

## The past and present scenario of avian influenza and its control strategy in Bangladesh: A review

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### Abstract

Avian influenza virus (AIV) is a pandemic threat and this year 2018 is passing the century of Spanish flu (H1N1) of 1918 when the world approximately 50 million human deaths occurred worldwide. About 1.7 million peoples become died in over Asia from 1957 to till now by the name of Asian flu (H2N2) at 1957 and Hong Kong flu (H3N2) at 1968. In Bangladesh, since first identification of Highly Pathogenic Avian Influenza (HPAI) at 2007 poultry industry faces outbreaks at a significant level in every year although human infection is uncommon. The infections spreading among all major avian species like chicken, duck, turkey, quail. On the other hand it is reported that the infection is spreading among wild birds like house crow, migratory birds and wild animals also. During first isolation the virus were in clade 2.2.2 but after several mutations over 11 years now it becomes under clade 2.3.2.1a and circulating in environment. Government of Bangladesh decided to vaccinate against AIV in 2012 with two killed and one vector vaccine to combat the AIV that brings a satisfactory result. But from the couples of years again the incidence of AIV becomes very high and ongoing researches like sink surveillance shows 50-90% live bird markets of Dhaka and Chattagram districts are infected. To combat the AIV it is recommended that farms should have to ensure the good quality vaccine with good farm biosecurity practice along with conventional stamping out program.

**(Key words:** Avian influenza virus, poultry, vaccine, infection)

### Introduction

Avian influenza virus has received increasing attestation over the years, as it affects production, trade and human health. The viruses are distributed worldwide and cause serious economic losses when outbreak occurs in chickens, turkeys and other gallinaceous birds (Morin *et al.*, 2018; Dhingra *et al.*, 2018; Ali *et al.*, 2015; Ali *et al.*, 2017). The current highly pathogenic avian influenza (HPAI) H5N1 panzootic has spread from Southeast Asia since 2003 (Li *et al.*, 2014). Bangladesh first experienced the wave of H5N1 HPAI in February 2007 (Biswas *et al.*, 2008). About 550 outbreaks have been reported to the World Organization

for Animal Health (OIE) placing Bangladesh as one of the most affected country in the world (OIE, 2018). Up to March 2018, eight human infections where seven non-fatal and one fatal cases of H5N1 influenza have been reported to WHO from Bangladesh (WHO, 2012). Outbreak situation in the country since 2017 remain quite difficult to understand and no new case have been reported except one crow mortality report to OIE at 2018. Bangladesh has no realistic evidence that the country is free from HPAI H5N1 due to several surveys and published reports confirming that the disease is now endemic in Bangladesh.

In Bangladesh avian influenza virus H5N1

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human pandemic influenza in Bangladesh. From the first outbreak, Bangladesh try to overcome the problem by following activities.

- a) Early diagnosis, reporting and rapid culling (Stamping out)
- b) Decontamination of affected farms and movement control
- c) Epidemiological surveillance
- d) Improvement of farm biosecurity

On the incursion of HPAI in 2007, Bangladesh also adopted the policy of stamping out for the control of avian influenza. In case of infection in a commercial poultry farm all type birds, eggs and animal feed kept in the farm premises was destroyed and disposed and in case of a backyard farm same type of animals and materials kept 500 meter around the infected premise was destroyed and disposed following the SOP for stamping out procedure developed by Department of Livestock Services (DLS) (Biswas *et al.*, 2008; 2nd AI National Plan, 2009). Quick detection and rapid response were emphasized, but delayed reporting was happened in many outbreak cases. Movement restriction was imposed but entry of infected chickens in the market have not been prevented. A novel and effective SMS Gateway based clinical surveillance was initiated with the help of FAO and found worked well. But that was not sustained due to fund constraint after completion of the project. Several trainings were arranged to build up the capacities of veterinary services in Bangladesh. There a policy of compensation for the farmers whose birds were H5N1 identified and culled. However, compensation was often delayed due to fund constraint (Islam, 2015). Now compensation

activities were completely stopped. As a result the number of non-reporting HPAI case was gradually increased (Moyen *et al.*, 2018).

But all those approach have failed to contain the spread of HPAI in Bangladesh. Poultry industry claimed the loss of more than 50% of their stock. In this regard, Government of Bangladesh decided to use vaccination as an additional tool on trial basis to combat HPAI H5N1 spread since 2012 (Shin *et al.*, 2016). Government constituted an Expert Committee to design and supervise the trial vaccination programme and provided recommendation. In 2013 the Government of Bangladesh started vaccination against H5N1, HPAI in selected geographical regions. After receiving recommendation from expert committee in 2014, the program has been expanded to areas further of the country. The Committee set an objective, to reduce avian influenza outbreak to a level that can be responded effectively through conventional stamping out procedure (2nd AI National Plan, 2009). The vaccination trial was limited in two selected districts initially. The program was implemented through public-private partnership under the control of Department of Livestock Services (DLS). Expert committee selected two killed and one vector immune HVT-AIV vaccines. The target of vaccination were taken as considering all existing breeder stocks, day old chicks produced by the breeder farms and commercial layers. As per policy, farmers bought and vaccinate their flock with the clearance from authority and support to conduct post vaccine surveillance.

### **Experience of AIV vaccination in Bangladesh**

Reporting of clinical outbreaks of HPAI

(H5N1) reduced in Bangladesh after vaccination started in early 2013. Low mortality due to avian influenza in vaccinated flocks almost neglected. Surveillance in live bird market indicates the presence of HPAI (H5N1) in poultry. Other subtypes including H9N2 found dominant in commercial poultry. Farmers are now demanding for H9N2 vaccine permeation.

### **Present status of avian influenza control in Bangladesh**

Due to lack of proper monitoring vaccination activities were failed to achieve its goal. The control of the veterinary authority on vaccination campaign has not always been as per plan. As a result, proper implementation and goal was not achieved. Several investigators reported the presence of HPAI H5N1avian influenza virus in circulation with high mortality. This information also supports the report of National Reference Laboratory for Avian Influenza (NRL-AI). Sink surveillance (conducted by DLS, NRL-AI and FAO) report shows high prevalence of H5 and H9 virus (50% to 90%) over the year in live bird market in Dhaka and Chittagong cities. Samples which were carried to NRL-AI also found presence of avian influenza virus in all types of poultry populations. Most of the breeder and large commercial poultry farms using government selected vaccine. Although they also face clinical problem H9 subtype with high production loss and low mortality. Some farmers discard their flock due to high production loss. NRL-AI, BLRI reported on circulation of LPAI and also HPAI in H5 vaccinated flocks. The report was stated that, avian influenza virus sub-type H5 was not shaded in the farms with good biosecurity but were shaded in 5.8% farms with moderate

biosecurity and 8.1% farms with poor biosecurity. Avian Influenza virus sub-type H9 were shaded in 14.1% farms with good biosecurity, 23.5% farms with moderate biosecurity and 27% farms with poor biosecurity (Samad *et al.*, 2017). Recently, the lab identified avian influenza virus sub-type H5 in H5 vaccinated good biosecurity farms with HI titer >log<sub>2</sub><sup>8</sup>. It indicates immune escape H5 viruses are circulating in poultry in Bangladesh (unpublished data).

### **Conclusion**

Avian influenza is endemic in Bangladesh and has a distinct seasonal pattern. From the experience of last few years it may be concluded that vaccination is not an alternative to biosecurity and conventional stamping out approach of avian influenza control. It could be an additional tool, only if it is used thoughtfully. Stamping out approach needs to be revised and a level of compensation also important for affected farmers.

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