

For information
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Legislative Council Panel on Food Safety and Environmental Hygiene

**Review of the Avian Influenza Risk in Hong Kong and the
Latest Development on Avian Influenza Vaccines
for Local Chicken Farms**

Purpose

This paper briefs Members on the outcome of a recent review on the risk of avian influenza (AI) in Hong Kong and the latest development on AI vaccines after a field trial of an alternative vaccine for local chicken farms.

Background

2. H5N1 highly pathogenic AI viruses have been circulating in Southeast Asia and have been detected in Hong Kong in poultry and/or wild birds every year from 1997, predominantly during the winter season. Since Hong Kong faced the challenge of the first AI outbreak in 1997, a series of preventive and control measures has been implemented to reduce the risk of AI outbreaks at various levels of the live poultry supply chain, including local poultry farms, the wholesale market, retail outlets and at the import level. The situation in Hong Kong has since improved and stabilised over the years but on-going vigilant monitoring is necessary.

3. In late 2009/early 2010, the Government conducted a scientific assessment to evaluate the risk of human infection by AI viruses associated with the live poultry trade in Hong Kong. We also undertook to regularly review the risk with a view to ensuring that policies remain effective and up-to-date in addressing prevailing circumstances.

4. There has been no locally acquired case of human infection with H5N1 viruses in Hong Kong since 1997. Two imported human cases were recorded in 2003, one in 2010 and another one so far in 2012. The local poultry population has not experienced any H5N1 AI outbreaks since December 2008. However, there was one chicken carcass, of unknown origin, that was tested positive for H5N1 and found in the Cheung Sha Wan Temporary Wholesale Poultry Market (CSWTWPM) in December 2011.

Review of AI Risk

5. As mentioned in paragraph 3 above, it is our plan to regularly review the risk of AI in Hong Kong. To this end, the relevant departments have collated scientific data on the global, regional and local AI situation from 2010 to early 2012 and the assessments are set out below.

Local situation

6. With regard to the surveillance of poultry and other birds, the results for 2010 to 2011 are as follows –

- (a) over 79 000 swabs were taken from local chicken farms and all samples were also negative for H5;
- (b) more than 22 000 swabs were taken from over 7.3 million imported poultry and all were found negative for H5;
- (c) at the retail level, over 7 000 faecal samples were taken from market stalls and fresh provision shops selling live poultry and all results were negative for H5 virus;
- (d) over 18 000 samples were collected at various sites habited by wild birds or pet birds, such as the Hong Kong Wetland Park, Mai Po Nature Reserve and Yuen Po Street Bird Garden to screen for the presence of the H5 virus. None of the samples were found to contain H5 virus;
- (e) over 48 000 samples from walk-in aviaries managed by the Leisure and Cultural Services Department were tested for AI with negative results; and
- (f) as part of the dead wild bird collection service that has been offered to the public since late 2005, more than 10 000 dead and sick wild birds were tested by the Agriculture, Fisheries and Conservation Department (AFCD), of which 6 samples (< 0.06%) were confirmed positive for highly pathogenic AI. Please see Table 1 below.

Table 1: Dead wild birds H5N1 Surveillance Results, 2006-2011

Year	2006	2007	2008	2009	2010	2011
Number of dead wild birds tested	9 893	8 719	7 305	8 622	5 207	5 465
Number of dead wild birds found with H5N1 virus	15	21	7	6	1	5
Prevalence	0.15%	0.24%	0.10%	0.07%	0.02%	0.09%

7. In the first five months of 2012, 20 wild birds have been tested positive for highly pathogenic H5N1. While there is a rise in the number of H5 cases in wild birds, it does not necessarily signify any long-term trend. It does, however, demonstrate that the virus continues to circulate in the region and that AFCD must continue with the wild bird surveillance as part of the AI prevention programme. The fact that there were more wild birds found positive with H5N1 in early 2012 but there was no cross-infection to local poultry farms proves the effectiveness of the biosecurity measures at the farm level.

8. A chicken carcass tested positive for H5N1 was found in CSWTWPM on 20 December 2011. Comprehensive testing of birds in the wholesale poultry market and local farms did not identify any further infected chickens and the case appears to have been an isolated incident. The Government took the decisive step to temporarily suspend live poultry trading and imports, and successfully prevented the spread of virus and contained the AI risk. Since that incident, AFCD has strengthened the dead bird monitoring system within CSWTWPM.

9. The data presented above shows that insofar as the local situation is concerned, AI risk has remained relatively stable. The following measures have proved to be continually effective –

- (a) surveillance and monitoring at all levels of the live poultry supply chain (including farms, the wholesale poultry market, retail outlets and the import level), pet bird shops, recreational parks and the wild bird environment including wild bird parks;
- (b) vaccination for both local and imported live chickens;
- (c) regulation of local farms including the enforcement of biosecurity measures;

- (d) import control requiring the importation of Mainland poultry sourced from registered farms with health certificates. Regular inspections are conducted by the Food and Environmental Hygiene Department to registered poultry farms on the Mainland to ensure compliance with AI control requirements;
- (e) the prohibition of the sale of live waterfowl, which can be natural carriers of AI viruses, in retail outlets;
- (f) stringent hygiene requirements in the wholesale market and retail outlets, including thorough cleansing and disinfection of transport cages and vehicles;
- (g) prohibition of overnight stocking of live poultry at all retail outlets;
- (h) ban on the rearing of backyard poultry. AFCD carries out ad hoc enforcement actions to ensure that no illegal backyard poultry are kept. From 2010 to February 2012, three cases of illegal backyard poultry were found, involving 30 chickens and 89 pigeons;
- (j) joint-departmental efforts to prevent illegal importation and smuggling of live poultry and raw poultry meat into Hong Kong; and
- (k) continued monitoring of the AI situation in humans by the Department of Health, as well as education forums for different target groups aimed at raising the community's awareness on the prevention of AI.

10. Reducing the likelihood of human contact with live poultry is a key to minimising the risk of human infection with AI viruses. Since the rolling out of a voluntary surrender scheme in 2004/05 and a buyout scheme in 2008, the landscape of the local live poultry industry has been maintained at the 30 chicken farms (with a total rearing capacity of about 1.3 million chickens), 23 wholesalers and 132 retail outlets. To prevent the AI risk from rekindling, the Government would maintain the status quo for the number and rearing capacity of chicken farms and the supply of live chickens.

Global and regional situation

11. Epidemiological analysis shows that H5N1 AI viruses are still circulating in several countries in Asia, and the Food and Agriculture Organization of the United Nations (FAO) considers H5N1 viruses endemic in poultry in five countries, namely Bangladesh, China, Egypt, Indonesia and Vietnam. H5N1 viruses are also occasionally detected in poultry and/or in wild birds in other countries but the number of H5N1 outbreaks has decreased over the years. Please refer to Table 2 below.

Table 2: *Number of countries/places (including Hong Kong) reporting highly pathogenic AI in domestic poultry and wildlife, 2006-2011 (Source: World Organisation of Animal Health (OIE))*

Year	2006	2007	2008	2009	2010	2011
Number of countries/place	53	34	28	16	17	15
Number of cases	2 543	1 168	2 181	1 326	569	621

12. H5N1 viruses continue to circulate in some countries but mortality in chicken populations is infrequent. This is most likely due to local vaccination programmes. Some places, including Hong Kong, have implemented surveillance programmes and developed rapid response plans and intensive control measures, including the stamping out of infected farms.

13. Based on available information worldwide, there does not appear to be any indication of increased public health risk posed by circulating H5N1 viruses. Human cases of H5N1 infection are rare and they occur sporadically mostly in areas where the virus is endemic in poultry. Table 3 below provides global statistics of confirmed human cases of H5N1 in 2003 to 2011. In those Asian countries that the FAO considers H5N1 endemic in poultry, the reported incidence of human cases has remained stable or has decreased since 2010. On the Mainland, one fatal human case of H5N1 infection in Shenzhen was recorded in 2011. The latest reported case was a fatal case in Guizhou in January 2012. The number of human H5N1 cases on the Mainland over the past six years is set out in Table 4.

Table 3: *Cumulative number of confirmed human cases for avian influenza A (H5N1) reported to the World Health Organization (WHO), 2003-2011*

Year	Number of cases reported	Number of human deaths
2003	4	4
2004	46	32
2005	98	43
2006	115	79
2007	88	59
2008	44	33
2009	73	32
2010	48	24
2011	62	34

Table 4: *Number of human cases of Influenza A (H5N1) in China, 2006-2011 (Source: WHO)*

Year	2006	2007	2008	2009	2010	2011
Number of cases*	13	5	4	7	2	1

*By onset date of cases, according to WHO's summary table

14. It is an inherent property of influenza viruses that they mutate as they circulate in human and animal populations. The resulting genetic diversity allows them to be grouped into “clades” based on their genetic similarity. One clade, namely clade 2.3.2.1, has been increasingly found in poultry and wild birds in several places including Hong Kong (all dead wild birds tested positive for H5N1 since the latter half of 2011 carried virus of this clade). In some areas, e.g. Japan and Korea, clade 2.3.2.1 has become predominant over previously circulating clades.

15. It is known that with the mutation of H5N1 viruses, antigenic changes can occur which may affect the ability of available poultry vaccines to adequately prevent infection and reduce viral shedding in infected birds. It is, therefore, vitally important to regularly monitor virus drift and update AI vaccines for poultry accordingly, as well as to target appropriate vaccines in different regions to best match the circulating strains of virus. There is currently no evidence indicating that any particular clade or strain of the H5N1 virus is more transmissible or pathogenic in humans.

16. In relation to AI vaccines for poultry, Members may recall that we briefed the Panel in January 2011 on a field trial programme to evaluate the efficacy of the Harbin Veterinary Research Institute (HVRI) Re-5 H5N1 AI vaccine (“the Re-5 vaccine”) against highly pathogenic AI viruses in local chicken farms (vide LC Paper No. CB(2)713/10-11(03)). The following section of the paper updates Members on the results of the trial and the way forward.

AI Vaccine for Local Chicken Farms

17. With the endorsement of the Investigation Group on Vaccine Study (IGVS)¹, AFCD launched a one-year field trial of the Re-5 vaccine in early November 2010 to comprehensively evaluate its efficacy and to observe whether it would have any adverse effect on chickens under local conditions. Two local chicken farms participated in the trial on a voluntary basis. Individual batches of chickens from the farms were vaccinated with either the Intervet Nobilis H5N2 AI vaccine (“the Intervet vaccine”, which has been used in local farms since the introduction of the mandatory vaccination programme for chickens in 2003) or the Re-5 vaccine. Results were evaluated through clinical, virological, serological and environmental monitoring.

18. The trial results, as noted by the IGVS, indicated that there were no adverse effects found in chickens associated with the use of the Re-5 vaccine. Chickens vaccinated with the Re-5 vaccine under local field conditions in Hong Kong have been shown to produce an adequate and similar immune response compared to those given the Intervet vaccine. As revealed from both the field trial and previous challenge studies conducted by the Veterinary Laboratories Agency of the United Kingdom, HRVI of the Mainland and the University of Hong Kong in 2009 to 2010, the Re-5 vaccine offers similar safety and efficacy as the Intervet vaccine, yet it confers better protection against challenge viruses tested so far (including the clade 2.3.2.1 virus, which is the predominant strain circulating in wild birds in Hong Kong). Therefore, the IGVS has accepted the recommendation of introducing the Re-5 vaccine as an alternative to the current Intervet vaccine for use in the local chicken farms in Hong Kong. AFCD will provide necessary assistance to the local chicken farmers’ association who has indicated interest to be the importer of the vaccine, to apply for registration of the Re-5 vaccine with the Department of Health.

¹ The IGVS was formed following an AI outbreak in a local farm in December 2008, to examine the efficacy of the existing vaccine and to explore alternative vaccines. It is chaired by the Director of Agriculture, Fisheries and Conservation. Members include experts from the University of Hong Kong, the Ministry of Agriculture of the Mainland, representatives of AFCD and the Department of Health.

19. It should be noted that vaccination is merely one of the measures in place to reduce the risk of infection with H5N1 viruses, the other measures being enhanced farm biosecurity and improvements to market management and practices. AFCD will keep in view the availability of any new vaccines that will offer broader protection against current (and future) strains of H5N1 virus, and assess whether they are suitable for introduction to local chicken farms. Until such time as these vaccines are available, the Re-5 vaccine appears to be the best candidate.

20. The IGVS also anticipated the need to facilitate the use of any newly developed vaccines in future. Virus sequencing will be conducted to determine any antigenic drift and if the drift appears significant, an assessment would be made to determine whether vaccines being used are still efficacious. The Administration will take steps to facilitate the introduction of new antigenically matched vaccines, once their efficacy, safety and quality issues have been resolved.

21. It has come to our knowledge that a new vaccine, Re-6, developed by HVRI, would be introduced in due course on the Mainland to match the prevailing clade 2.3.2.1 of AI virus commonly found in the region. This vaccine is produced by the same production facility as the Re-5 vaccine with the same quality control in place. As the genetic drift of AI viruses appears to have accelerated over the last decade, following the principles outlined above, AFCD will continue with its surveillance programme to keep track of the circulating strains on AI virus in the region and conduct virus sequencing where appropriate so as to identify antigenic drift early. It will also closely monitor the development of the Re-6 vaccine and other vaccines which may come into light, and see to their timely introduction into Hong Kong as appropriate as and when their efficacy, safety and quality are proven.

Conclusion

22. The occurrence of AI outbreaks in different places over the past few years, coupled with the changes in the circulating virus strains, indicate that the threat of AI still persists. Taking account of the scientific evidence gathered so far and all the stringent preventive and control measures in place, we consider that the overall risk of AI in Hong Kong, especially the risk of human infection, has remained at a stable and low level. In fact, the isolated AI incidents in Hong Kong and on the Mainland from end-2011 to present showed that our relevant policies and

measures, including the comprehensive AI surveillance and the contingency response plans, were effective in preventing and controlling AI outbreaks. Upon the introduction of a new AI vaccine for use in local poultry farms later, the protection of the local poultry population against AI viruses will be further enhanced. However, it will not be scientific or realistic to expect complete elimination of AI risk in Hong Kong, as outbreaks may depend on the occurrence of even a series low probability events. It is therefore of utmost importance for the whole society including the Government, the trade and the general public to remain highly vigilant and not to relax the AI prevention and control measures.

23. Members are invited to note the content of this paper.

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Food and Environmental Hygiene Department
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