km and 1.6 km from other poultry farms (both broiler and layerfarms) (http://agritech.tnau.ac.in/expert_system/poultry/Biosecurity%20and%20Disease%20Management.html).

Structural bio-security is important as it plays vital role in preventing the access of diseases causing microorganisms and other pest that may endanger the birds. A good structural bio-security of a farm can stop all of them by a physical barrier. Most of the small scale farmers in this area are not aware about the bio-security process. Though the layer farmers maintain a little bit bio-security but the maximum broiler farmers do not maintain bio-security. Only 16% farmers make fence around the farms to protect from wild animals (Table 2) which allows easy entry of infectious agents from all sorts of visitors (strangers, friends, relatives, neighbors, buyers, drivers and workers). But Islam and Flaque (2007) reported that 59% of farms had fencing. In broiler farms, 40% farmers are sensitive in entry of people in the farms. But in layer farms, 58% farmers are very sensitive in entry of people (Table 3). Most of the farmers build their shed very close their house, so that, they can maintain their farms easily. Moreover, most of the floors 6f the farms are not plastered. These are very good place for rats and rodents habitants which are important carrier of different diseases. Some layer farmers maintain a little bio-security practice like footbath, hand wash and spray with disinfectants but most of the

small scale farmers who rear 500-2000 birds do not maintain bio-security properly.

In Bangladesh, 74% people bury their dead birds, 24% farmers throw birds in open field and 2% give the bird in fish pond (Table 4). Islam & Huque (2007) reported that most dead birds (72%) were disposed of by traditional burying. Bangladesh is a densely populated country. So the farms are surrounded by the villages. Sometimes village chickens come to scavenge in the farm premises and spread the infectious agents in the commercial poultry. It is need to mention that Gazipur region is densely populated with poultry and largely affected with highly pathogenic avian influenza.

Cleaning of farm premises and surroundings are very important factor for bio-security practice because waste feeds and garbage attracts the wild animals and birds. But the maximum small scale farmers ignore these things. Only 36% farmers clean their premises on regular basis but other do not (Table 6). So, many diseases occur due to their negligence.

In layer farms, 72% farmers use both footbath and spray with disinfectants to their farms. During entering into the shed 4% farmers use gumboot in layer farms. In broiler farms 92% farmers do not use footbath properly. Only 4% farmers use spray but not always. In broiler farms nobody use any protective clothing or other measures during entering into the shed, 92% farmers wash their hands after handling birds and feed (Table 6). But Islam and Fluque (2007) reported that farmers changed their shoes/sandals when entering farm houses. On the other hand, only 21% farmers kept footbath at the entrance of shed for disinfecting visitors' sandals/shoes/ boots. Many farmers (87%) disinfected their hands using small sprinkle hand sprayer before beginning work in the farm.

Vehicles act as a mechanical carrier during transportation of DOCs and eggs from market to farm or farm to markets. Some (82%) farmers sell their litter to the fish farmers and 16% farmers use their litter as manure (Table 5) which might not properly composed. Islam & Huque (2007) reported that 87% farmers bagged poultry litter and sold it to fish farmers and/or crop producers. The remaining litter was dumped on the ground in and around the farms. In all farm, farmers are conscious about vaccination schedule. They maintain regular vaccination schedule. But sometimes they do not give the vaccine in proper time. As a result there is outbreak of some diseases.

In Bangladesh, there is shortage of veterinarian or skill technical person in the field level. So, farmers are deprived of technical support. Most of the farmers (80%) were not aware of bio-security. This might be due to lack of awareness, knowledge and training (Islam and Huque, 2007). When a farmer reports a veterinarian or para-vet about death or sickness of poultry, 100% vet showed little interest and give prescription by hearing signs and symptoms of birds. Sometimes veterinarian or para-vet comes to visit the farms on calls at serious cases- like highly mortality. Maximum time's farmers bring sick or dead birds to veterinarian or para-vet in serious cases and after post-mortem examination they give prescription and other suggestions to him.

Avian influenza is a great threat for our poultry industry. Last year, in 2007, the first outbreak of avian influenza occurs in this Gazipur area. So, every farmer heard the name of avian influenza, namely, bird flu. The 100% farmers came to know that this avian influenza can transmit from birds to human (Table 8). They get this information through media like, T.V., Newspaper, also from chemist and other farmers but they do not take any precautionary measures because they do not know how they can protect themselves or their birds from AI. Sixty two percent (62%) farmers believe that bird gets bird flu from other birds but the rest 38% farmers have no idea about transmission of bird flu. Twenty six percent (26%) farmers believe that people can get bird flu from eating raw and undercooked meat of poultry but rest 58% farmers do not know. They are confused and they do not have the real information. In Gazipur, 64% farmers do not know how they can protect themselves from bird flu but 36% farmers believe that the infected birds should be burned so that they can't spread disease to other farms. As Gazipur area is affected with AI from last year, the farmers of this area more or less hear and see the signs and symptoms of AI. When this survey was conducted, 34% farmers said that there is sudden death of bird in a large number looks weak and in layer farms reduce egg production. Some layer farmers said that this disease attack the poultry when they are in peak production. There were some farmers (8%) who know the actual signs and symptoms of this disease. They said that when this disease occur, there is loss of production, weak, ruffled feathers, especially redden and bluish comb, wattle and shank and sudden onset of death in very large number at a time.

This study clearly demonstrates that the bio-security against avian influenza applied in small-scale poultry farms in Gazipur region was inadequate. Most of the small-scale farmers were not aware of the importance of bio-security. It may be concluded that the immediate steps to be undertaken are to train poultry farmers on bio-

security practices; otherwise avian influenza will not be controlled. Internal regulations need to be implemented immediately as recommended by OIE and WTO if Bangladesh is to enter world trade.

Conflict of interest

None to declare.

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