

Potential Good Practice Note

Combating Bird Flu through Bio-security Measures at Farm and Community Levels



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Combating Bird Flu through Bio-security Measures at Farm and Community Level: *Evidence from Bangladesh*

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1. Introduction

Bangladesh has shown a steady economic growth of 1–2% in the 1970s, 3–4% in the 1980s, 4–5% in the 1990s, and in the years after 2000, the country has witnessed a growth rate of over 5% (Rahman, 2007). The livestock sector has also grown consistently, recording growth rates of 7.2% annually, much higher than the growth in other agriculture sub-sectors (0.2% for crops and 3.7% for fisheries). Within the livestock sector, poultry is a major contributor to this growth. It constitutes 14% of the total value of livestock output. According to the South Asia Enterprise Development Facility, the current market size of the poultry industry is \$1 billion (Raihan, 2008).

The chicken and duck population amounts to 212.5 and 39.9 million heads, respectively (Bangladesh Economic Review, 2008). Although a variety of poultry production systems exist in the country (Appendix 1), the sector is dominated by small-scale commercial and backyard poultry farms, with the latter accounting for about 80% of all poultry population in the country (District Livestock Services—DLS, 1998). Poultry, therefore, plays a predominant role in income generation, providing nutrition security and employment to large numbers of the country's rural population. Poultry rearing is a livelihood option practised mainly by women, particularly the landless, and supports the livelihoods of over six million people. On an average, rural households keep small flocks of six to seven birds each that are raised under semi-scavenging production systems (Bangladesh Bureau of Statistics 1996, GOB 2009). These birds are raised with little or no inputs, and productivity is low and irregular, with an average annual egg production of 35–45 eggs weighing 33–38 gm per egg (Shamsuddoha and Sohel, 2004).

Table 1: Contribution of Poultry Industry in Bangladesh

Particulars	Number/Amount
Number of commercial poultry farms	0.15 million
Annual production of meat	0.32 million tonnes
Annual production of eggs	5,200 million
Total investment in poultry sector	BDT 80,000 million
People engaged in the poultry sector (directly or indirectly)	6 million
Number of hatcheries	130
Number of grand parent farms	7
Number of feed mills	47
Annual consumption of meat per capita	2.25 kg
Annual consumption of eggs per capita	36
<i>Source: Rahman (2007)</i>	

With reference to data from the Asian Development Bank (ADB), the commercial poultry sector in Bangladesh grew by 20% annually up to 2007 (ADB, 2007). Further, the country has 0.15 million commercial poultry farms (Table 1), which produce 0.32 million tonnes of poultry meat and 5,200 million eggs per year; the annual per capita consumption of poultry meat was 5.3 kg/capita/year in 2005 (FAO, 2008) whereas the annual per capita egg consumption was 59 eggs/capita/year (Bangladesh Bureau of Statistics, 2006), which has increased substantially from 3.2 kg/capita/year and 32 eggs/capita/year in 2001.

Although the growth of the poultry sector has been positive

and impressive, a few constraints such as recurrent outbreaks of poultry diseases remain. Bangladesh's agro-climatic conditions favour disease agents (bacteria, fungi and parasites); in addition, contact with migratory and wild birds, large imports of poultry and poultry products, frequent cross-border movement of people, and unregulated wet markets¹ contribute to making the industry vulnerable to disease. Overall, poultry diseases, including Newcastle disease, infectious Bursal disease, Marek's disease, fowl pox, leucosis, infectious bronchitis and fowl cholera (Table 2), affect about 20% of layers and 15% of broilers and kill about 30% of all birds every year, with an estimated total loss of BDT 8,000 million (Giasuddin et al., 2002, and Saleque, 2007).

Disease	Year								Total	
	1999				2000					
	Layer		Broiler		Layer		Broiler			
	Number	%	Number	%	Number	%	Number	%	Number	%
Alfatoxicosis	145	26	203	39	42	12	66	26	456	28
Infectious Bursal Disease	51	9	68	13	30	9	46	18	195	12
Newcastle Disease	36	7	33	6	31	9	24	10	124	8
Salmonellosis	28	5	1	0	57	17	6	2	92	5
Fowl Cholera	20	4	0	0	27	8	4	2	51	3
Chronic Respiratory Disease	55	10	29	6	36	11	24	9	144	9
Colibacillosis	23	4	18	4	15	4	17	7	73	4
Coccidiosis	25	5	20	4	16	5	3	1	64	4
Nutritional Deficiency	75	13	67	13	38	11	35	10	205	12
Others*	45	8	54	11	31	9	31	12	161	10
Unidentified	49	9	22	4	10	3	7	3	88	5
Total	552	33	515	31	333	20	253	15	1,653	100
*Others: Fowl Pox, Avian Leucosis, Parasitic Diseases, Staphylococcosis, Eggs Drop Syndrome etc.										
Source: Giasuddin et al (2002)										

¹Wet markets sell live poultry, fish, goats, sheep, etc. Animals may stay there for days or weeks. Daily introduction of new animals provides optimum conditions for the development of disease agents such as influenza. Wet markets provide customers a chance to see animals alive (and, therefore, assess health, etc.) before slaughtering, and are often preferred over supermarkets for the purchase of meat and meat products. (Source: MedicineNet.com)

Avian Flu Crisis and Incentives for Change in the Bangladesh Poultry Sector

Box 1: Avian Influenza

Avian influenza is an infectious disease of birds caused by the type A strain of the influenza virus. The incubation period is usually 3 to 7 days and may go up to 21 days in a flock. The hens initially lay soft-shelled eggs and soon stop laying eggs. Combs and wattles become cyanotic¹ and may have petechial² or ecchymotic³ haemorrhages at their tips. The head is swollen and edematous⁴. The mortality rate varies but could go up to 100%. Signs of the disease in broilers are less obvious and, frequently, the birds show severe depression, lack of appetite and high mortality.

1 blue colouration of the skin

2 tiny red or purple spots

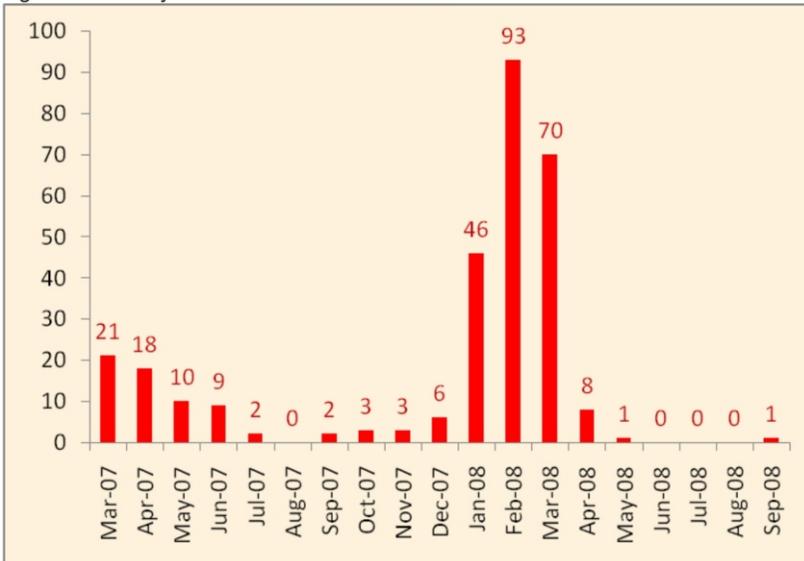
3 extensive purple discolouration

4 swollen with an excessive accumulation of fluid

Recently, both large- and small-scale poultry producers have had to bear unexpected and tremendous losses associated with two outbreaks of the highly pathogenic avian influenza (HPAI), the first of which was recorded in March–June 2007 and the second, in January–March 2008. Bangladesh first experienced HPAI on 22 March 2007 after detection of the disease in the Biman Poultry Complex (Box 1). The National Reference Laboratory for Avian Influenza (NRL-AI) at the Bangladesh Livestock Research Institute (BLRI)

diagnosed and confirmed the presence of H5 sub-type virus in this case. The first wave of the outbreak reached its peak in March 2007, gradually declining in the subsequent months with no cases reported in August 2007. The second outbreak (which reappeared in Bogra district) started in September 2007 and peaked in February 2008 with 93 cases. A regression started again in March 2008, and in April only eight cases were reported and a single case was reported in May (in Tangail). The last outbreak was reported on 29 September 2008 after a gap of more than four months (Figure 1). An analysis of the outbreak in 2008 demonstrates the commencement of the disease in November and a decline by April.

Figure 1: Monthly Pattern of Bird Flu Outbreak



Since September 2008, bird flu was detected in 287 locations, covering 128 *upazilas* and 14 metropolitan *thanas* of 47 districts in Bangladesh (Annexure 2). Up to 15 May 2008, NRL-AI had analysed 399 samples, of which 286 were found to be H5N1 positive and three were H9N2 positive². Some of these samples were re-examined and reconfirmed with the same results by an International Reference Laboratory in the United Kingdom and a regional laboratory in Thailand.

²H5N1 is a sub-type of the influenza virus, which can cause illness in humans and other animal species. A bird-adapted strain of H5N1, called HPAI A, or a highly pathogenic avian influenza virus of type A of sub-type H5N1 is the causative agent of H5N1 flu, commonly known as avian influenza, or bird flu. H9N2 is a sub-type of the species Influenza A virus, with a low pathogenic avian influenza virus serotype. The low H9N2 virus is widespread in poultry across Asia and Europe, and is capable of causing a mild influenza-like illness in humans. H9N2 viruses have repeatedly infected humans, causing a mild disease.

Whereas most of those affected by avian influenza outbreaks were small-scale poultry farmers, many of whom lost their entire flock, the losses at layer farms were 12 times more than that at broiler farms. This resulted in the reluctance of many large- and small-scale poultry rearers to re-start poultry farming (BLRI, 2008). In addition to losses associated with a reduced poultry flock, the profitability of poultry farming has declined

following the HPAI crises. This is due to a sharp decline in the prices of both broilers and eggs. The price of broilers declined by about 28% whereas the price of eggs decreased by 26.5%, suggesting that not only production but a consumption crisis was also triggered by the HPAI outbreaks. More than one-third of the consumers refrained from consuming broiler meat and eggs in the aftermath of the avian influenza outbreaks. Overall, the total loss to the nation associated with the two HPAI outbreaks was estimated between BDT 31,660 and 38,583 million, that is, about 5% of the national budget, in 2007–08 (BLRI, 2008).

The recent HPAI outbreaks and the associated losses for farmers and the entire Bangladesh economy, in general, have led policy makers and development practitioners to appreciate the importance of designing and formulating appropriate strategies to prevent, control and contain outbreaks of HPAI.

This Potential Good Practice highlights how bio-security measures (BSM), tailored to various categories of poultry farmers, can help prevent and control future outbreaks of avian influenza as well as other poultry diseases.

2. Background of the Potential Good Practice

Bio-security is an essential tool to minimize the risk of incursion of diseases into individual production units (bio-exclusion) and the risk of outward transmission (bio-containment) and onward transmission through production and marketing chains. Bio-security includes two different elements: first, the nature of the barriers employed to achieve bio-security; and second, the practices to control the disease and to prevent its spread when it occurs³.

BRAC arranged a multi-sector meeting on 19 November 2005⁴ at its head office in Dhaka, to formulate a concerted emergency plan for the prevention of bird flu in Bangladesh (Saleque, 2006). The participants agreed that all stakeholders should work jointly to prevent the entrance of bird flu in Bangladesh. Thereafter, BRAC conducted several meetings with scientists, policy makers, farm owners and academicians, who agreed that strict bio-security measures would ensure minimal chances of HPAI outbreaks in the country. The Government of Bangladesh and BRAC decided to join forces to conduct campaigns to raise the awareness of poultry keepers, vaccinators, programme officers, live/wet market sellers and the general public on avian-flu related issues.

Before initiating activities for the prevention, control and eradication of bird flu, BRAC conducted a survey to identify the natural habitation areas of migratory waterfowl in Bangladesh, with the help of the *upazila* livestock offices. In the 37 districts of Bangladesh, 275 hot spots were identified through the survey. About 359,140 wild birds visit Bangladesh each year in these areas and about 35,600 poultry farms were situated in the vicinity of these hot spots. In November 2005, BRAC trained 37 members of its staff at BLRI, in the collection, preservation and dispatch of samples and deployed them in these potential hot spots. These trained personnel collected 10,500 samples from December 2005 to February 2006 from migratory waterfowl and sent them to BLRI for early detection of disease in wild birds, to develop an early warning system (Saleque, 2006). BRAC, in collaboration with DLS, provided training on farm bio-security, that is, the prevention and control of bird flu, to all breeders/hatchery farm managers as well as to large commercial farms (Table 3). Trainees were also given gloves and disinfectants. During training, hatchery owners were advised to pass critical bird flu-related messages to their clients—mostly poultry farmers involved in small-scale production.

³The concept of creating microbiological barriers to prevent pathogen transmission is at the core of the bio-security concept. Building farms in isolated areas, promoting disease resistance, controlling infected animals, insects and contaminated materials, regulating the movement of people and equipment, limiting the number of visitors, providing quality feed and water and continual surveillance for evidence of disease causing microorganisms, including evaluation of abnormal production parameters, are ways to achieve bio-security at the ground level.

⁴The meeting was presided over by the Deputy Executive Director, Operations (BRAC) and attended by the Deputy Executive Director, Research and Evaluation (BRAC), Director General of Livestock Services (DLS), Director General of Bangladesh Livestock Research Institute (BLRI), and representatives of leading hatcheries and pharmaceutical companies. The Member Director of the Bangladesh Agricultural Research Council (BARC), renowned poultry scientists, virologists and BRAC poultry experts were other participants.

Division	Number of Beneficiaries			Officers				Grand Total
	Hatchery	Commercial Farms	Total	DLO	TLO	DD, AD, VS & SO	Total	
Dhaka	22	-	22	02	05	10	17	39
Chittagong	-	70	70	03	10	12	25	95
Rajshahi	03	114	117	16	12	27	55	172
Khulna	05	64	69	10	12	14	36	106
Sylhet	03	92	95	01	05	29	35	130
Grand Total	33	340	373	32	44	92	168	541

Source: Saleque (2006)

To ensure the appropriate use of material distributed during training (posters and leaflets, gloves and disinfectants) and the application of basic bio-security measures (Annexure 3), BRAC constantly monitors 420 farms in 12 upazilas of six divisions; definite improvements in poultry husbandry practices were found on these farms (Table 4). In addition, poultry and livestock extension workers (PLEWs) have been constantly monitoring the overall poultry disease situation; they inform the local DLS offices immediately, regarding outbreaks of any disease. BRAC also conducted a massive survey within Dhaka city to locate and study the hygiene status of poultry shops.

Material	Monitoring Status <u>Before</u> Distribution			Monitoring Status <u>After</u> Distribution			
	No. of Sample Farms	Previously Practised BSM	%	No of Sample Farms	Actual Coverage (No.)	Currently Practising BSM	%
Mask	420	60	14	420	413	296	72
Gloves	420	25	6	420	410	263	64
Bleaching	420	136	32	420	390	319	82

Source: Saleque (2006)

In spite of all these efforts, the H5N1 virus was detected in Bangladesh in March 2007 and a significant number of outbreaks have been reported since then, affecting 47 out of the 64 districts in the country.

In response to the HPAI outbreak, the Government of Bangladesh adopted a '**stamping out policy**', which involved culling all birds within a one kilometre radius of the outbreak epicentre as well as imposing a restriction of movement of poultry and poultry products and disinfection of premises. Post-HPAI (2007), around 1.6 million birds were culled and disposed, and 2.2 million eggs were destroyed (BLRI 2008).

Culling was executed by the culling committee after the declaration of the infected area by the Chief Veterinary Officer (CVO), DLS. A record of culled birds, duly signed by the district committee, was then sent to the CVO for compensation. Following the guidelines fixed by the government, a sub-committee headed by the Director General, DLS, determined the compensation rates for different categories of birds, including native, broiler, layer and duck. Although the compensation rate was based on the market price, it was insufficient to fully compensate farmers for the losses incurred.

*Payment was usually made through (i) cheques and (ii) cash payment. In case of backyard poultry rearers in rural areas, cheques were issued in favour of the *Upazila* Nirbahi Officer (UNO), who was responsible for cash payment to farmers. All payments were to be paid within four weeks of culling.

*Commercial producers were compensated only after the satisfactory cleaning and disinfection of the premises was carried out and this was duly certified by the veterinary surgeon and the *Upazila* Livestock Officer (ULO) of the respective *upazila*.

3. Towards a New HPAI Prevention and Control Strategy

Given the recurrent outbreaks of HPAI in Bangladesh, the ineffectiveness of the existing system of disease surveillance and control has clearly elicited the need for both public and private stakeholders, to review their strategies for preventing and controlling these outbreaks. The steps taken by different stakeholders are:

The Government

☞ The Ministry of Fisheries and Livestock recognized the importance of identifying major risk factors of HPAI in order to formulate effective prevention and control strategies. The Ministry, therefore, urged a group of scientists, headed by the Director General of BLRI, to conduct epidemiological investigations in the country to identify major causes of transmission of the disease (Refer Box 2).

☞ Thereafter, the government began massive awareness-raising and information campaigns on TV, radio and in newspapers, to promote the adoption of basic bio-security measures by farmers and market operators, which are critical for the prevention of HPAI outbreaks.

Recently, BLRI conducted a survey to gauge the effectiveness of the campaigns and found that a majority (70%) of the stakeholders claimed to have received information first from TV and then from their neighbours (66.7%) (Annexure 4).

☞ Disinfection programmes are regularly carried out across 11 major entry points in the country where all vehicles, including trucks, vans/rickshaw-vans carrying poultry birds and eggs, are disinfected before entering the country. This is critical. For instance, a total of 42,056 vans and 7,998 rickshaw-vans were disinfected in the months when bird flu occurred in 2007 and 2008, thereby reducing the probability of importing HPAI from abroad (GOB and BRAC, 2008).

☞ The Government has adopted a 'National Avian Influenza and Human Pandemic Influenza Preparedness and Response Plan', covering the period 2006–08 and then for the three-year period from 2009–11. The flowchart of committees at different levels responsible for containing the spread of avian and pandemic influenza is shown in Annexure 5. The budget for these two phases is in Annexure 6.

Public-Private Partnerships

☞ On account of human resource constraints, the government has sub-contracted the private sector, including, NGOs and other organizations, which work at the grass-roots level, to provide HPAI-related extension services in rural areas, with a focus on training lead farmers (both men and women) to provide advice to fellow farmers. The government has also involved BRAC and other stakeholders such as CARE, USAID, ICDDR, RTMI and Proshika to build awareness among communities about bio-security and HPAI-related issues.

Box 2: Epidemiological Study of BLRI

In the epidemiological study (BLRI, 2008), the role of possible risk factors in the spread of HPAI in the country was examined through descriptive as well as case control studies. It was revealed that:

*In most cases, mortality in backyard chickens preceded the outbreak in the commercial farm.

*Poor management and breaches in bio-security practices appeared to have a significant role in the spread of HPAI.

*Significant association was observed between the incursion of HPAI in a farm, and risk factors such as ad hoc farm workers, visit by feed and medicine suppliers, the entry of vehicles within the farm premises, and the sharing of egg trays, other poultry equipment and vehicles.

Most of the above risk factors have a strong link with the market chain.

☞ BRAC provided training on bio-security management to small-scale farmers across the country, focusing on a sub-sample of about 1,50,000 farmers, who raise about 500–2,000 birds each. These farmers lived in districts that were unaffected by HPAI but were close to districts where HPAI outbreaks occurred.

☞ IFC SEDF and BRAC launched a series of trainings and practical demonstrations on bio-security and Personal Protective Equipment Usage in retail and wholesale shops in 38 wet markets of Dhaka city. There are 912 poultry retailer shops, involved in selling, slaughtering and dressing live poultry in Dhaka (BRAC, 2008). From each shop, two persons were selected for a one-day training on bio-security. A total of 1,863 retailers and wholesalers of live poultry were trained. The trainees were also given protective equipment such as gloves, masks and disinfectants, which had rarely been used previously (IFC SEDF, 2008). After training, 2 kg of bleaching powder, 250 gm of Virkon and one small spray machine were distributed to them (Ghosh et al. 2008).

Box 3: Biosecurity in Wet Markets
 The Bio-security Management Training for Wet Market Operators provides indications on:

- ♣ Procuring healthy chicken only from farms that maintain bio-security.
- ♣ Using plastic cages instead of bamboo cages.
- ♣ Maintaining personal hygiene.
- ♣ Using gloves and masks when handling poultry.
- ♣ Keeping the shop floor and drainage systems clean.
- ♣ Cleaning and appropriately disinfecting shops after sales.
- ♣ Cleaning and appropriately disinfecting vehicles carrying poultry.
- ♣ Storing/disposing offal safely.

With the support of the government, BRAC and other NGOs involved PLEWs⁵, to conduct mass vaccination programmes against Newcastle Disease so that any outbreak will preclude it. This, in turn, will help in prompt reporting and identifying HPAI outbreaks.

BRAC-supported Bio-security Measures

BRAC acknowledges that the effective prevention and control of HPAI should involve all stakeholders along the poultry value chain, including the many different farmers, feed millers and processors, traders and consumers. It has, therefore, developed and promoted the application of tailored bio-security measures across the various levels of the supply chain.

✿ Farm Level

Small and marginal farmers are rarely aware of bio-security measures and associated husbandry practices. Because most rural households raise chicken under semi-scavenging conditions, bio-security measures take different dimensions. Bio-security measures that entail the seclusion of flocks are neither practical nor cost-effective. However, within the system some of the interventions tried were:

Box 4: Wooden Shelter
 A wooden shelter is made of locally available wood or bamboo. The measurement of the shelter varies according to the number of birds to be housed. A wooden shelter measuring 3 ft in length, 2.25 ft in width and 2 ft in height can house 6–10 birds and costs only 300 BDT. It protects the birds from sun, cold and predators, and is well ventilated. The unique selling point of this shelter is that it can be moved from one place to another, facilitating thorough cleaning and thus minimizing the risk of infection from different diseases.

☞ **Use of wooden shelters:** BRAC developed a prototype of a movable wooden shelter, which helps small-holder farmers in taking appropriate bio-security measures at low costs,

⁵Extensive information on PLEWs is documented in BDGP01—Mitigating Diseases and Saving Valuable Assets and can be accessed at <http://saplpp.org/goodpractices/small-holder-poultry/BDGP01-mitigating-diseases-and-saving-valuable-assets/>

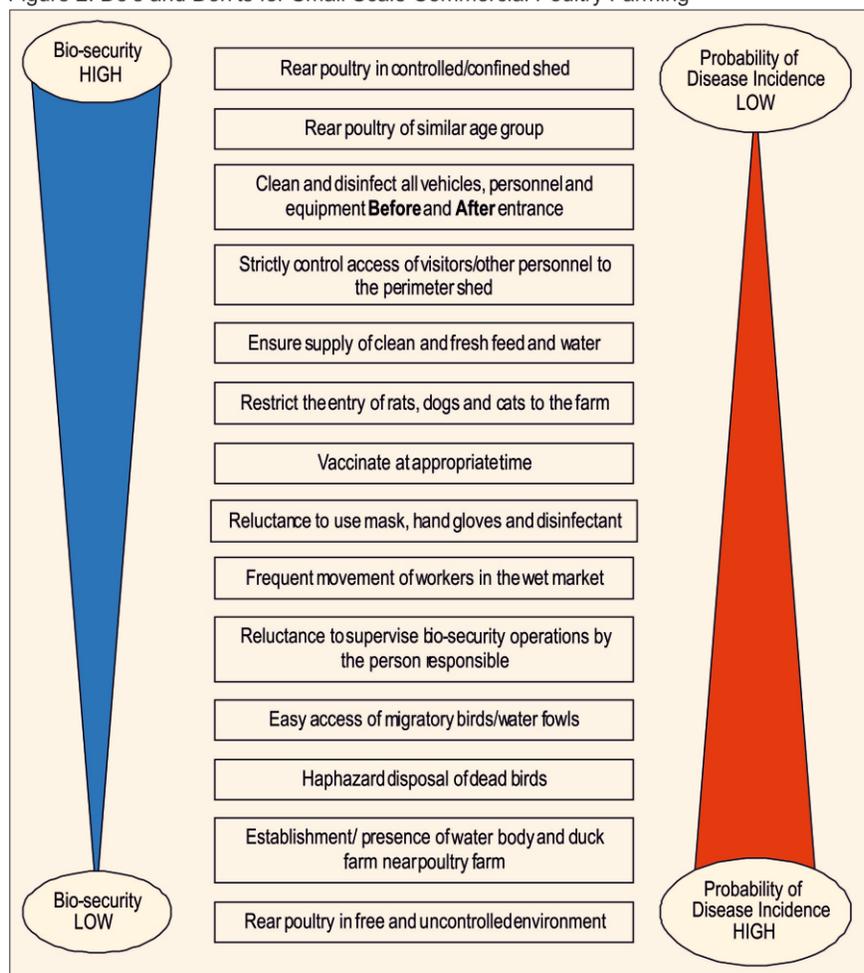
thereby reducing the risk of disease incidence. Poultry rearers can easily take the shelter outside their house and clean it well, using disinfectants or can simply keep it under sunlight if no disinfectants are available. The shelter helps reduce the contact of poultry with migratory birds, water fowl, rodents and other predators, which are potential carriers of diseases, including HPAI.

☞ **PLEW:** BRAC trains a large number of women PLEWs to vaccinate birds as well as helps farmers to prevent and control poultry diseases. The five-day training for PLEWs (as well as a day's refresher course every month) focuses on chick/bird rearing/management, food and water supply, heating and ventilation techniques, basic bio-security measures (for example, restricted access for visitors, disposal of dead birds, composting of waste materials and litter, cleaning, and treatment of common diseases). PLEWs provide free advice to small and marginal farmers although farmers are required to pay a nominal fee for bird vaccination or treatment. A number of other agencies such as CARE, USAID, ICDDR, Research Training and Management International (RTMI) and Proshika etc. – have also been training PLEWs to reach out to small-holder poultry rearers.

✿ Small scale Commercial Farms

Small scale commercial farmers contribute to the poultry industry at a significant level, and adoption of appropriate bio-security measures by them is critical to minimize the risk of HPAI outbreaks and control the spread of the disease. BRAC, therefore, has identified a number of key measures that these small-scale commercial poultry farmers should take to prevent outbreaks of bird flu. These are summarized in Figure 2.

Figure 2: Do's and Don'ts for Small Scale Commercial Poultry Farming



✿ Broiler Rearing Farms

BRAC operates three broiler rearing farms, in which strict bio-security measures are enforced. Both the farm and adjacent areas are regularly sprayed with disinfectant and lime / bleaching powder is spread on the perimeter of the farm; all vehicles entering the farm are sprayed and disinfected according to strict protocol; workers take a shower and wear clean clothes before entering the shed; at each entry point, a foot bath and disinfectant spray are available; workers wash and disinfect their hands and feet, using potassium permanganate; they always wear gloves and masks; put up scarecrows and glossy paper that reflects light at critical places to scare migratory birds. Down time is maintained properly so that after selling a batch of birds and before starting afresh with a new batch, the sheds are carefully cleaned and disinfected (See Figure 3). These bio-security measures ultimately cost about BDT⁶ 0.50 only per bird. No HPAI outbreaks have been reported in BRAC broiler farms since these measures have been followed.

✿ Parent stock farms

BRAC supplies disease-free quality chicks from its six parent stock farms throughout the country. Strict bio-security is maintained at every step in the parent farms, to stop disease transmission through chicks.

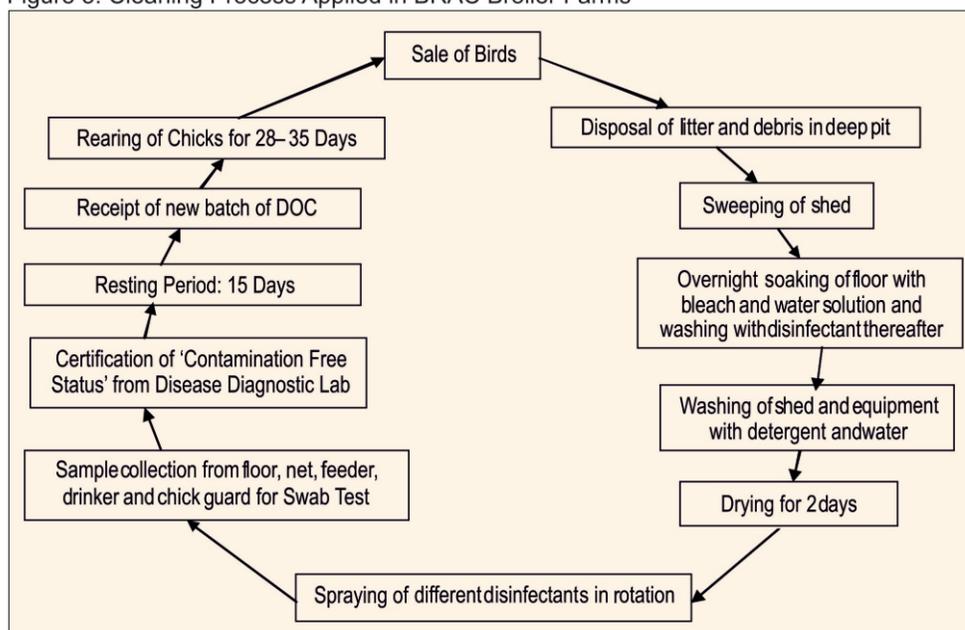
✿ Feed mill

All vehicles entering the feed mill are carefully sprayed with disinfectant; visitors have to dip their feet in the foot bath and have to wear an apron and mask before entering the mill.

✿ Broiler processing plant

Plastic crates are used for transporting live broilers; ante-mortem and post-mortem tests, water tests and swab tests are undertaken for each batch before processing; standard bio-security measures are followed during processing and storage; every section of processing has different entry and exit doors, and entering without authorization in the processing plant is not allowed; workers go through annual health check-ups whereas the plant area and surrounding drains are cleaned every day with disinfectant.

Figure 3: Cleaning Process Applied in BRAC Broiler Farms



⁶1 US \$ = 69 BDT

4. A Case Study

Community-led bio-security measures in Kapasia Sub-District

Whereas the theory of bio-security is rather straightforward, implementing bio-security measures, particularly among small-holder poultry farmers is challenging; appropriate mechanisms and incentives have to be provided for small-holders to comply with bio-security procedures and protocols. Kapasia, popularly known as the '*poultry village*', is a unique example of effective community based bio-security activities (Table 5). The recent outbreaks of avian flu affected all the *upazilas* in Gazipur district, except Kapasia.

Particulars	Numbers
Number of Villages	11
Scavenging poultry	250,480
Ducks	22,375
Commercial layers	794,700
Broilers	1,037,000
Layer farms	523
Broiler farms	671
Egg production (per day)	532,480
Broiler meat production (MT per day)	12
Persons employed	3,791
<i>Source: ULO, Kapasia (2008)</i>	

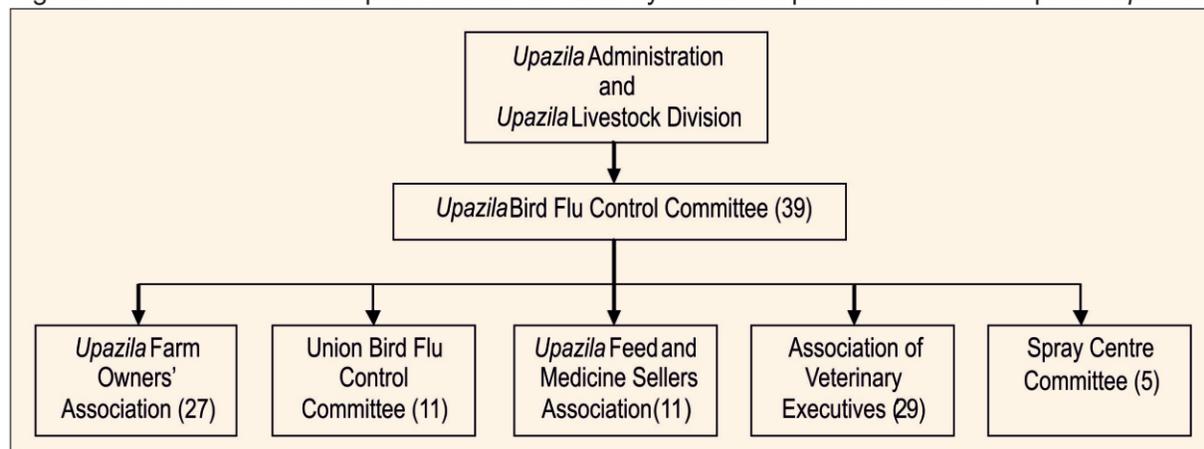
Stakeholders in Kapasia formed different sub-committees (Figure 4), to monitor and gear up bio-security activities (Annexure 7). Members of these committees were not paid but comprised community stakeholders, who were actively involved in poultry farming or/and related business, and could provide information on bio-security measures; at the village level, farmers were primarily responsible for providing information urgently to the upazila livestock office if any incidence of disease was reported or suspected. To prevent infection from entering Kapasia, two persons were employed to disinfect all vehicles entering the village. At the farm level, all egg carrying trays were washed with disinfectants before and after delivering eggs to the market. Figures 4 and 5 show the institutional set-up and the specific tasks of stakeholders involved in the Kapasia HPAI prevention and control strategy.

The Kapasia model was promoted by the Upazila Livestock Officer (ULO). Based on his professional experience in the early incidences of bird flu, the ULO developed and implemented a participatory process whereby all stakeholders involved in the poultry business had a say in community-based, bio-security measures adopted in the village (Box 5).

Box 5: Initiating the Kapasia Bio-security Model

"My experience in Jamalpur and Tangail showed that many farmers were compelled to shut down their farms due to bird flu, which spread mostly due to lack of knowledge regarding bio-security measures. I took some initiatives in the Kapasia Upazila and emphasized individual farm bio-security. Soon, I realized that without community based bio-security initiatives, individual farm protection would be meaningless. I arranged a meeting with all stakeholders related to the enterprise, and formed committees responsible for specific tasks. Within a few months, the disease incidence and mortality rate went down, and treatment costs also reduced. Farmers were happy to see no incidence of disease in Kapasia Upazila although the neighbouring upazilas were affected by bird flu. I have informed the government of the success of this model and requested that it be replicated throughout the country to support the poultry industry". ~ Reflections of Dr. Akhil Chandra, ULO, Kapasia

Figure 4: Administrative Setup to Ensure Bio-security at doorsteps of Farmers in Kapasia Upazila



Parentheses indicates the number of members in the respective committees

Key Activities of Upazila Committee	Key Activities at Farm Level
<ul style="list-style-type: none"> ☼ Training the farm owners and other stakeholders through the union committee. ☼ Ensuring that vehicles carrying poultry equipment and other related products are disinfected. ☼ Ensuring that egg trays are washed with caustic soda properly before and after use. ☼ Ensuring that disinfectant spray is regularly stocked in feed and medicine shops. ☼ Distributing information leaflets and posters. ☼ Monitoring rigorously. 	<ul style="list-style-type: none"> ☼ Routine vaccination of all poultry birds. ☼ Cleaning farm perimeters regularly. ☼ Restricting the entry of scavenging poultry, ducks, pigeon, birds, etc. ☼ Washing and disinfecting hands and feet, using potassium permanganate ☼ Using a foot bath at each entry point. ☼ Burying/burning dead birds, litter and other wastes in remote areas. ☼ Spreading lime powder and spraying disinfectant around the sheds/farm perimeters. ☼ Spraying vehicles and all sacks of poultry feed⁷ with disinfectant. ☼ Cleaning and washing egg trays and other equipment with caustic soda.

⁷The sacks of poultry feed have double layers, with the inner layer being non-porous. The chances of the disinfectant affecting the feed are, therefore, very low.

⁸The Upazila administration provided 11.65% of the funds.

The implementation of bio-security measures are partly funded by the *upazila* administration, which, in turn, receives funds from the livestock department⁸. The detailed expenditure statement for a period of eight months is shown in Table 6 whereas the costs incurred to maintain bio security at the farm level are shown in Annexure 8.

Other contributors include pharmaceutical companies, egg traders, hatcheries, Feed and Medicine Traders Associations, and representatives of the Pharmaceutical Company Associations, and Farm Owners Association.

Table 6: Expenditure Incurred during February - September 2008

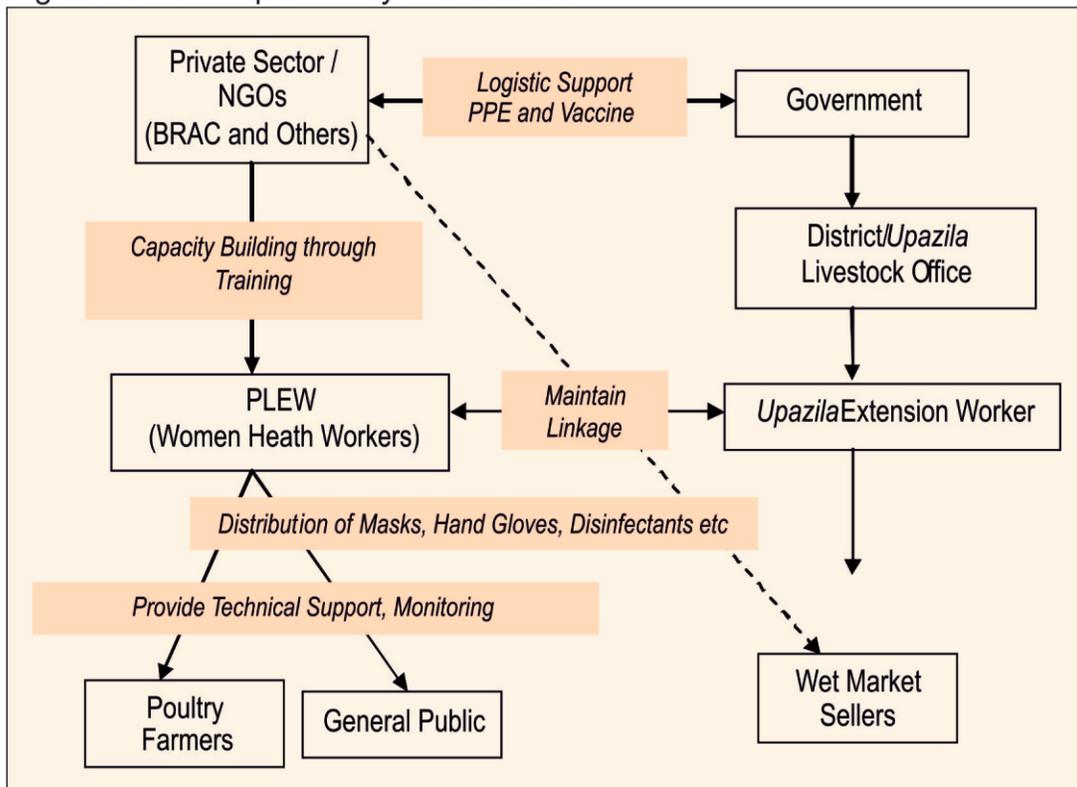
Particulars	Allocation	Grand Total (BDT)
Hiring 18 men for regular spraying of disinfectant throughout the area	18 x 150 x 240	648,000
Information Banners 4 Nos @ BDT 300	4 x 300	1,200
Spray Machine 8 Nos (2 at each point)	8 x 1,200	9,600
Disinfectant @ BDT 5,000 per centre/month	4 x 8 x 5,000	160,000
Caustic Soda (5 kg/day @ BDT 50)	5 x 50 x 240	60,000
Total Cost Incurred		878,800

Source: ULO, Kapasia (2008)

ULO, Kapasia's innovative approach for ensuring bio-security, through doorstep extension services, is shown in Figure 5.

In the Upazila, a Livestock Officer, a veterinary surgeon, the sub-technical staff and the field personnel are responsible for providing animal health services. In each upazila, there is one veterinary hospital where treatment, preventive vaccination and extension services are provided. No health services are provided at the village level by the government but NGOs have grass-roots level animal health workers, who provide health services on payment.

Figure 5: Doorstep Delivery Mechanism



5. Issues and Lessons Learnt

The emerging issues and lessons in applying bio-security measures along the poultry supply chain in Bangladesh are as follows.

*Farmers are often reluctant to report outbreaks, either because they do not understand public health implications associated with HPAI or for fear of social and economic implications. At times, prior information of culling leads to people hiding/sending birds out of the one kilometre radius culling area and bringing them back after the culling operation is over. Moreover, some poultry keepers still lack information on bird flu and bio-security measures.

*Small-holder poultry rearers are often reluctant to maintain strict bio-security measures, on account of the low value of the small number of birds they rear and the high costs involved in terms of time and labour to enforce bio-security measures. It has been observed that small-holder poultry rearers only maintain bio-security measures when an active monitoring system is in place.

*There are only four government field staff and one livestock officer at each sub-district level, who are responsible for attending to about 2,00,000 poultry, 50,000 cattle and 20,000 sheep and goats (GOB, 2007). Building awareness and delivery of services at farmers' doorsteps are, therefore, not always possible. This is a niche that NGOs such as BRAC and Proshika have filled.

*Public-private partnerships, as well as promoting private entrepreneurs (for example appointing PLEWs), can be effective tools to expand the coverage and the quality of livestock services, including HPAI prevention and control measures. Community based bio-security approaches may also facilitate the implementation of strict bio-security measures.

*A few general constraints, which may hamper the implementation of bio-security measures, include weak associations of poultry keepers across the entire value chain, unreliable quality of disinfectants and drugs, and related costs, often making them unaffordable, and the absence of laboratories for regular testing and timely feed-back.

*Technical advice and assistance as well as information campaigns and awareness-raising are all critical to ensure the strict enforcement of bio-security measures along the entire poultry supply chain.

Overall, the practices of bio-security do not have to be cumbersome, confusing or expensive, and small investments of time and money can suffice to reduce disease risk and outbreaks greatly, with resultant positive benefits for farmers and also for all other stakeholders along the supply chain, including consumers. The National Livestock Development Policy (2007) and the National Poultry Development Policy (2008) issued by the Government of Bangladesh has further detailed the commitment of the government to control and contain the spread of avian influenza. The BLRI has been declared as the National Reference Laboratory for the detection of avian influenza and other emerging diseases, and will soon be strengthened to international standards. A National Avian Influenza Preparedness Plan will be developed and implemented, which will include the registration of all commercial farms with the DLS. In addition, the Ministry of Fisheries and Livestock has developed a bio-safety protocol to be followed by all stakeholders. Other initiatives detailed in the two policy documents include limiting the marketing of live ducks and chicken in areas under city corporations and municipalities, development of a disease reporting system, norms for the establishment of commercial poultry farms, including the distance to be maintained between two poultry farms, and incentives and support to be provided for the safe disposal of poultry litter and waste.

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Appendix 1: FAO Classification of Poultry Production Systems

Sectors (FAO Classification)	Poultry Production Systems			
	Industrial and Integrated Production	Commercial		Village or Backyard
		Bio-security		
		High	Low	
Sector 1*	Sector 2**	Sector 3***	Sector 4****	
Bio-security	High	Moderate-high	Low	Low
Market outputs	Export, Urban	Urban/Rural	Urban/Rural	Rural/Urban
Dependence on markets for inputs	High	High	High	Low
Location	Near capital and major cities	Near capital and major cities	Smaller towns and rural areas	Rural areas
Birds housed	Indoors	Indoors	Indoors/Part-time outdoors	Outdoors most of the day
Shed	Closed	Closed	Closed/Open	Open
Contact with other chickens	None	None	Yes	Yes
Contact with ducks	None	None	Yes	Yes
Contact with other domestic birds	None	None	Yes	Yes
Contact with wildlife	None	None	Yes	Yes
Veterinary Service	Own veterinarian	Paid veterinary service	Paid veterinary service	Irregular, depends on government veterinary service
Source of medicine and vaccine	Market	Market	Market	Government and market
Source of technical information	Company and associates	Sellers of inputs	Sellers of inputs	Government and extension services
Source of finance	Banks and own	Banks and own	Banks and private	Private/ocassionally banks
Breed of poultry	Commercial	Commercial	Commercial	Native
Food security of owner	High	Adequate	Adequate	Adequate to low

*Sector 1: Industrial integrated system, with high level of bio-security and birds/products marketed commercially (for example, farms that are part of an integrated broiler production enterprise, with clearly defined and implemented standard operating procedures for bio-security).

**Sector 2: Commercial poultry production system, with moderate to high bio-security and birds/products usually marketed commercially (for example, farms with birds kept indoors continuously; strictly preventing contact with other poultry or wildlife).

***Sector 3: Commercial poultry production system, with low to minimal bio-security and birds/products entering live bird markets (for example, a caged layer farm with birds in open sheds; a farm with poultry reared outside sheds; a farm producing chickens and waterfowl).

****Sector 4: Village or backyard production with minimal bio-security and birds/products consumed locally.

Appendix 2: Division-wise Incidence of Avian Influenza from March 2007 to June 2008 in Bangladesh

Division	Districts affected	Upazilas affected	Metro Thanas affected	Total number of locations affected	Number of farms on which birds were culled		
					Commercial Farm (unit)	Backyard (unit)	Total
Dhaka	14	46	07	140	286	05	291
Rajshahi	13	42	02	74	79	25	104
Khulna	08	14	02	21	43	06	49
Chittagong	06	16	03	35	60	03	63
Barisal	04	07	00	14	33	03	36
Sylhet	02	03	00	03	04	00	04
Total	47	128	14	287	505	42	547

Source: Department of Livestock, 2008

Appendix 3: Report on Material Distribution by BRAC

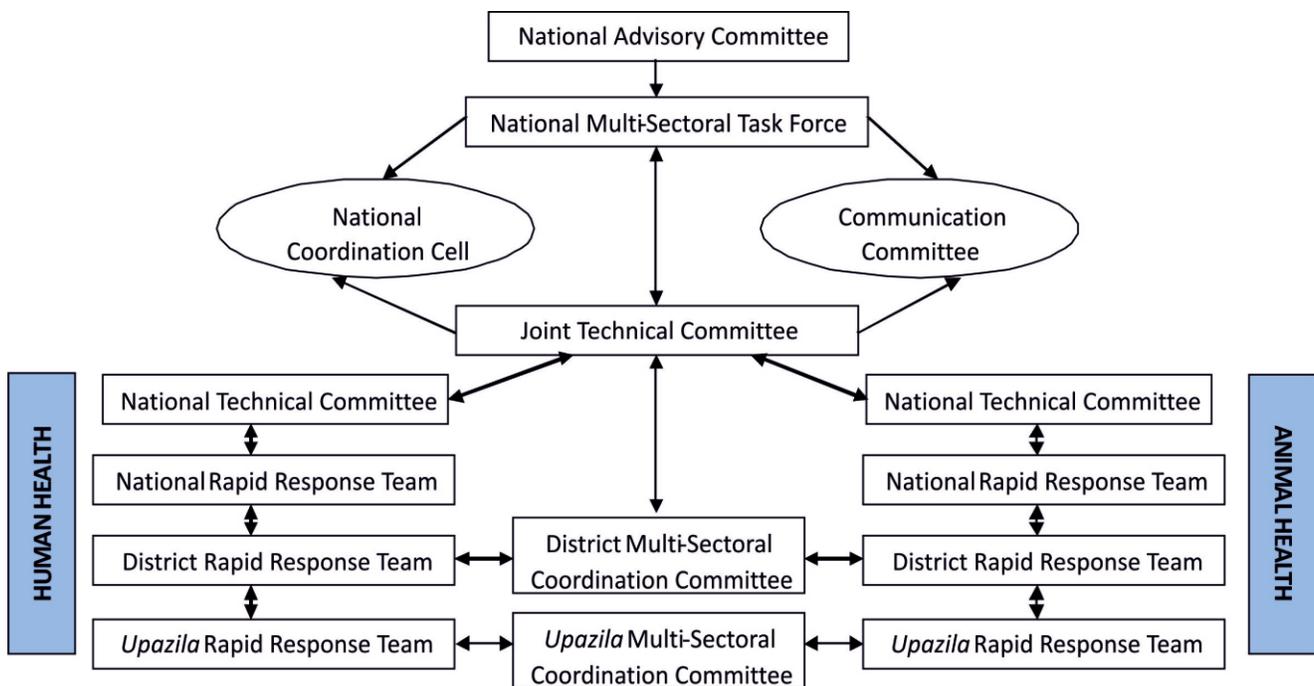
Coverage	Division						
	Dhaka	Rajshahi	Chittagong	Sylhet	Khulna	Barisal	Total
Districts covered	9	8	5	4	7	4	37
Upazilas covered	55	54	36	28	39	20	232
Farmers reached	4,593	3,116	2,474	1,271	2,473	1,230	15,157
Total birds covered	5,350,674	2,885,635	3,088,345	1,264,900	1,679,518	843,003	15,112,075
Bleach distributed (kg)	3,250	1,900	1,650	800	1,700	700	10,000
Masks distributed	10,857	6,168	5,641	2,236	5,004	2,232	32,138
Gloves distributed	3,918	1,646	1,538	730	1,382	786	10,000
Posters distributed	15,100	6,250	3,600	2,200	4,950	2,950	35,050
Information leaflets distributed	24,000	19,000	13,000	11,000	17,000	10,000	94,000

Appendix 4: Sources of Obtaining Information about Avian Influenza

Consumers	Sources				
	TV	Radio	Newspaper	Neighbour	Market
Farmers	54.69	15.63	10.94	71.88	43.75
Religious leaders	34.62	15.38	75.00	67.31	51.92
Service holders	94.29	15.71	74.29	57.14	38.57
Wage labourers	69.70	19.70	7.58	59.90	34.85
Businessmen	87.50	26.56	60.94	59.38	46.88
All Consumers (%)	69.94	18.67	44.94	62.66	42.72

Source: BLRI, 2008

Appendix 5: Committees at Different Levels for dealing with Avian and Pandemic Influenza



**Appendix 6: Government of Bangladesh - Three-year Budget (in million US\$)
for Avian Flu Control and Containment, 2006-08**

Sector	2006			2007			2008			Total
	Pre-pandemic	Alert	Pandemic	Pre-pandemic	Alert	Pandemic	Pre-pandemic	Alert	Pandemic	
Wildlife	3.673	0.500	0.500	1.253	0.500	0.500	1.243	0.500	0.500	9.169
Livestock	6.530	1.100	0.000	7.570	1.000	0.000	2.850	1.000	0.000	20.050
Health	7.065	15.270	4.780	5.342	17.780	5.930	5.027	17.505	5.916	84.615
Total	17.286	16.870	5.280	14.165	19.280	6.430	9.120	19.005	6.416	113.834
Total	39.418			39.875			34.541			

Source: Government of Bangladesh, 2009

Appendix 7

Duties of Upazila Bird Flu Control Committee

1. To maintain co-ordination with *Upazila* administration and livestock division.
2. To survey farms in the *Upazila*.
3. To manage allotted funds.
4. To arrange training for farm-owners, with the help of the union committee.
5. To monitor the implementation of bio-security measures on all farms, shops and vehicles carrying poultry and related equipment.
6. To monitor the activities of the spray centre.
7. To arrange weekly meetings with members of the five committees and implement decisions made.

Duties of the Upazila Farm owners' Association

1. To arrange training for farmers, with direct monitoring by the *Upazila* bird flu control committee.
2. To monitor bio-security operations in farms, cleaning and disinfection of vehicles and equipment.
3. To implement the decisions made by the bird flu control committee.

Duties of the Union Bird Flu Control Committee

1. To collect accurate information about the status of the farms.
2. To arrange training on bio-security in farms.
3. To inform the *Upazila* committee about the condition of all farms at the union level.
4. To implement the decisions of the *Upazila* committee.

Duties of the Upazila Feed and Medicine Sellers Association

1. To supply quality feed and medicine.
2. To implement bio-security measures in shops selling feed.
3. To ensure that disinfectant is sprayed on all feed items and despatched to farms.
4. To implement all decisions of the *Upazila* committee.

Appendix 7: Continued

Duties of the Association of Veterinary Executives

1. To ensure the smooth supply of quality vaccine and medicine.
2. To make frequent farm visits and provide farmers technical support related to bio-security.
3. To provide logistic support for the training of farmers.
4. To act as a catalyst in the implementation of all decisions taken by the Upazila committee.

Duties of the Spray Centre Committee

1. To monitor the activities of the spray centres.
2. To spray disinfectant on all vehicles carrying poultry and equipment, at the entrance of the Upazila.
3. To ensure the proper cleaning and disinfection of egg trays.
4. To monitor the expenditure and budget utilization of the spray centres closely.
5. To implement the decisions of the Upazila committee.

Appendix 8: Economic Analysis of Maintaining Bio-security at Farm Level

Name and Address	Type of Farm	Number of Birds	Annual Expenditure on Bio-security Tools		Monthly Mortality Rate (%)	Monthly Cost/Bird
Mr. Khorshad	Layer	2,800	Vaccines	59,400	0.4	2.88 BDT
Village: Rautkona			Medicines	36,700		
Upazila: Kapasia			Disinfectants	800		
			Total	96,900		
Mr. Dalowar	Layer	2,025	Vaccines	41,500	0.42	2.55 BDT
Village: Rautkona			Medicines	20,000		
Upazila: Kapasia			Disinfectants	600		
			Total	62,100		
Mr. Kalam	Layer	4,260	Vaccines	80,500	0.65	2.68 BDT
Village: Pabur			Medicines	55,200		
Upazila: Kapasia			Disinfectants	1,200		
			Total	137,400		
<i>Source: ULO, 2009</i>						

Abbreviations

AD	Assistant Director
ADB	Asian Development Bank
BARC	Bangladesh Agricultural Research Council
BLRI	Bangladesh Livestock Research Institute
BSM	Bio-security measures
CVO	Chief Veterinary Officer
DD	Deputy Director
DLO	District Livestock Officer
DLS	Department of Livestock Services
FAO	Food and Agriculture Organisation of the United Nations
GOB	Government of Bangladesh
HPAI	Highly Pathogenic Avian Influenza
ICDDR	International Centre for Diarrhoeal Disease Research, Bangladesh
IFC	International Finance Corporation
NRL-AI	National Reference Laboratory for Avian Influenza
PLEW	Poultry and Livestock Extension Worker
RTMI	Research Training and Management International
SEDF	South Asia Enterprise Development Facility
SO	Sales Officer
ULO	<i>Upazila</i> Livestock Officer
UNO	<i>Upazila Nirbhai</i> Officer
VS	Veterinary Surgeon

The NDDB-FAO **South Asia Pro-Poor Livestock Policy Programme** (SA-PPLPP) is a unique livestock development program that aims to 'to ensure that the interests of poor livestock keepers are reflected in national as well as international policies and programs affecting their livelihoods'. It endeavors to do so by a) creating spaces for and facilitating dialogue among the actors playing a direct and indirect role in the livestock sector of South Asia, and b) drawing from and using lessons from field experiences to influence livestock-related policies, and facilitate programme and institutional changes benefiting small-holder livestock rearers in the region..

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BRAC Bangladesh is one of the largest southern development organisations employing 120,337 people, with 61% women, and working with the twin objectives of poverty alleviation and empowerment of the poor. It has emerged as an independent, virtually self-financed paradigm in sustainable human development. BRAC works with people whose lives are dominated by extreme poverty, illiteracy, disease and other handicaps. With multifaceted development interventions, it strives to bring about positive changes in the quality of life of the poor people of Bangladesh as well as bring about change at the level of national and global policy on poverty reduction and social progress. Women and girls have been the central analytical lens of BRAC's anti-poverty approach, recognizing both their vulnerabilities but also their thirst for change.

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About this Potential Good Practice

Poultry is a major contributor to the growth of the livestock sector in Bangladesh. But in recent years, both large and small scale poultry producers have had to bear unexpected and tremendous losses associated with two outbreaks of the highly pathogenic avian influenza (HPAI). The HPAI outbreaks and the associated losses for farmers have led policy makers and development practitioners to appreciate the importance of designing and formulating appropriate strategies to prevent, control and contain outbreaks of HPAI.

This Potential Good Practice Note highlights the measures jointly initiated by government and non-government organizations to address the problem. Bio-security measures (BSM), tailored to various categories of female poultry farmers were put in place to help prevent and control future outbreaks of avian influenza as well as other poultry diseases.

SOUTH ASIA Pro Poor Livestock Policy Programme

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