

Study on the Way Forward of Live Poultry Trade in Hong Kong

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Study on the Way Forward of Live Poultry Trade in Hong Kong

Final Report

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Contents

Executive Summary

1	Introduction	1
1.1	This Study	1
1.2	General Approach and Methodology	1
1.3	Definition of Avian Influenza	2
2	Live Poultry Trade in Hong Kong	3
2.1	History of AI Incidents	3
2.2	Supply of Live Poultry in Hong Kong	5
2.3	Live Poultry Trade Landscape in Hong Kong	6
2.3.1	<i>Farmers and Hatcheries (Local and the Mainland)</i>	6
2.3.2	<i>Wholesalers</i>	6
2.3.3	<i>Retailers (Public Market Stalls and Fresh Provision Shops)</i>	7
2.3.4	<i>Transporters</i>	7
2.4	Live Poultry Trade Operation	7
2.4.1	<i>Registered Poultry Farms on the Mainland</i>	7
2.4.2	<i>Man Kam To Animal Inspection Station</i>	7
2.4.3	<i>Local Chicken Farms</i>	8
2.4.4	<i>Cheung Sha Wan Temporary Wholesale Poultry Market (CSWTWPM)</i>	8
2.4.5	<i>Public Markets/Fresh Provision Shops</i>	9
2.5	Existing Safeguarding Measures	11
2.6	Effectiveness of AI Control Measures	17
2.7	Resources Spent on Existing AI Control Measures	17
3	Case Studies of Other Places	18
3.1	Introduction	18
3.2	Singapore	18
3.2.1	<i>Trade Operation</i>	18
3.2.2	<i>AI Situation</i>	18
3.2.3	<i>Safeguarding Measures</i>	18
3.3	Guangzhou	20
3.3.1	<i>Trade Operation</i>	20
3.3.2	<i>AI Situation</i>	20
3.3.3	<i>Safeguarding Measures</i>	21

3.4	New York City	22
3.4.1	<i>Trade Operation</i>	22
3.4.2	<i>AI Situation</i>	22
3.4.3	<i>Safeguarding Measures</i>	22
3.5	Implications for Hong Kong	24
4	Culinary Preference of Hong Kong People	25
4.1	Introduction	25
4.1.1	<i>Forms of Poultry</i>	25
4.2	Culinary Preference	26
4.2.1	<i>Culinary Preference to Different Chicken Forms</i>	26
4.2.2	<i>Preferences to Different Origins of Live Chicken</i>	26
4.2.3	<i>Consumers' Confidence in Food Safety</i>	27
4.3	Summary	27
5	Stakeholders Views on the Future of Live Poultry Trade	28
5.1	Introduction	28
5.2	Stakeholders Views: Health Experts	29
5.2.1	<i>AI Risk</i>	29
5.2.2	<i>Views on Policy Direction of Live Poultry Trade</i>	29
5.2.3	<i>Views of Scientific Committee on Emerging and Zoonotic Diseases</i>	30
5.3	Stakeholders Views: Members of the Public	30
5.3.1	<i>Hong Kong People's Confidence in Live Poultry Consumption</i>	30
5.3.2	<i>Future Policy Direction of Live Poultry Trade</i>	30
5.4	Stakeholders Views: Trade Operators	31
5.4.1	<i>Policy Direction of Live Poultry Trade</i>	31
6	The Way Forward	32
6.1	Introduction	32
6.2	Should the Live Poultry Trade in Hong Kong be Maintained?	32
6.3	Should the Mode of Operation for Live Poultry Trade be changed to Further Reduce the Risk of AI Infection in Human	33
6.3.1	<i>Banning of live poultry importation</i>	34
6.3.2	<i>Banning of Live Poultry Sale</i>	35
6.3.3	<i>Recommendation</i>	37

7	Potential Improvement Measures against Increasing AI Threats	38
7.1	Methodology	38
7.2	Enhancing Separation	38
7.2.1	<i>Relocation of Wholesale Market</i>	38
7.2.2	<i>Upgrade of Retail Outlets</i>	39
7.2.3	<i>Reducing Staying Time of Minor Poultry in CSWTWPM</i>	40
7.3	Enhancing Monitoring	40
7.3.1	<i>Introduction of H7 Vaccine</i>	40
7.3.2	<i>Pre-sale PCR Testing on Local Poultry</i>	40
7.4	Enhancing Traceability	41
7.4.1	<i>Numbering of Cages</i>	41
7.4.2	<i>Tagging Individual Poultry</i>	41
7.5	Evaluation of Effectiveness and Feasibility of Potential Improvement Measures	42
7.5.1	<i>The Assessment</i>	42
7.5.2	<i>Effectiveness</i>	42
7.5.3	<i>Feasibility</i>	44
7.6	Recommended Improvement Measures	46
7.6.1	<i>Recommended Improvement Measures</i>	46
8	Conclusion	47
8.1	Live Poultry Trade and Culinary Preference	47
8.2	The Way Forward	47
8.2.1	<i>Live Poultry Trade</i>	47
8.2.2	<i>Mode of Operation</i>	48
8.3	Improvement Measures	49

Executive Summary

This study (“the Study”), commissioned by the Food and Health Bureau (“FHB”), is conducted to propose the way forward of the live poultry trade in Hong Kong from the perspective of avian influenza (“AI”) control for safeguarding public health.

Live Poultry Trade

Poultry is an important source of meat in Hong Kong. Over the past 20 years, the total poultry consumption in Hong Kong has shown an increasing trend.

Poultry is available in different forms in the market including live, freshly slaughtered, chilled, frozen and prepared. Chilled, frozen and prepared chickens are mostly imported. Live chickens are supplied by both local farms and registered farms on the Mainland, and freshly slaughtered chickens are produced from these chickens. According to the Agriculture, Fisheries and Conservation Department (“AFCD”), in 2016 the local poultry industry produced HKD400 million worth of produce, which accounted for over 38% of the total produce produced by the local agriculture industry.

The live poultry trade has occasionally been affected by occurrence of avian influenza incidents since the first one occurred in 1997. The Government has since then taken various actions to control the spread of disease and ultimately to safeguard public health. Except the first incident in 1997, so far there has been no confirmed locally infected human case of H5 or H7.

Culinary Preference

A telephone survey was conducted by the Study Team in November and December 2015 with an aim to collect information on the culinary preference of the general public and their views on the way forward of live poultry trade. 1,000 valid responses from the general public were collected.

The survey results showed that nearly half (47%) of the respondents still preferred the consumption of live chickens to other forms of chickens.

Consumption of live poultry is considered a unique culinary culture of the Hong Kong population.

Survey results also showed that about 43% of the respondents would be dissatisfied or very dissatisfied if they could no longer purchase live chickens in Hong Kong.

AI Risks and Existing Safeguarding Measures

According to the World Organisation for Animal Health (“OIE”), both H5 and H7 AI viruses need to be put under close surveillance, and OIE should be notified of incidents caused by H5- or H7-infection of poultry due to their serious socio-

economic or public health consequence. Other avian influenza such as H7N7, H7N3, H10N7 or H6N7 and H9 are usually less virulent.

Since the first human case of H5N1 AI infection occurred in Hong Kong in 1997, numerous safeguarding measures have been imposed by the Government to prevent the outbreak of avian influenza in Hong Kong. These measures can be classified as “preventive”, “surveillance” and “remedial” in nature –

- *Preventive* – Preventive measures include vaccination of poultry, bio-security requirements at the farm level, certification of poultry from the Mainland, strict hygiene requirements in wholesale market and retail outlets, thorough cleansing of transport cages and vehicles, banning overnight stocking of live poultry at all retail outlets, etc.
- *Surveillance* – Surveillance programmes for early detection of signs of AI infection include frequent collection of samples from live poultry and environment at all levels of the live poultry supply chain, and dead bird carcasses reported territory-wide for AI virus testing.
- *Remedial* – In dealing with AI cases, rapid response is of the essence to minimise the chance of human infection. Such responsive measures include detention and culling of infected live poultry, thorough cleansing and disinfection of the nearby environment, etc.

Based on the study of the AI safeguarding measures in other cities in the world and the views of health experts collected, the system of measures currently adopted in Hong Kong is generally amongst the most comprehensive and stringent.

Owing to the safeguarding measures, there has been no locally infected human case¹ of H5N1, H5N6 and H7N9. However, the AI viruses have previously been detected via surveillance measures in different levels of live poultry supply chain, including farm, wholesale, and retail levels.

Although the probability of outbreak of AI in Hong Kong has been kept to minimum by existing safeguarding measures, potential risk of human infection of AI through contact with live poultry shall not be overlooked.

Since the emergence of H7N9 on the Mainland in 2013, as at end December 2016, the total number of cases reported globally had reached 819². According to the World Health Organisation (“WHO”), most such human infection cases had involved contact with infected poultry or exposure to contaminated environments, including live poultry markets. Evidence also shows that H7N9 viruses have become enzootic among poultry in some parts of the Mainland and are unlikely to

¹ There are imported human H5N1 and H7N9 cases and local human cases of H9N2. The latter is considered less virulent.

² Avian Influenza Report, Volume 12 Number 53, published by Centre for Health Protection, HKSARG
<http://www.chp.gov.hk/files/pdf/2016_avian_influenza_report_vol12_wk53.pdf>

be eradicated³. It is also noted that the AI incidents in Hong Kong have all been related to H7N9 since 2014.

Stakeholders Views on the Way Forward of Live Poultry Trade

Stakeholders' views on the future of live poultry trade are divided. There is no public consensus on whether the retail sale of live poultry should continue.

A health expert panel discussion involving five health experts covering major disciplines of public and animal health and 55 trade operators were conducted on 20 April 2016. Another two health experts who were not available for the discussion have provided views on the related subjects.

Some of the health experts participating in the panel agreed that the sale of live poultry at retail level could continue if existing safeguarding measures were further enhanced. Some experts cast doubts if it was necessary to retain the sale of live poultry at retail level due to the potential risk of human contact with live poultry at retail ends. ***Nevertheless, all the health experts supported maintaining the local poultry rearing industry.***

For the general public, with reference to the survey conducted 39% of the respondents did not have any explicit views on the future of live poultry trade, 35% supported prohibiting sales of live chicken at retail level while 26% did not support such a measure. However, as mentioned earlier, 43% surveyed would be dissatisfied or very dissatisfied if they could no longer purchase live chickens in Hong Kong.

Trade operators in general supported maintaining status quo with supply of both local and imported live poultry, which was considered important in preserving local culinary culture and minimising the impact on the trade.

Since the stakeholders' views on the way forward of live poultry trade in Hong Kong have shown to be divided, it should be discriminative when taking into account the views of different stakeholders due to their different positions and knowledge levels on AI risk.

³ "Recommendation on Control of the Risk of Transmission of Avian Influenza to Humans in the Long Term", published by Scientific Committee on Emerging and Zoonotic Diseases, dated July 2016.
<http://www.chp.gov.hk/files/pdf/recommendation_on_control_of_the_risk_of_transmission_of_avian_influenza_to_humans_in_the_long_term.pdf>

Recommendations on The Way Forward

Considering the strong culinary preference for live chicken of Hong Kong people, the prevailing AI risk, and the effectiveness of existing safeguarding measures implemented in Hong Kong to safeguard public health, it is recommended that live poultry trade in Hong Kong should be maintained. This will preserve the culinary culture of Hong Kong people and minimise the impact on the trade operators.

The Study Team has also deliberated the potential changes to the existing mode of operation for the live poultry trade to further reduce the risk of AI infection in human, including:

- Banning of live poultry importation
- Banning of live poultry trade at the retail level

For the first potential change which is to ban the importation of live poultry from the Mainland, the Study Team has found no concrete evidence showing that imported live poultry carry higher risk of AI than that of the local live poultry, in that:

- In reviewing the past AI incidents, evidence shows that the AI incidents happened on both local and imported live poultry.
- Stringent safeguarding measures have been imposed on both imported and local live poultry.

At the same time, according to the survey, live poultry imported from the Mainland is still preferred by some of the Hong Kong population owing to their perceived better meat texture and taste, and often lower price than that of local poultry. Therefore, the importation of live poultry should be maintained.

For the second potential change which is to ban the live poultry trade at retail level, live poultry will need to be slaughtered before delivery to the retail outlets. However, centralised slaughtering at individual farms or centralised slaughtering has been deemed unviable due to reasons of either space, technical or commercial constraints.

While the live poultry trade remains in Hong Kong, in view of the prevailing AI risk, it is strongly recommended that safeguarding measures should be further improved under the existing operation mode of live poultry trade.

Measures that are both effective in mitigating AI risk and feasible to be implemented are recommended for the Government's consideration and further study. First of all, in addition to the bivalent Re6+Re8 vaccine (which can provide sufficient protection against prevailing clades of H5 AI virus) currently used by all local chicken farms and registered farms on the Mainland, considering the increasing risk of H7N9, it is strongly recommended that the Government should

explore the feasibility of introducing additional vaccination in local chicken farms against the new challenge posed by H7N9 AI virus.

Second, for local live poultry, further to the monthly Polymerase Chain Reaction (“PCR”) test (virological testing) and regular and pre-sale serological tests, it is recommended that PCR test should be conducted for each marketable batch before delivery to the wholesale market. This could provide an additional safeguard for detecting AI virus, and thus reducing the possibility of any infected live poultry entering the market.

Third, the live poultry retail outlets are the main contact points between the general public and live poultry. Although numerous safeguarding measures, including stringent hygiene code, regular inspection and sampling, have been applied in the retail outlets, it is recommended that the outlets be upgraded to enhance separation by providing physical barriers. The suggested separation may be conducted in different degree in view of various constraints confronted by different live poultry retail outlets such as their physical locations, scale of operation, a need for re-designing of the market, etc., and should be handled with certain flexibility. Dedicated study and layout design may be required for individual outlets to enhance separation to some extent. The physical barriers in the retail outlets are expected to further minimise the contact between the general public and potential viruses, hence reducing the risk of human infection.

Fourth, it is recommended that the wholesale market at Cheung Sha Wan be relocated to a less populated suburban area. Given that the wholesale market is one of the largest holding place of the live poultry in Hong Kong, relocating the wholesale market can reduce the risk of virus exposure to the public.

Finally, it is recommended to set up a maximum number of days (e.g. 3 to 4 days) for minor poultry staying in the wholesale market, plus compulsory emptying of poultry keeping cages for thorough cleansing. By reducing the staying time of live poultry in the wholesale market, the AI risk at the wholesale level can be further reduced.

Conclusion

In conclusion, the decisions on the way forward of the live poultry trade in Hong Kong are not easy. Based on the study of the current situation and views from interviewed health experts, it is noted that there is no system that can attain zero risk. Nonetheless, the safeguarding measures against avian influenza currently adopted in Hong Kong are regarded as one of the most comprehensive and stringent in the world, and have been effectively keeping the risk of human infection to a minimal. Besides, survey results showed that there was a strong culinary preference for live chickens. Therefore, it is recommended that the live poultry trade in Hong Kong, including the sale of live poultry at the retail level, should be maintained.

Nevertheless, to further safeguard public health, improvement measures have been studied and proposed. The Government should keep in view the developments, including the prevailing AI risk in the region, the occurrence of AI

cases in Hong Kong and the neighbouring places, and consider the implementation of these improvement measures. Costs of these proposed measures are subject to further studies.

Last but not least, the recommendations on the way forward in this Study are made on the basis of the current AI risk level. If AI risk level increases significantly in the future (which is beyond current comprehension), the Government may wish to reassess the necessity of changing mode of operation in the live poultry trade, or even banning of the live poultry trade. Signs of an increasing risk level may include confirmed local cases of human infection, increasing detection of AI in live poultry or environment in Hong Kong, and occurrence of sustained human to human transmission.

1 Introduction

1.1 This Study

This study ("the Study"), commissioned by the Food and Health Bureau ("FHB"), is conducted to propose the way forward of the live poultry trade in Hong Kong from the perspective of avian influenza ("AI") control for safeguarding public health.

The objective of the Study, as specified in the Consultancy Brief, is:

- To come up with proposals and recommendations for the future of live poultry trade in Hong Kong; taking into account an analysis of the current situation, the relevant experiences in comparable cities and the consumption patterns of live poultry in Hong Kong. The reactions and opinions of stakeholders against different measures must also be assessed. Consideration will also be given on the possible mutation of AI viruses into more deadly strains.

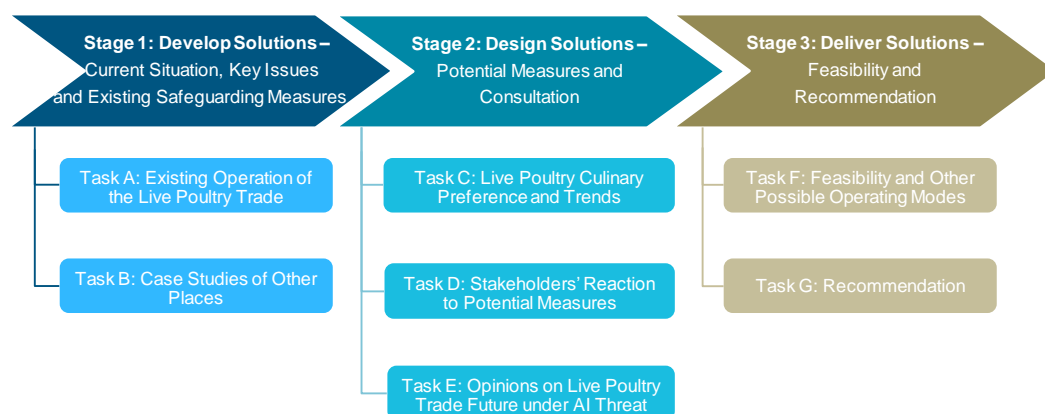
1.2 General Approach and Methodology

The Study included a series of Papers, which aim to address the following key questions.

- Should the live poultry trade in Hong Kong be maintained?
- Should the mode of operation of the live poultry trade be changed to further reduce the risk of AI infection in human?
- Are there any improvement measures that can be applied to further reduce the risk of AI infection in human?

The findings of these Papers, including a questionnaire survey and the extensive consultation with industry undertaken during their preparation, are summarised and applied in this Final Report.

Figure 1.1 Approach of the Study



Source: BMT

1.3

Definition of Avian Influenza

According to World Health Organisation (“WHO”), AI is an infectious viral disease of birds (especially wild water fowl such as ducks and geese), often causing no apparent signs of illness. Most AI viruses do not infect humans; however some, such as A (H5N1), A (H5N6), and A(H7N9), have caused serious infections in people, with fatality in human ranging from about 35% to 60%⁴. According to the World Organisation for Animal Health (“OIE”), both H5 and H7 AI viruses need to be put under close surveillance, and OIE should be notified of incidents caused by H5- or H7-infection of poultry due to their serious socio-economic or public health consequence.

For the purpose of the Study, AI strains that are virulent in human (i.e. strains that can result in serious infection and relatively high rate of death) and of the public’s concern will be considered, typically H5N1, H5N6, and H7N9.

Nonetheless, the Study has also considered the possibility of further mutation of the AI virus in the future and its implications of such a factor in the analysis for the way forward of live poultry trade in Hong Kong.

⁴ According to WHO, the fatality rate of H7N9 in human is about 60%.
<http://www.who.int/influenza/human_animal_interface/avian_influenza/h5n1_research/faqs/en/>

According to FAO, as of 22 February 2017 there were 1,230 human cases of H7N9, including 428 deaths. Hence the case fatality rate was about 35%.
<http://www.fao.org/ag/againfo/programmes/en/empres/h7n9/situation_update.html>

There were only 16 human cases of H5N6 globally, as of 25 February 2017. (No detailed information of fatality rate is available.)

2 Live Poultry Trade in Hong Kong

2.1 History of AI Incidents

The first human case of H5N1 AI infection occurred in Hong Kong in 1997. Since then, there are a number of imported human cases and incidents reported among live poultry. The history of AI incidents in Hong Kong is summarised as follows:

Human cases

1997: the first human case of H5N1 infection was isolated in a three-year-old boy in Hong Kong. There were in total 18 human cases of H5N1 infection recorded, with six fatalities.

2003: two imported human infection cases of H5N1 AI virus were reported. The patients were father and son who had visited Fujian Province and they were believed to have come in contact with live poultry.

2010: an imported human case of H5N1 was identified in November. The patient had travelled to the Mainland before she was found infected.

2012: In June, an imported human case of H5N1 was identified. The patient lived in Guangdong Province with his parents.

2013: first imported human case of H7N9 infection reported in December where the patient slaughtered and cooked a live chicken for consumption during her visit to Shenzhen. Since then 18 imported human cases of H7N9 were confirmed in Hong Kong (as at end December 2016).

Poultry cases

1997: Multiple incidents of H5N1 were detected at poultry farms in Hong Kong; poultry at Cheung Sha Wan Temporary Wholesale Poultry Market (“CSWTWPM”) also tested positive. H5 AI virus were also found in the live poultry retail outlets of Hong Kong.

2001: H5N1 virus was detected in ten retail outlets of live poultry in Hong Kong.

2002: H5N1 was detected in samples from retail outlets and the wholesale market in January. H5N1 virus was then detected in poultry samples from 22 local poultry farms in February and March. Later in December, waterfowl and other wild birds at two recreational parks in Hong Kong were isolated with H5N1. H5N1 incidents also occurred in five unvaccinated chicken farms in late December 2002 and January 2003.

2008: Environmental samples taken from three poultry stalls in Sham Shui Po were tested positive for H5N1. Subsequently, samples from three other retail outlets in

Fanling, Ap Lei Chau and Tuen Mun also tested positive for H5N1. In December, H5N1 virus was detected in a chicken farm in Yuen Long.

2011: A dead chicken found at the CSWTWPM during routine inspection was tested positive for H5N1.

2014: In January, a number of positive samples tested with H7 Polymerase Chain Reaction (“PCR”) test in a batch of imported live chicken at CSWTWPM were confirmed. In December, samples from a consignment of imported live chickens tested positive for H7 AI by PCR test.

2016: In June, AI strain H7N9 was found in a sample of faecal droppings of live poultry taken from a poultry stall in Tuen Mun.

During the above incidents, the Government has ordered culling of potentially infected live poultry to control the disease. Details of the culling actions are summarised in the following table.

Since the first AI outbreak in 1997, the Government has taken a series of measures with reference to international practices to help prevent and control the disease. The most significant measures include mandatory H5 vaccination programme in 2003 and banning of overnight stocking of live poultry at retail outlets in 2008 and surrender and buyout schemes in 2004 and 2008. Details of the key measures implemented will be discussed in Section 2.5.

Table 2.1 Number of Live Poultry Culled

Year	Virus type	Point of supply chain	Number of Live Poultry Culled
1997	H5	Local farms, wholesale market and retail outlets	1.5 million
2001	H5	Retail outlets	1.4 million
2002	H5	Local farms, wholesale market and retail outlets	1.0 million
2008	H5	Retail outlets and a local farm	110,000
2011	H5	Wholesale market	20,000
2014	H7	Wholesale market	40,000
2016	H7	A retail outlet	5,600

Source: FHB, AFCD, FEHD, LegCo Papers

2.2

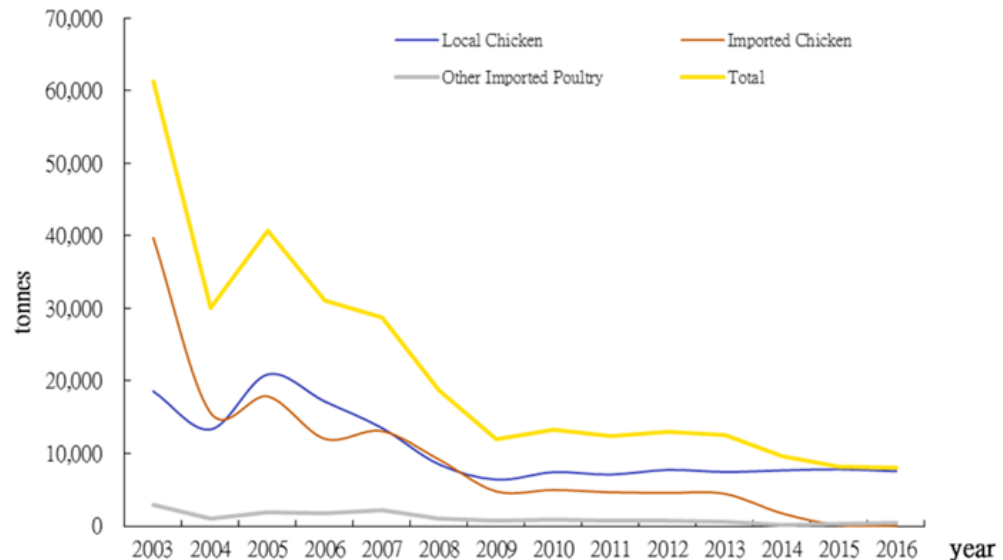
Supply of Live Poultry in Hong Kong

Pork, poultry, beef and mutton, are the major types of meat consumed in Hong Kong. Poultry is available in different forms in the market including live, freshly slaughtered, chilled, frozen and prepared.

Yellow chickens historically account for about 80-90% of the total live poultry consumption in Hong Kong. Minor poultry such as pheasants (雉雞), chukars (石雞), silky chickens (竹絲雞) and pigeons take up the rest of the market share. Live poultry is either produced locally or imported from the Mainland. At present, local poultry farms produce only yellow chickens, whereas registered farms on the Mainland are eligible to supply both yellow chickens and minor poultry.

As seen in Figure 2.1, the live poultry supply in Hong Kong has dropped significantly since 2003. The decrease resulted from the combined effect of the decrease in number of live poultry imported from the Mainland and the decrease in local supply, which might be attributed to the reduced consumer demand, and a result of the conscious policy decisions of the Government to downscale the live poultry trade in view of the on-going AI threat. As a result of the Voluntary Surrender Scheme ("VSS") and Buyout Scheme, the total licensed rearing capacity of poultry farms in Hong Kong was reduced from 3.9 million in 2004 to about 1.3 million in 2009.

Historically, about 70% of live poultry were imported and the rest were supplied locally. Following AI incidents in imported live chickens in 2014, the relevant Mainland authority has strengthened their safeguard measures on registered farms. The supply of imported live chickens has been reduced and there has been no import of live chickens from the Mainland since 17 February 2016 notwithstanding that the Hong Kong Government has not banned the importation of live poultry from the Mainland. Currently, the supply of minor poultry still continues. Live chickens consumed in Hong Kong since then has been mainly supplied locally.

Figure 2.1 Live Poultry Supply in Hong Kong 2003-2016

Source: AFCD, FEHD

2.3 Live Poultry Trade Landscape in Hong Kong

Key operators involved in the live poultry trade of Hong Kong include:

2.3.1 Farmers and Hatcheries (Local and the Mainland)

At the end of December 2016, there were a total of 29 licensed chicken farms in Hong Kong with the overall maximum licensed rearing capacity being capped at around 1.3 million. Individual rearing capacity ranges from 10,000 to 162,300 chickens per farm. Fifteen of them are eligible to hatch eggs to produce day-old chicks (while in reality not all may hatch eggs). Local chicken farms are scattered in the New Territories, many of which are located in Yuen Long. In addition, there are four off-farm hatcheries in Hong Kong which supply day-old chicks to local farms.

At the end of December 2016, there were 34 registered farms on the Mainland eligible for exporting live poultry to Hong Kong and Macao under the farm registration system of the General Administration of Quality Supervision, Inspection and Quarantine of China ("AQSIQ"). Nine of the registered farms supply day-old chicks to Hong Kong.

2.3.2 Wholesalers

At the end of December 2016, there were 23 wholesalers, among whom 2 engage in trading imported live poultry only; 11 engage in trading local live chicken only; and 10 wholesalers are inactive.

2.3.3 Retailers (Public Market Stalls and Fresh Provision Shops)

At the end of December 2016, there were 130 retail outlets with endorsement to sell live poultry, including 85 operating in public markets managed by the Food and Environmental Hygiene Department (“FEHD”) and 45 licensed fresh provision shops.

2.3.4 Transporters

At the end of December 2016, there were 91 transporters in Hong Kong involved in the transportation of live poultry, of which 26 are responsible for the transportation from the local farms to the wholesale market, 6 cross-boundary trucks are responsible for transportation from the Mainland farms to the wholesale market and 61 transporters are responsible for the transportation from the wholesale market to the retail outlets.

2.4 Live Poultry Trade Operation

2.4.1 Registered Poultry Farms on the Mainland

The 34 registered farms are subject to regular inspections by the relevant Entry-Exit Inspection and Quarantine authorities (“CIQ”) and the Centre of Food Safety (“CFS”) of FEHD to ensure compliance with the prescribed AI control requirements (as discussed in Section 2.5).

According to the Administrative Measures on Inspection and Quarantine of Live Birds Supplied to Hong Kong and Macao (供港澳活禽檢驗檢疫管理辦法) issued by AQSIQ, prior to exportation to Hong Kong, live poultry at the registered farms will be put under quarantine for 5 days during which AI tests (including serological test and PCR testing against AI, including H5 and H7) are conducted.

If the live poultry are qualified, veterinary officers authorised by CIQs will issue an “Animal Health Certificate” (with 3 days validity). The consignment of live poultry shall be transported to exit ports by designated vehicles, and the actual number of exported live poultry is checked by CIQs and the vehicles are sealed there. A “Certificate of Inspection for Goods Outward” (出境貨物通關單) is then issued. The handover of live poultry at exit ports needs to be carried out at venues designated by CIQs. All relevant personnel and transportation tools are disinfected at the designated spot with inspection by CIQ officers.

2.4.2 Man Kam To Animal Inspection Station

The importation of live poultry for food consumption is controlled by the regulations under the Public Health (Animals and Birds) Ordinance (Cap. 139). Public Health (Animals and Birds) Ordinance (Cap. 139A) stipulates that the live poultry intended to be slaughtered for food in Hong Kong can only be imported via designated point of entry, i.e. Man Kam To Boundary Control Point.

After customs clearance, the vehicles carrying imported live poultry are inspected by FEHD officers at the Man Kam To Animal Inspection Station in between 9am to 2pm under normal circumstances.

CFS will verify and collect the Animal Health Certificates of each poultry consignment and the field officers will examine the physical conditions of the poultry for any clinical symptoms. Samples are then collected by CFS for PCR and serology tests of H5 and H7 at the Tai Lung Veterinary Laboratory operated by the Agriculture, Fisheries and Conservation Department (“AFCD”).

After inspection, CFS officers will seal the door of the vehicle with a plastic strip and a “Record of Movement for Poultry Truck” will be issued to the driver of the vehicle. Under Cap. 139A, the imported live poultry must be transported to Cheung Sha Wan Temporary Wholesale Poultry Market in the most direct route after entering Hong Kong.

2.4.3

Local Chicken Farms

Chickens reared at the local farms come from two main sources – locally-bred and imported day-old chicks. Local chicken farms must hold a Livestock Keeping Licence (“LKL”) as required under the Public Health (Animals and Birds) (Licensing of Livestock Keeping) Regulation (Cap. 139L). AFCD inspects local chicken farms at least once a week for hygiene, health conditions of the chickens and compliance with the licensing conditions. Every pre-sale batch will be tested serologically for H5 and samples will be collected monthly for serological testing of H7 and PCR testing for both H5 and H7.

Upon satisfaction, AFCD will issue a “Blood Test Certificate and Poultry Transportation Authorisation” in respect of the poultry consignment concerned. Prior to sales, poultry farmers would contact AFCD to obtain an approval code upon presenting the unique farm number and PIN. The chickens are then ready to be transported to CSWTWPM for trading.

Chickens from local farms are typically transported from the farms to CSWTWPM between 8 pm to 12 midnight. It is the usual practice that wholesalers would be responsible for hiring transporters to pick up the chickens at local farms. The transporters would have to first disinfect their vehicles at the CSWTWPM and collect clean empty poultry cages upon presentation of the approval code and a “Cage Removal Form”. Upon arrival at the farm, the vehicle must be sterilised before entering into the farm. The chickens will be collected and carried by the clean empty cages. The vehicle loaded with chickens must also be sterilised before leaving the farm.

2.4.4

Cheung Sha Wan Temporary Wholesale Poultry Market (CSWTWPM)

Established in 1974, CSWTWPM is the only wholesale poultry market in Hong Kong at present, handling both imported and local poultry.

Handling of Imported Poultry

When consignments of imported live poultry arrive at CSWTWPM, FEHD staff will break the plastic seal on the door of the vehicles and verify the relevant records. Live poultry in cages will be unloaded by transporters and the wholesalers will transfer the live poultry to cages rented with the wholesaler association. AFCD will then arrange labels (in green colour) bearing the vehicle registration number and the date, to be tagged on poultry cages. The imported poultry will be stored at wholesalers’ stalls while awaiting the AI testing results. In the meantime, the

compartments of cross-boundary vehicles and the used cages are cleaned before they leave.

Normally, the AI testing results for imported live poultry will be available in 4 to 5 hours. Local live chickens are delivered to CSWTWPM after the test results are confirmed negative for imported poultry, thereby avoiding unnecessary infection and culling on the part of local live chickens if the imported poultry are confirmed to be carrying H5 or H7 AI virus. If the imported poultry are suspected to be infected with such AI viruses, local farms will be informed to put on hold the delivery of their live chickens to CSWTWPM.

Handling of Local Chickens

When consignments of local chickens arrive at the wholesale market, AFCD staff will verify the PIN number on the Blood Test Certificate. They will cross-check the number of cages with the Cage Removal Form, as well as the number of birds sent from the farm. If there is any mismatch of the information, the chickens concerned will be detained. AFCD will arrange labels (in orange colour) bearing the vehicle registration number and the date, to be tagged on poultry cages.

Wholesaling and Handling of Leftover Poultry

Wholesale trading activities typically start at around midnight to 4 am the next day. Wholesalers could bring up for sale the poultry left over from the previous day and trade. Any leftover chickens after trading hours will be stored at dedicated bird-proof stocking area. These leftover chickens are required to be sold within 24 hours and the number of leftover chickens is counted and recorded.

Sold poultry will be distributed to retail outlets by vehicles hired by retailers at around 4am to 7am the next day. Live poultry will be kept at cages in retail outlets and the transport cages will be returned to CSWTWPM usually within 24 hours.

All vehicle entering and leaving CSWTWPM has to go through a disinfection pool for cleansing the wheels of the vehicles. Details of other preventive and surveillance measures taken at CSWTWPM will be discussed in Section 2.5.

2.4.5

Public Markets/Fresh Provision Shops

Daily trading takes place at the wholesale market before 4 am, whereby the buyers, who help the retailers to select chickens and negotiate price, purchase the chickens from the wholesalers. However, the majority of retailers normally place forward orders by phone with the wholesalers so that both parties know how many to supply each day. Retailers usually buy live poultry from a handful of farms through the wholesalers' arrangement. According to industry stakeholders, the retailers will arrange transportation of live poultry to retail outlets. As a licensing condition, the poultry sold at the retail outlets must come from designated wholesale market, i.e. CSWTWPM or a source approved by FEHD.

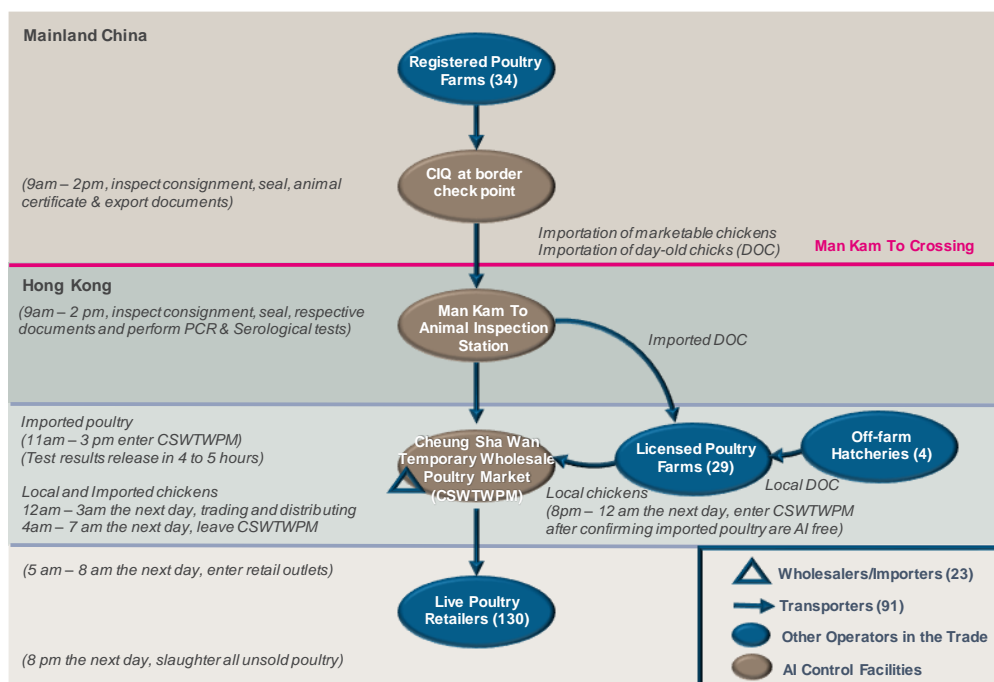
Retail outlets (including both public market stalls and fresh provision shops ("FPS")) are usually opened between 6 am and 8 pm. Live poultry are delivered to retail outlets at 5am to 8 am. No live poultry are allowed to be kept at retail outlets

between 8 pm each day and 5 am the next day⁵. Upon arrival, live poultry will be transferred from the plastic transport cages to stainless steel cages inside the stalls or shops. As mentioned earlier, vehicles transporting used cages will return to CSWTWPM within 24 hours. The retail outlets are the designated locations for poultry slaughtering. Freshly slaughtered poultry are sold to individual customers and restaurant for consumption. Any unsold live poultry will have to be slaughtered by 8 pm.

After each business day, all wall, floor surfaces, all cages for the storage of live poultry, and utensils, equipment or facilities shall be kept clean and be thoroughly washed and disinfected.

There are other AI preventive measures implemented at the retail outlets. These include requiring the retailers to install movable transparent acrylic panels around the cages facing the pavement or common passageway to avoid human and poultry contact, thoroughly cleanse and disinfect the retail premises including slaughter equipment and chicken cages every night, as well as requiring retailers to wear protective gears. Details of the preventive and surveillance measures will be discussed in Section 2.5.

Figure 2.2 Live Poultry Supply Chain and AI Control Check Points



Source: Consultations with FHB, AFCD, FEHD

⁵ According to section 30AA(1A) of the Food Business Regulation, Cap. 132X, if a black rainstorm warning or a gale warning is in force at any time between noon and 8:00 p.m. on a day, a permittee is exempt from compliance with subsection (1)(a) on that day, namely the permittee shall ensure that each day, before 8:00 p.m., all poultry remaining at the relevant permitted premises (whether sold or unsold) is slaughtered; and from compliance with subsection (1)(b), namely the permittee shall ensure that there is no live poultry at the permitted premises between 8:00 p.m. each day and 5:00 a.m. the next day

2.5 Existing Safeguarding Measures

The AI preventive and surveillance measures along the live poultry supply chain introduced by the Government over the years were designed and implemented with reference to international practices, including the World Organisation for Animal Health (“OIE”), Food and Agriculture Organisation of the United Nations (“FAO”) and World Health Organization (“WHO”)⁶. These measures can be classified as “preventive”, “surveillance” and “remedial” in nature –

- *Preventive* – Preventive measures include vaccination of poultry, bio-security requirements at the farm level, certification of poultry from the Mainland, strict hygiene requirements in wholesale market and retail outlets, thorough cleansing of transport cages and vehicles, banning overnight stocking of live poultry at all retail outlets, etc.
- *Surveillance* – Surveillance programmes for early detection of signs of AI infection include frequent collection of samples from live poultry and environment at all levels of the live poultry supply chain, and dead bird carcasses reported territory-wide for AI virus testing.
- *Remedial* – In dealing with AI cases, rapid response is of the essence to minimise the chance of human infection. Such responsive measures include detention and culling of infected live poultry, thorough cleansing of the nearby environment, etc.

The safeguarding measures are summarised in the following table.

⁶ International practices include “Terrestrial Animal Health Code” by OIE, “Codex Alimentarius” by FAO and guidelines in pandemic influenza preparedness by WHO.

Table 2.2 Summary of Safeguarding Measures across the Live Poultry Supply Chain

	Preventive	Surveillance	Remedial
Registered Farms on the Mainland	<ul style="list-style-type: none"> • Farm registration system: imported live poultry must be sourced from a registered farm. • Import quota: maintained a 7,000 quota on daily live chicken imports. • Health certificate: certifying that the live poultry are free from H5 and H7 AI and were properly vaccinated against H5 avian influenza virus. • Mandatory vaccination against H5 AI: Live poultry destined for Hong Kong must be vaccinated against H5 AI (except poultry with short life span (i.e. pigeon)). • Quarantine: poultry designated for export are put under quarantine for 5 days. • Biosecurity measures: strict requirements are set up for many aspects of farm design and operations. • Physical separation: no other animal farm, veterinary hospital, livestock market or slaughterhouse within a radius of 1km of the farm. 	<ul style="list-style-type: none"> • Inspections: all farms subject to regular inspections to ensure compliance with the bio-security requirements. • AI tests: required before the poultry leaves the farm. • Handover of live poultry to be at designated venues where all transportation equipment are disinfected. 	<ul style="list-style-type: none"> • Zonal policy: For H5 outbreak in registered farm: Suspend live poultry and poultry products from whole province up to 21 days. 13 Km suspend for at least 21 days and 3 Km suspend for 90 days. For H7 outbreak in registered farm: Only live poultry from infected farm will be suspended for 21 days. • Response to AI outbreak on the Mainland: maintain close liaison with the Mainland authorities on the development of outbreak.
Man Kam To Animal Inspection Station		<ul style="list-style-type: none"> • Documentary check: validates health certificates. • Inspection: for any injury or clinical sign of disease. • Collect samples for AI tests: 30 samples in each consignment collected for PCR test for influenza A virus, with 30 samples already tested by relevant 	

	Preventive	Surveillance	Remedial
		Mainland authority (i.e., relevant CIQs). Blood samples from 21 poultry tested for sufficient antibody level against H5 (in alternative consignment) and presence of antibody against H7 (fortnightly on farm basis).	
Local Poultry Farms	<ul style="list-style-type: none"> • Banned direct sales from local farms to market. • Bird-proof facilities required for all local farms. • Disinfection facilities at the entrance of the farms: including disinfectant, washing detergent/soap and water, and body protection. • Separation of different types of chicken: to better monitor which chickens have received the vaccine/blood test. • A distance of at least 500m between two farms. • Rearing capacity: The total licensed rearing capacity of poultry farms in Hong Kong has been capped at around 1.3 million. • Mandatory vaccination against H5 AI: all live poultry destined for Hong Kong must be vaccinated against H5 AI. Two shots of vaccines are administered, typically at the age of 8 days old and 1 month later. • Importation of day old chicks (where applicable): should be supplied by registered farms on the Mainland and be accompanied with an animal health certificate. 	<ul style="list-style-type: none"> • Inspection: regular inspections by AFCD to ensure compliance with the bio-security and licensing requirements. • Detection: local farms are required to place sentinel chickens in each batch of vaccinated chickens for detecting the infection. Health condition of vaccinated and sentinel chickens closely monitored. • AI testing: swabs and blood samples are collected from both vaccinated and sentinel chickens for PCR test and serological testing. • Environmental surveillance: every month, AFCD randomly selects 9 farms and collect environmental samples for AI testing. • Inspection (on-farm hatcheries): review records, conduct egg count and chicken count. • Reporting: farmers are required to report abnormal death of chickens to AFCD for investigation. 	<ul style="list-style-type: none"> • Response to infection case: the farm will be declared an “infected area” and any live poultry in the infected farm will be destroyed and a 3km radius zone will be drawn up within which farms will be suspended for enhanced surveillance. • Inspection of other farms: If one farm is found affected by AI, AFCD will inspect all other live chicken farms in Hong Kong and collect additional samples for AI testing. • Trading of live poultry in Hong Kong will be suspended. Trading will be resumed and local farms can restore supply of live chickens to the market after they are confirmed to be AI-free.

	Preventive	Surveillance	Remedial
	<ul style="list-style-type: none"> • Records: entry and exit records of chicken are updated on a daily basis. 		
Cheung San Wan Temporary Wholesale Poultry Market	<ul style="list-style-type: none"> • Cleansing and disinfection: market floor disinfected twice every week. The stocking area of unsold chickens is cleaned every hour when it is in use. The market floor, lorry parks and walkways are cleaned daily after trading hours. • Disinfection pool for vehicles entering and exiting the market is provided at the market entrance. Disinfection fluid will be added once per 3 hours. • All used cages must be cleaned before being used again. • Separation: only same type and same batch of poultry will be stored in the same cage and they are labelled to differentiate between imported and local poultry to facilitate tracing. • Bird proof facilities: Leftover chickens will be stored separately according to source in dedicated bird-proof stocking area. • Left over chickens must be sold and removed from the wholesale market by 7am on next trading day. 	<ul style="list-style-type: none"> • Sampling: Faecal, environmental swab and drinking water samples are collected for AI testing. The frequency of sample collection is currently four times per month covering 288 sampling spots. • Inspections: subject to inspection (regular and surprise checks), including the cleansing and disinfecting of poultry cages. • Leftover poultry: serological test on leftover chickens and minor poultry will be conducted. • Dead chicken: Wholesalers are required to report any dead chicken found as soon as possible. Dead chickens will be collected for AI testing. • Seal of cross boundary truck transporting imported chicken to CSWTWPM should remain intact until after checking of relevant documents by staff of FEHD. 	<ul style="list-style-type: none"> • Response to AI incident: in case of samples from poultry kept are tested H5 or H7 positive, all poultry in the wholesale market will be culled. CSWTWPM will be closed and trading of live poultry will be suspended for at least 21 days.
Live Poultry Retail Outlets	<ul style="list-style-type: none"> • Segregation policy: sale of waterfowl in live form has been prohibited. In addition, quails are prohibited from sale at retail markets. • Cleansing and disinfection: public areas in public markets must be cleaned 3 times per day and live 	<ul style="list-style-type: none"> • Inspections: public market stalls and fresh provision shops selling live poultry to be inspected by FEHD every day and once a week respectively. • Sampling: faecal and drinking water samples are collected for AI testing. 	<ul style="list-style-type: none"> • Report abnormal death rate and provide the dead poultry to government officer for laboratory investigation. Existing licensing conditions of fresh provision shops and tenancy agreements of live poultry market stalls also stipulated that no live poultry shall be removed from the fresh provision

	Preventive	Surveillance	Remedial
	<p>poultry stalls must be cleansed and disinfected at the end of the day.</p> <ul style="list-style-type: none"> • Rest day (from 2001 up to 2008): Monthly rest day to facilitate thorough cleansing and disinfection. • Ban on overnight stocking (from 2008): live poultry that remain unsold must be slaughtered by 8pm every day. • Approved source of supply: Poultry should be obtained from the wholesale market or an approved source. • Slaughtering: should only be conducted in the trough in the slaughter / scalding / dressing room. Poultry carcasses and offal should be handled separately. • The Food Hygiene Code, which provides guidelines on the handling of live poultry, hygiene, slaughtering process, and display of dressed poultry, should be practiced by operators and food handlers. • Cages facing the pavement or common passageway shall be segregated by a transparent acrylic panel. 	<ul style="list-style-type: none"> • Records: showing supply of live poultry should be kept for at least 60 days. • Report: All incidents where abnormal deaths of poultry when the sum of dead poultry in the previous 24 hours exceeds 5% of the total number of poultry (including the dead and alive) in cages are found should be immediately reported to FEHD. 	<p>shops and live poultry market stalls at all time.</p> <ul style="list-style-type: none"> • Culling: If positive H5 or H7 samples are detected by PCR test at a live poultry stall, culling of all live poultry in the concerned market stall or fresh provision shop selling live poultry in the vicinity, and closure of the retail outlets concerned for 21 days may be required, to prevent the spread of avian influenza and to minimize the risk of human infection. After depopulation, FEHD will disinfect all the market stalls / all licensee of the fresh provision shop will disinfect the premises to the satisfaction of the FEHD before resumption of its operation.
Vehicles transporting live poultry	<ul style="list-style-type: none"> • Hygiene: thorough cleansing and disinfection of venue, transport cages and vehicles required. No overcrowding. • Cleansing and disinfection: all vehicles must be disinfected before entering or leaving local chicken farms. When leaving CSWTWPM, the vehicles must be disinfected again. • Transportation: cages for conveyance of live poultry should be returned to the 	<ul style="list-style-type: none"> • Inspection: trucks carrying imported poultry are inspected, sealed and issued a certificate. On arrival at CSWTWPM, the seal should remain intact and record will be verified. 	<ul style="list-style-type: none"> • All vehicles, equipment and facilities are required to be thoroughly disinfected.

	Preventive	Surveillance	Remedial
	<p>wholesale market for cleansing and disinfection after delivery at retail outlets.</p> <ul style="list-style-type: none"> • Poultry coming from different farms cannot be carried by the same vehicle at the same time. 		
Other Measures	<ul style="list-style-type: none"> • No keeping of poultry in backyards. • Voluntary Surrender Scheme (2004) and Buyout Scheme (2008): provides financial assistance and ex-gratia payment to operators who leave the live poultry trade in order to reduce the scale of the live poultry trade. • Free seasonal influenza vaccine given to workers in the live poultry trade. • Government promulgated the “Preparedness Plan for Influenza Pandemic” to enhance government and community preparedness to deal with pandemic influenza emergencies, including avian influenza. • Poultry culling operation training in preparation for outbreak training is offered to various divisions of AFCD as part of the contingency plan. 	<ul style="list-style-type: none"> • Surveillance: comprehensive surveillance and monitoring at all levels of live poultry supply chain to ensure early detection of abnormalities. • Importation: Prevent the illegal import of live poultry or uncooked poultry meat into Hong Kong by travellers, including deployment of detector dogs to check travellers’ baggage at the boundary control points. 	<ul style="list-style-type: none"> • Contingency response: culling of live poultry and suspension of live poultry trade will be deployed where necessary in case of confirmed AI cases.

Source: FHB, AFCD, FEHD, LegCo Papers

2.6 Effectiveness of AI Control Measures

Based on the assessment, the existing safeguarding measures against AI adopted in Hong Kong are considered comprehensive. They include preventive, surveillance and remedial measures that cover all levels of the supply chain, from local farms and registered farms on the Mainland to wholesale market and retail outlets.

Although there were several AI incidents at different levels of the supply chain since the first outbreak in 1997, there has been no locally infected human case of H5 or H7, the AI strains which are virulent and of public concern. Hence the safeguarding measures are considered effective in preventing human infection of AI. The effectiveness of existing safeguarding measures was also agreed by all the health experts that participated in the health panel and interviewed.

Nonetheless, given the known characteristics of AI virus (e.g. their ability to mutate at unknown speed, and the high mortality rate that may be caused by certain strains), it is raising concerns and risk that should not be overlooked. The set of safeguarding measures should therefore be continuously reviewed and improved upon, should the live poultry trade continue.

2.7 Resources Spent on Existing AI Control Measures

The set of AI control measures takes up both human and financial resources. Government expenditure on regular operation and surveillance works cost about HKD 63.03 million in 2015-2016⁷. Additional cost will be required during AI incidents when culling operation is conducted, compensation and ex-gratia payments are granted to poultry operators, etc.

Considering that annual supply of live poultry is around 8 million kilograms⁸, the cost spent on safeguarding measures is equivalent to about HKD 8 per kilogram of live poultry (or less than HKD 15 per poultry⁹). Given the potential severe consequence that may be caused by AI, this cost is considered reasonable compared to the enduring retail price of HKD 200 per chicken surveyed.

⁷ LCQ5: Prevention and control of epidemics and influenza winter surge
<http://www.fhb.gov.hk/en/legco/replies/2017/lq170208_q05.htm>

⁸ Wholesale and Consumption of Fresh Food 2016, published by AFCD
<https://www.afcd.gov.hk/english/agriculture/agr_fresh/agr_fresh_fur/files/Fact_sheet_on_food_supply_e_2016.pdf>

⁹ According to Hong Kong Annual Digest of Statistics 2016, about 4.44 million heads of poultry was sold through CSWTWPM in 2015. <<http://www.statistics.gov.hk/pub/B10100032016AN16B0100.pdf>>

3 Case Studies of Other Places

3.1 Introduction

Three cities, each with a different mode of operation in its live poultry trade and a relatively high population density were studied. Two of them possess similar culinary and traditional culture to Hong Kong. They are namely:

- Singapore (with no live poultry for sale at retail markets),
- Guangzhou (with live poultry for sale at restricted areas), and
- New York City (with live poultry for sale at retail markets).

The implications of the other places' experience to Hong Kong and the possibility for Hong Kong to take reference from any of the successful experiences will be discussed.

3.2 Singapore

3.2.1 Trade Operation

In Singapore, the slaughtering of live poultry in wet markets has been phased out since 1993. Live poultry are imported from farms in Malaysia. The slaughtering of imported live poultry is conducted in 14 slaughterhouses (10 for chickens and 4 for ducks) before selling in retail markets. The local poultry farms in Singapore are for the production of eggs rather than of meat.

3.2.2 AI Situation

There have been no notifiable AI cases reported in Singapore, either in human beings or poultry. Many countries in Southeast Asia experience frequent and reoccurring outbreaks. For example, Indonesia has declared H5N1 as endemic since September 2006 and according to OIE there has been 2,746 AI cases detected in the poultry population in Vietnam and over 1,141 cases detected in Thailand during the period from end 2003 to end 2016¹⁰. The threat of avian influenza is of great concern to the Singapore authorities.

3.2.3 Safeguarding Measures

The measures adopted in Singapore to prevent, monitor and remediate infection are comprehensive. Every stage of the supply chain is controlled under strict

¹⁰ Outbreaks of Highly Pathogenic Avian Influenza (subtype H5N1) in poultry notified to the OIE from the end of 2003 to 28 November 2016, published by OIE
<http://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/graph_avian_influenza/graphs_HPA_L_28_11_2016.pdf>;
Update on highly pathogenic avian influenza in animals (type H5 and H7), published by OIE
<<http://www.oie.int/en/animal-health-in-the-world/update-on-avian-influenza/2016/>>

biosecurity measures imposed by the Agri-Food & Veterinary Authority of Singapore (“AVA”). A complete surveillance program is also implemented to detect AI in the poultry supply chain as well as in wetland reserves, migratory birds, residential birds, ornamental birds, etc. Exercises simulating the remedial efforts during an AI pandemic are also conducted to improve contingency plans and the coordination among agencies during national crisis.

Table 3.1 Safeguarding Measures Implemented in Singapore

Type of Measures	Details
Preventive	<ul style="list-style-type: none"> No broiler farms in Singapore. Biosecurity measures and registration of vehicles and visitors are required for layer farms. An accreditation system maintained for all countries and farms eligible for exporting live poultry to Singapore. Veterinary certification is required for each imported poultry consignment. Movement control, e.g. each consignment must come from a single farm and movement of poultry must make use of the shortest route and via Tuas Second Link Bridge. Slaughtering of live poultry in wet markets has been phased out since 1993. Poultry slaughtering could only be carried out in approved slaughterhouses. The full slaughtering process must meet AVA's health and hygiene requirement. Locations of slaughterhouses are chosen by the Singapore Government and away from residential areas. Food safety control of chilled poultry at retail outlets. Ban on keeping of more than 10 pet poultry on non-commercial premises. H5 vaccination for high risk bird species (such as peafowl, bar-headed geese and Egyptian geese) and biosecurity measures in zoo, bird parks and botanic gardens.
Surveillance	<ul style="list-style-type: none"> Regular random audit inspections for all accredited farms in Malaysia and licence will be suspended for non-conformance of food safety requirements. Temperature check for farm workers. Local layer farms are inspected every year. All consignments of live poultry are inspected at the Tuas Checkpoint for signs of illness and hygienic condition. 30 samples are taken for AI testing against both H5 and H7. Tags showing the farm name and code are attached to poultry crate. Random sample of marketable poultry meat will be collected and sample of poultry offal and carcass are also collected regularly to check for virus, pathogens and contamination. Regular survey and test of birds at zoos, parks, bird shops, and wild birds.
Remedial	<ul style="list-style-type: none"> Disease-Free Zones (“DFZs”) established are consistent to OIE’s guideline zoning and compartmentalisation. Countries infected with AI will be banned from exporting poultry products to Singapore. If AI incident happens in accredited Malaysian farms, AVA will visit and evaluate the surveillance and biosecurity systems put in place by the Malaysian Government before the import suspension can be lifted. If outbreak is suspected in layer farms or slaughterhouses in Singapore, the premise will immediately put under quarantine with movement of poultry and

Type of Measures	Details
	products strictly controlled and culling will be performed if AI virus is detected.
	<ul style="list-style-type: none"> Influenza pandemic readiness and response plan available

3.3

Guangzhou

3.3.1

Trade Operation

Currently there are around 1,500 poultry farms in Guangzhou. In May 2014, Guangzhou have launched a pilot programme (named “Centralised Slaughtering, Cold Chain Delivery, Chilled Poultry Supply” (“集中屠宰、冷链配送、生鲜上市”)) in designated areas. Live poultry trade at retail levels is banned in six out of 14 districts with a centralised slaughtering system put in place. Freshly slaughtered poultry are sold at limited number of wholesale markets in these urban areas. In the non-restricted districts, the traditional mode of operation remains, whereby live poultry from farms are transported to wholesale markets and then delivered to retailers’ stalls or picked up by stall tenants.

3.3.2

AI Situation

Guangdong Province is one of hardest-hit areas in the Mainland’s AI outbreaks in history.

H5N1 Outbreaks

The first appearance of avian influenza may date back to 1996, when H5N1 virus was isolated from a farmed goose in Guangdong. A fatal human case of H5N1 infection occurred in Beijing in 2003. In February 2004, the Mainland first reported H5N1 in poultry with 16 mainland provinces being affected, where Guangdong Province is among one of the affected provinces. H5N1 High Pathogen AI viruses have been detected in poultry and/or wild birds on the Mainland every year since 2004. During 2003 to 2016, 130 H5N1 cases of domestic birds were found in 22 provinces including Guangdong¹¹. 53 human cases were detected in Mainland China, including 31 deaths¹².

¹¹ *Outbreaks of Highly Pathogenic Avian Influenza (subtype H5N1) in poultry notified to the OIE from the end of 2003 to 28 November 2016, published by OIE*
<http://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/graph_avian_influenza/graphs_HPA_I_28_11_2016.pdf>;
Update on highly pathogenic avian influenza in animals (type H5 and H7), published by OIE
<<http://www.oie.int/en/animal-health-in-the-world/update-on-avian-influenza/2016/>>

¹² *Cumulative number of confirmed human cases for avian influenza A(H5N1) reported to WHO, 2003-2017*
<http://www.who.int/influenza/human_animal_interface/2017_02_14_tableH5N1.pdf?ua=1>

H7N9 Outbreaks

No human infections with H7N9 viruses were reported until March 2013. A total of 215 H7N9 human cases were reported within Guangdong, including 80 deaths, from 2013 to 2016¹³.

3.3.3

Safeguarding Measures

The relevant authorities in Guangzhou have also introduced many safeguarding measures to prevent AI. Table 3.2 summarises the safeguarding measures implemented in Guangzhou.

Table 3.2 Safeguarding Measures Implemented in Guangzhou

Type of Measures	Details
Preventive	<ul style="list-style-type: none"> Banning of backyard poultry rearing in the urban areas Slaughter cell isolated from live poultry storage and separated from the marketing site. Clearly distinguished personnel for slaughter and sale of live poultry Slaughterhouse should be located on higher ground, with dry weather, convenient transport conditions, and distant from densely populated areas. Compulsory vaccination of poultry against HPAI Live poultry wholesale markets be sterilised every day, thoroughly cleansed every week and closed once for cleansing every month Transport vehicles, loading tools and associated protective gears for personnel should be sterilised Banning of the live poultry trade in retail level in urban districts
Surveillance	<ul style="list-style-type: none"> Regular monthly surveillance with serological test and PCR test An animal quarantine certification system Slaughtered poultry should be attached with the name of wholesale market, sales stalls, contact numbers Regular inspection of live poultry and its trading at wholesale market Retail operator at restricted areas should establish and implement purchase inspection, certificate, invoice and purchase ledger systems for chilled poultry trades Live poultry transported from other provinces or cities to Guangzhou will receive a quarantine certificate
Remedial	<ul style="list-style-type: none"> Zoning strategy adopted once HPAI cases are found. <ul style="list-style-type: none"> Stamping out all poultry within infected zones (areas within 3km from the infected point) Emergency vaccination of all susceptible poultry within the threatened zones (areas within 5km from the infected zones) Disposal of carcass and poultry products, etc, at infected points Cleansing and disinfection at infected points Movement control at infected zones Closing markets selling poultry products in the infected zones and live poultry markets in areas within 10 km from the infected zones

¹³ H7N9 statistics from the Health Department of Guangdong Province
<<http://www.gdwst.gov.cn/upfile/20170214183926.doc>>

Type of Measures	Details
	<ul style="list-style-type: none"> ○ Tracing operation ○ Surveillance of staff in poultry industry especially staff in the infected zones ○ Lifting quarantine of the infected points and infected zones after 21 days and threatened zone after 14 days, when all treatments required are complete.

3.4

New York City

3.4.1

Trade Operation

The operating model of the poultry industry in New York State, as in many parts of the U.S., is mainly vertically integrated with a small number of sizable poultry producers which produce slaughtered poultry to be sold at retail level. At the same time, there are live bird markets where live birds are sold and slaughtered at retail level. New York City has the largest number of live bird markets of any metropolis in the U.S. Each of the approximately 80 live bird markets (LBMs) in operation in New York City may handle up to 208,000 live birds each year.

3.4.2

AI Situation

In October 1924, a HPAI (fowl plague) case was first found in Pennsylvania among poultry. The plague quickly spread to New York City and 3 farms in Long Island. The plague cases were traced back to the Live Poultry Market in New York City.

During 1983 – 1984, a virulent H5N2 AI virus appeared in chickens in Pennsylvania. In 1985 to 1986, H5N2 virulent viruses were again isolated from poultry in Pennsylvania and subsequently in other states. Extensive studies by the United States Department of Agriculture (“USDA”) finally traced the virus to birds in live-poultry markets in New York City, New Jersey, and Miami.

In November 2003, a patient with serious underlying medical conditions was admitted to a hospital in New York with respiratory symptoms. Subsequent tests showed that the patient had been infected with an H7N2 AI virus.

3.4.3

Safeguarding Measures

USDA and the State Department of Agriculture and Markets respond swiftly to cases of AI infection. They are also vigilant in their efforts in promoting biosecurity measures to farmers and in educating the general public.

Table 3.3 summarises the safeguarding measures implemented in New York.

Table 3.3 Safeguarding Measures Implemented in New York

Type of Measures	Details
Preventive	<ul style="list-style-type: none"> Poultry farms have to be licensed with premises identification number. Farm biosecurity measures adopted. Poultry provided to distributor or live bird markets must originate from a flock tested AI negative and distributor must only accept qualified birds. Poultry sent to distributors must be identified by origins, date or lot number to distinguish. The information must be recorded on the test certificate Visitor and vehicle control at poultry farms. Operators of truck shall maintain a record of cleansing and disinfection dates. Poultry distributors must be licensed or registered with facility, recorded system and biosecurity protocol inspected and approved. Distributors shall ensure trucks or equipment used in sanitary condition. Operators of truck shall maintain a record of cleansing and disinfection dates. Distributors must use State-approved all-season crate and conveyance washing equipment and present cleansing and disinfection documentation when obtaining birds. LBMs must develop a biosecurity protocol that is approved by the state Regular closures with depopulation and complete sanitation, cleansing and disinfection at LBMs All poultry moved from other states into New York require a Certificate of Veterinary Inspection showing they are tested AI negative or originated from an AI Monitored Flock; All hatching eggs and day-old chicks must be from a National Poultry Improvement Program H5/H7 AI Clean Flock
Surveillance	<ul style="list-style-type: none"> Flock are considered AI-monitored when tested monthly for AI with negative results for at least 3 consecutive months. At least 30 birds per flock are tested monthly. Established flock must be maintained together for at least 21 days prior to sample collection with no additions to flock. 30 birds must be tested AI negative within 10 days prior to shipment to the LBMs. Farms are subject to random inspections by animal health officials to ensure compliance to bio-security standard, collect random samples and conduct record review. LBMs may be tested for AI virus by the State at any time, but they must be tested at least quarterly.
Remedial	<ul style="list-style-type: none"> Positive H5 or H7 LPAI test results will result in quarantine of the farms which may then be depopulated. Premises testing positive for notifiable avian influenza must be quarantined and be inventoried. An epidemiological investigation will occur. In the event of an HPAI outbreak, farm in the control area will be under quarantine with restriction of poultry movement. Eradication, testing, disinfection where appropriate will be conducted.

3.5 Implications for Hong Kong

All the three studied cities adopt stringent safeguarding measures to reduce the risk of AI transmission to human. The measures in different cities are generally similar and can be classified into preventive, surveillance, and remedial ones. Based on a thorough review, the same safeguarding measures, or similar measures, have been applied in Hong Kong. Comparing to the three benchmark cities, Hong Kong has implemented the most comprehensive and stringent safeguarding measures against AI. For example, the sample size of AI test (PCR) adopted in Hong Kong (60 samples) is higher than that adopted in New York (30 samples) and Singapore (30 samples) (No information regarding the sample size was found for Guangzhou). In terms of the quantity of measures, Hong Kong is also leading the other cities, covering both local farms and registered farms on the Mainland, wholesales market and retail markets.

Nonetheless, Singapore has demonstrated a case of no retail sale of live poultry, which could be further considered. The centralised slaughtering system could eliminate live poultry contact with the general population, and thus reduce the risk of human infection. Banning of live poultry at retail level is realised by setting up a centralised slaughtering system. Sufficient amount of live poultry is required to make centralised slaughtering commercially viable. In addition, the culinary preference of Hong Kong people is another consideration before reaching the decision on whether to ban the retail sales of live poultry.

Both the culinary preference of Hong Kong people and the viability of setting up of centralised slaughtering facilities need to be evaluated before making the decision. The possibility of banning live poultry sales at retail levels in Hong Kong will be further explored in Chapter 6.

4 Culinary Preference of Hong Kong People

4.1 Introduction

A telephone survey was conducted between November and December 2015 with an aim to solicit the following information. 1,000 valid responses from the general public were collected.

- Respondents' culinary preference, and the consumption behaviour among different forms of poultry.
- Respondents' views on the way forward of live poultry trade, particularly whether live poultry should be sold at the retail level.

This Chapter focuses on the analysis of respondents' culinary preference for live poultry. Analysis on the way forward will be conducted in the next Chapter.

4.1.1

Forms of Poultry

As chicken is the dominant type of poultry among poultry consumption, survey respondents were specifically asked to express their opinions toward individual "chicken" forms, namely live, freshly-slaughtered, chilled and frozen chickens as shown in below figure.

Figure 4.1 Different Forms of Chicken



Live chickens are available for sale at the designated retail outlets (including public market stalls and fresh provision shops). Live chickens are first chosen by the customers before being slaughtered.



Freshly slaughtered chickens are slaughtered at designated retail outlets before being available for purchase. These chickens are stored at temperatures between 0°C and 10°C, preferably at 4°C, and are consumed within 24 hours. (Freshly slaughtered chickens are sometimes referred as warm chickens in the retail outlets and fresh chicken in supermarkets)



Chilled chickens are slaughtered and packaged chicken stored at between 0°C and 4°C after going through a chilling process and has a shelf-life of 5-7 days. The packaging is air-tight with a laser stamp.



Frozen chickens undergo a quick freezing process; the chicken is kept under -18 °C during storage and transportation. Frozen chicken can be stored for over 3 months or longer.

* Poultry is also available in the form of prepared poultry, including marinated, preserved or cooked poultry. Examples of prepared chickens include curry chicken in canned form and pre-breaded chicken filets for deep frying. However, prepared poultry is not covered in the telephone survey.

4.2

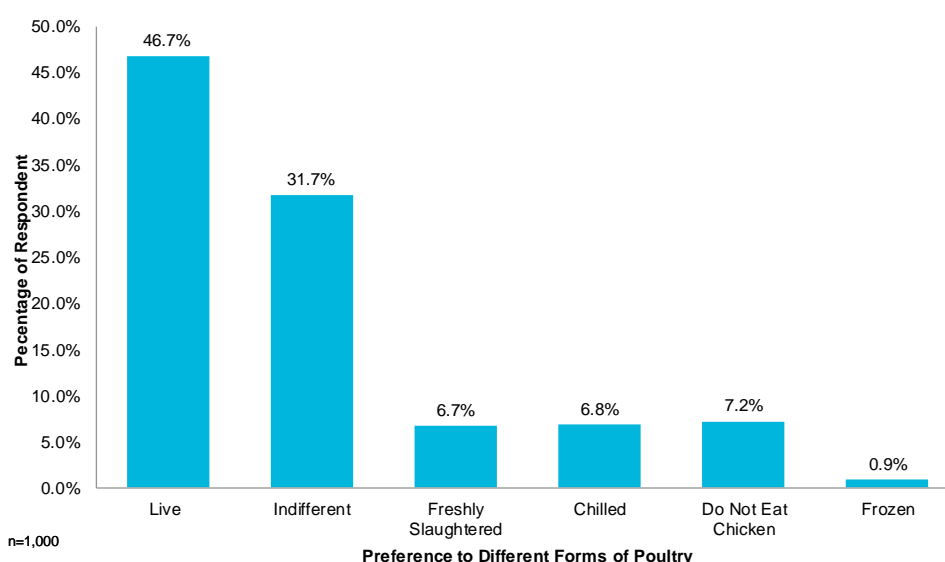
Culinary Preference

4.2.1

Culinary Preference to Different Chicken Forms

All respondents were asked about, without consideration of other factors, which type of the chicken they preferred most among the four types of chicken (i.e. live, freshly slaughtered, chilled or frozen). A significant portion of 47% (467) respondents indicated that they preferred live chicken above other forms of chicken, while 32% (317) expressed “indifferent”.

Figure 4.2 Respondents’ Culinary Preference to Different Forms of Chicken



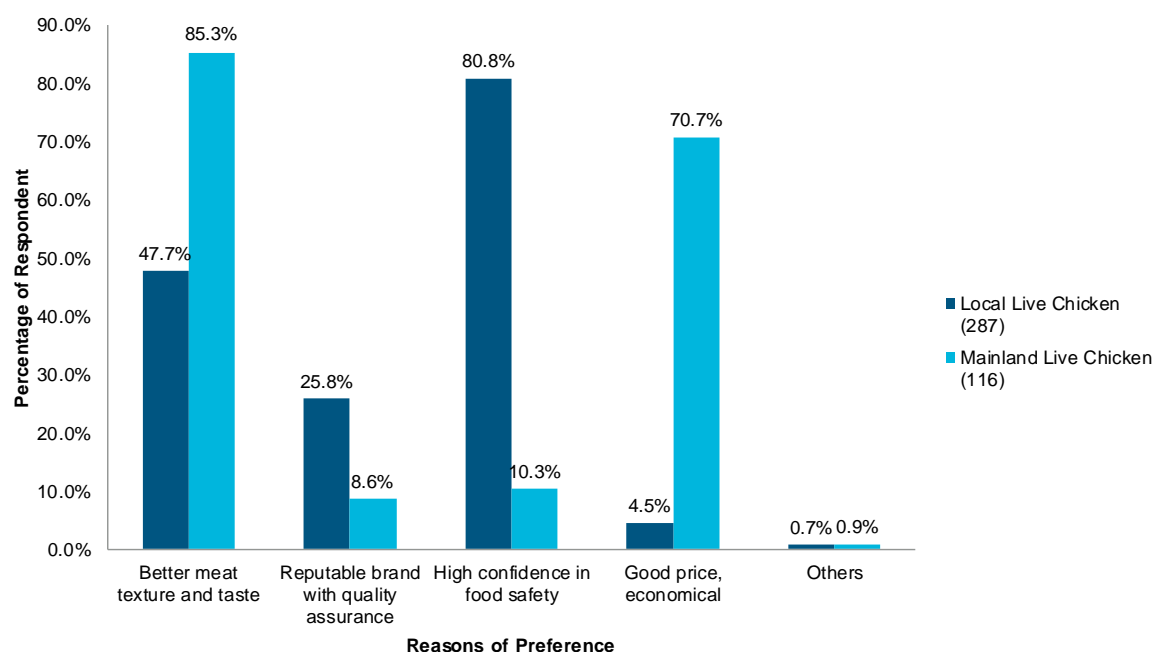
Source: BMT

4.2.2

Preferences to Different Origins of Live Chicken

On preference for different origins of live chicken among local and imported poultry from the Mainland, close to half (49%) of the 784 respondents who consume live chickens indicated that they do not have preference on the origin, especially the younger respondent. However, those indicated preference, 37% prefer local chicken over mainland chicken.

Of the 287 respondents who favour local live chicken, 81% expressed confidence in the food safety as the primary reason. Meanwhile, nearly half (48%) of respondents prefer local chicken due to better meat texture and taste, followed by reputable brand with quality assurance (26%). Among the 116 respondents who prefer chicken from the Mainland, they consider Mainland chickens as having better taste (85%) and economical pricing (71%).

Figure 4.3 Reasons of Preference to Local and Mainland Live Chicken

Source: BMT

4.2.3 Consumers' Confidence in Food Safety

Despite two AI incidents occurred in Hong Kong in 2014, many of the respondents indicated an average level of confidence (41%) or quite confident (36%) about the food safety of eating live chickens. Another 3% respondents indicated that they are very confident about the food safety of eating live chickens. Only a small portion of the respondents (17%) indicated they are unconfident or very unconfident about the food safety of eating live chickens.

4.3 Summary

A significant portion of survey respondents (47%) prefers the consumption of live chickens over other forms of chickens. Respondents are in general confident about the food safety of consuming live chickens. For preference towards the origins of the chickens (i.e. locally produced versus imported from the Mainland), nearly half of the respondents, especially younger respondents, indicated no preference. However, 37% indicated that they would prefer local chickens to imported ones due to mainly food safety concerns, while a smaller percentage of respondents would prefer imported chickens, due to the freshness of the meat and the competitive price.

5 Stakeholders Views on the Future of Live Poultry Trade

5.1 Introduction

The Study Team has solicited views of the stakeholders on the way forward of live poultry trade through the following key activities:

- Telephone Survey (see Section 4.1 for details)
- Health Expert Panel Discussion

The Study Team held a panel discussion¹⁴ with experts of public health and animal health and the live poultry trade stakeholders, and separately interviewed some public health experts¹⁵ to tap their views on whether the sale of live poultry should continue, taking into account the AI threat, and cost implication of maintaining the whole set of safeguarding measures against AI.

- Interviews and Research

Apart from the above consultation activities, the Study Team has also consulted the Advisory Council on Food and Environmental Hygiene (“ACFEH”) and catering personnel on the way forward. Where appropriate, recommendations from Scientific Committee on Emerging and Zoonotic Diseases (“SCEZD”) of the Centre of Health Protection were considered as well.

This Chapter first discusses the risk of AI, mainly with inputs from the Health Expert Panel Discussion. Stakeholders’ views on the way forward collected via the above mentioned activities are then discussed.

¹⁴ A health expert panel discussion was held on 20 April 2016. Five health experts from the fields of public health and animal health, including Professor Paul CHAN Kay-sheung, Professor Frederick LEUNG, Chi-ching, Professor WONG Tze-wai, Dr. Howard WONG, and Dr. Thomas SIT Hon-chung and 55 trade operators attended the discussion.

¹⁵ Separately, due to the unavailability of some of public health experts to attend the panel discussion, the Study Team has also conducted individual interviews with some of the public health experts, including Professor YUEN Kwok-yung, and Professor POON Lit-man.

5.2

Stakeholders Views: Health Experts

5.2.1

AI Risk

Risk in the Region

During the Panel Discussion, health experts pointed out that notwithstanding repeated AI outbreaks in the neighbouring Mainland and Southeast Asian countries over the past ten years, different levels of the live poultry trade have been subject to stringent bio-security measures, which help keep the AI risks at bay. This was also supported by the fact that when AI outbreaks hit countries across Southeast Asia in 2004, Hong Kong was one of the few cities unaffected. However, a health expert pointed out that AI risk exists with increasing number of infected cases across the world.

Human Infection

People mainly become infected with avian influenza through close contact with infected birds and poultry (live or dead) or their droppings¹⁶. In general, the health experts agreed that a significant risk to human health exists when people contact with chickens carrying H5N1 and H7N9.

A paper published by the Scientific Committee on Emerging and Zoonotic Diseases (SCEZD) of the Centre of Health Protection in July 2016 suggested that “H7N9 viruses have become enzootic among poultry in some parts of Mainland China and are unlikely to be eradicated. It is foreseeable that sporadic human H7N9 infections will continue to occur from time to time.”

Human-to-human Transmission

According to WHO’s publication “Influenza at the Human-Animal Interface, monthly risk assessment summary”¹⁷, even though small clusters of A(H5) and A(H7) virus infections have been reported previously including those involving healthcare workers, current epidemiological and virological evidence suggests that A(H5) and A(H7) viruses have not acquired the ability of sustained transmission among humans. Some health experts in the panel also opined that the risk of AI mutation turning into a wide spread epidemic cannot be ignored.

5.2.2

Views on Policy Direction of Live Poultry Trade

The views of health experts on future direction of live poultry trade are divided. Some of the health experts agreed that the sale of live poultry at retail level could continue if existing safeguarding measures are further enhanced. Some experts cast doubts if it was necessary to retain the sale of live poultry at

¹⁶ Avian Influenza, Centre for Health Protection.
<<http://www.chp.gov.hk/en/content/9/24/13.html>>

¹⁷ Influenza at the human-animal interface, published by WHO
<http://www.who.int/entity/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_10_03_2016.pdf>

retail level due to the potential risk of human contact with live poultry at retail ends. Nevertheless, ***all health experts participated in the discussion supported maintaining the local poultry rearing industry.***

5.2.3

Views of Scientific Committee on Emerging and Zoonotic Diseases

With reference to WHO, the committee noted that most human cases acquired avian influenza infection through contact with infected poultry or contaminated environments including live poultry markets (“LPM”)¹⁸. Many studies have shown that exposure to LPM is a major risk factor associated with human H7N9 infections.

Therefore, given considerations to the above and the situation and risk recognised by the committee (mentioned in section 5.2.2), the committee recommended ***eventual cessation of the sale of live poultry in retail markets outlets*** in Hong Kong to control the risk of AI transmission to human in the long term.

5.3

Stakeholders Views: Members of the Public

5.3.1

Hong Kong People’s Confidence in Live Poultry Consumption

As discussed in Section 4.2.3, survey results showed that the public were in general not worried about food safety in consuming live chickens - only 17% of the respondents indicated unconfident in consuming live chickens. The results show that currently there is no public panic of AI risk. Nonetheless, the confidence of people about the food safety of purchasing live chicken has no implication on the true risk of AI transmission.

5.3.2

Future Policy Direction of Live Poultry Trade

The views of the public on future policy direction of live poultry trade is divided. The survey showed that ***39% (389) of the respondents did not have any explicit views, 35% (348) supported prohibiting sales of live chicken at retail level, while 26% (263) did not support such a measure.*** It should be noted that the supporters of banning live chicken sales are mainly among those who did not have preference of live chicken consumption (representing 53% of people based on the culinary survey).

At the same time, survey results showed that about 43% of people would be dissatisfied or very dissatisfied if they could no longer purchase live chickens in Hong Kong. On the other hand, 87% (870) revealed that the chicken rearing industry in Hong Kong should remain in future – 49% (489) and 38% (381)

¹⁸ “Recommendation on Control of the Risk of Transmission of Avian Influenza to Humans in the Long Term”, published by Scientific Committee on Emerging and Zoonotic Diseases, dated July 2016.
<http://www.chp.gov.hk/files/pdf/recommendation_on_control_of_the_risk_of_transmission_of_avian_influenza_to_humans_in_the_long_term.pdf>

opined that the Government should provide policy support to develop the chicken rearing industry or at least to maintain the prevailing policies.

Apart from the survey, as mentioned the Study Team has also consulted ACFEH on the way forward of the live poultry trade. In general, the council members are of the view that existing AI control system has been effective in safeguarding public health and the live poultry sale should be continued, with additional improvement measures to safeguard public health.

Interview with personnel from the catering industry also confirmed the need of live poultry sale, dual sources from local and Mainland farms to ensure steady supply of high quality food source, which helps uphold Hong Kong reputation as gourmet paradise. Should the option of banning of live poultry at retail level realises, the catering personnel reckons that only freshly slaughtered poultry can be considered as replacement because of its relatively similar taste and texture to live poultry.

5.4 Stakeholders Views: Trade Operators

5.4.1 Policy Direction of Live Poultry Trade

Trade operators in general supported ***maintaining status quo with supply of both local and imported live poultry***, which was considered important in preserving local culinary culture and minimising the impact on the trade.

Some trade operators even hoped to see an expansion of live poultry trade in the future. This includes increasing numbers of live poultry for sale, allowing transfer of farm, wholesale and retail licences.

The trade operators were concerned about the increase in investment and operation costs arising from the further potential improvement measures. Although they in general understood the rationale behind a stricter AI control system, due to the limited scale of the industry and the uncertainty of the future prospect of the live poultry trade, they lacked incentives to further invest in AI control measures to enhance their current operations. The continuity of live poultry trade would be a prerequisite for further investment in the AI control system by the industry stakeholders.

6 The Way Forward

6.1 Introduction

To decide the way forward of live poultry trade in Hong Kong one should answer the following questions:

- First of all, should the live poultry trade in Hong Kong be maintained?
- Second, should the mode of operation for live poultry trade be changed to further reduce the risk of AI infection in human?
- Third, are there any improvement measures that can be applied to further reduce the risk of AI infection in human?

Since the stakeholders' views on the way forward of live poultry trade in Hong Kong have shown to be divided, it should be discriminative when taking into account the views of different stakeholders due to different positions and knowledge of AI risk. Even the view of the public on whether to maintain live poultry sale is divided due to the respective culinary preference of Hong Kong people.

To answer the above-mentioned questions, considerations have been drawn upon from the findings of the previous chapters, in particular the following:

- Review of AI incidents in Hong Kong and the region;
- Review of live poultry trade in Hong Kong;
- Review of safeguarding measures applied in Hong Kong;
- Review of safeguarding measures in benchmark cities in the world;
- Culinary preference of Hong Kong people;
- Views of stakeholders including health expert, public, and trade operators.

6.2 Should the Live Poultry Trade in Hong Kong be Maintained?

Key findings in the previous chapters related to this aspect are summarised as follows:

- Consumption of live poultry is considered a unique culinary culture of the Hong Kong population. Despite the occurrence of some AI incidents in the past two decades, the survey results showed that nearly half of the respondents still preferred the consumption of live chickens to other forms of chickens. Survey results also showed that about 43% of Hong

Kong people would be dissatisfied or very dissatisfied if they could no longer purchase live chickens in Hong Kong.

- On the other hand, numerous safeguarding measures have been imposed by the Government to prevent the outbreak of avian influenza in Hong Kong. The system of measures adopted in Hong Kong is considered comprehensive, which includes preventive, surveillance and remedial measures that cover all levels of the supply chain.
- Although there have been several AI incidents of live poultry infections at different levels of the supply chain since the first outbreak in 1997, there has been no locally infected human case of H5 or H7. Hence the safeguarding measures are considered effective in preventing human infection.
- The annual expenditure incurred on the safeguarding measures is assessed to be around HKD 8 per kilogram of live poultry, which is considered reasonable compared to the endurable price the survey revealed.
- All health experts attending the panel discussion or being interviewed were of the view that the existing set of AI control measures imposed by the Government had been effective. All health experts participated in the discussion supported maintaining the local poultry rearing industry.

Based on the above key findings, it is concluded that with existing effective safeguarding measures, live poultry trade in Hong Kong should be maintained. This will preserve the culinary culture of Hong Kong people and minimise the impact on the trade operators while safeguarding public health against AI.

6.3

Should the Mode of Operation for Live Poultry Trade be changed to Further Reduce the Risk of AI Infection in Human

There have been discussions on whether the existing mode of operation for the live poultry trade should be changed in order to further reduce the risk of AI infection in human. Two possible changes to the current mode of operations were identified, i.e.:

- ***Banning of live poultry importation***, with the consideration that there are views of concern over the compliance of safeguarding measures by Mainland farm operators;
- ***Banning of live poultry trade at retail level***, with the consideration to minimise human contact with live poultry including potentially infected ones.

Any decision on changing the mode of operation should consider:

1. *Will the change of mode help reduce the risk of AI infection effectively, and*
2. *Will the change of mode be feasible and be successfully implemented.*

6.3.1

Banning of live poultry importation

On this aspect, the following key findings are considered:

- In reviewing the past AI incidents, evidences show that the AI incidents happened on both local and imported live poultry (as shown in Table 6.1). There were cases where consignments of Mainland live poultry were confirmed infected through virological tests, before being delivered to the retail outlets. On the other hand, some AI cases have also been found in local farms.
- Despite the fact that avian influenza viruses have been detected repeatedly in poultry (H7N9, in particular) in many areas on the Mainland in recent years, there is no evidence showing that the risk of AI in imported live poultry from registered farms in Mainland is higher than that of local live poultry (the reported infection cases were not related to the registered farms). Moreover, the AI tests conducted by Hong Kong Government on import consignments are of essence, and serve as the effective gate keeper for virus detection.
- There have been stringent safeguarding measures imposed on imported live poultry, including
 - All registered farms on the Mainland are required to apply H5 vaccine to live poultry;
 - PCR test and serology test are conducted for all consignments of imported live poultry before they enter Hong Kong.
- According to the survey, Mainland live poultry is still preferred by some of the Hong Kong population owing to perceived better taste, meat texture, and often lower price than local poultry.

Table 6.1 AI Cases in Hong Kong (Excluding Human Cases)

Year	Number of affected locations	Virus type	Point of supply chain	Source of infected live poultry
1997	Multiple	H5	Local farms, wholesale market and retail outlets	Local poultry; imported poultry not confirmed
2001	Multiple	H5	Retail outlets	Not confirmed
2002	Multiple	H5	Local farms, wholesale market and retail outlets	Local poultry; imported poultry not confirmed
2008	Multiple	H5	Retail outlets and a local farm	Local poultry; imported poultry not confirmed
2011	One	H5	Wholesale market	Not confirmed
2014	One	H7	Consignments of mainland poultry	Mainland
2016	One	H7	A retail outlet	Not confirmed

Source: FHB, AFCD, FEHD, LegCo Papers

In short, as stringent safeguarding measures are imposed on the registered farms on the Mainland (and hence imported live poultry), and no concrete evidence has been identified to show that imported live poultry from registered farms in Mainland delivered carry higher risk of AI than local live poultry, there is no strong basis for banning the importation of live poultry. Moreover, the AI tests conducted by Hong Kong Government on import consignments are of essence, and serve as the effective gate keeper for virus detection.

6.3.2

Banning of Live Poultry Sale

Retail outlets are the main contact points between the general public and live poultry. There is a possible mode where live poultry can be slaughtered and delivered to retail outlets in the form of freshly slaughtered poultry. This can significantly reduce the contact between the general public and live poultry and hence potentially infected poultry, and ultimately reduce the risk of human infection. However, its feasibility in implementation will need to be assessed. For this, there are two key questions to be asked:

- Do Hong Kong people prefer live poultry to other forms of poultry, including the freshly slaughtered poultry?
- Is the idea of slaughtering before retail sales commercially and operationally viable in Hong Kong?

The two questions are addressed in details as follows:

1. *Do Hong Kong people prefer live poultry to other forms of poultry, including the freshly slaughtered poultry?*

The culinary preference survey shows that a significant portion, i.e., 47% of the Hong Kong people surveyed preferred live chicken to other forms of chicken, while only 7% preferred freshly slaughtered chicken.

2. *Is the idea of slaughtering before retail sales commercially and operationally viable in Hong Kong?*

To cease live poultry sales in retail outlets, live poultry will need to be slaughtered before delivery to the retail outlets. There are two possible ways of slaughtering before sending poultry to retail outlets:

- Option 1: Slaughtering to be performed by individual farms, or
- Option 2: Slaughtering to be performed in a centralised slaughtering facility.

Nonetheless, neither of these options are considered to be feasible. Slaughtering at individual farms (Option 1) is considered to be infeasible because of the following reasons:

- Local farms may not be a suitable location for performing slaughtering activities due to the following reasons:
 - Slaughtering process should comply with high standard of bio-security requirement to avoid contamination of carcass, preferably within separate buildings in a considerable distance from poultry sheds, as suggested by animal health experts. However, many of the existing farms do not provide adequate room for establishing such slaughtering facilities;
 - Low facility utilisation may discourage future investment on bio-security;
 - Inadequate water supply in farm premises;
 - Drainage and sewage systems may not be adequate;
 - Waste disposal systems overload with feathers and offal;
 - Environment concern of pollution to the villagers;
 - Current farm licence requirements do not permit slaughtering activity for wholesale purpose; and
 - Hygiene inspection could be difficult.

On the other hand, centralised slaughtering facility (Option 2) is considered to be commercially unviable due to lack of demand to sustain the operation of the facility, according to a previous study on the Commercial Viability Study of a Poultry Slaughtering Centre ("PSC") conducted in 2010.

6.3.3

Recommendation

The above potential changes in operation modes are considered either not preferred at this stage or commercially infeasible to be implemented.

Nonetheless, the above recommendations are made on the basis of current risk level. If AI risk level will increase significantly in the future (which is beyond current comprehension), the Government may wish to reassess the necessity of changing mode of operation of live poultry trade, even banning of the live poultry trade. Based on the consultation with health experts, signs of increasing risk level can be identified as follows:

- Confirmed local case of human infection;
Confirmed local case of human infection from live poultry in Hong Kong indicates that the risk has been increasing to a level that even existing safeguarding measures cannot effectively prevent human infection.
- Increasing detection of AI in live poultry or environment in Hong Kong;
The number of AI cases in live poultry did not increase in recent years despite increasing cases of AI (especially H7N9) on the Mainland. Increasing detection of AI in live poultry (both local and imported) or in the environment may signify increasing AI risk level in Hong Kong.
- Occurrence of sustained human to human transmission.
Currently, there has been no confirmed case of human to human infection. Nonetheless, sustained human to human transmission (in any places of the world) may trigger a pandemic and imply serious consequences to potential infection.

While the live poultry trade remains in Hong Kong, it is strongly recommended that improvement measures be further improved under the existing operation mode of live poultry trade. Potential improvement measures will be discussed in Chapter 7.

7 Potential Improvement Measures against Increasing AI Threats

7.1 Methodology

As mentioned, it is suggested that the safeguarding measure system should be continuously reviewed and improved upon, when the live poultry trade continues. Based on the study and stakeholder consultation, the Study Team has identified a list of potential improvement measures, with the aims to:

- Enhance separation environment;
- Enhance monitoring;
- Enhance traceability and visibility.

While various measures can be proposed from the perspectives of best practice, it is noted that under various constraints and limitations (e.g. inadequate space for higher level of separation), some of the best practice measures may deem less practical. Only those practical measures should be proposed.

Section 7.2 describe in detail the original rationale for the seven potential improvement measures that have been taken into further consideration (more potential measures have been explored in the working papers). Section 7.3 conducts an assessment of the feasibility and effectiveness of these potential measures. Based on the assessment, five out of the seven potential measures are considered to be feasible for implementation and effective in further reducing the risk of AI infection.

7.2 Enhancing Separation

7.2.1 Relocation of Wholesale Market

CSWTWPM, with size about 2.6 hectares capable of handling more than 90,000 tonne live poultry a year, evident before AI first hit Hong Kong in 1997, has been serving as a temporary facility in Sham Shui Po district. Its close proximity to densely populated area has raised concerns of public health from nearby residents. In fact, the relocation of wholesale market has been considered by the Government, but is on hold pending the outcome of this study.

Although existing measures can reduce the AI risk to a minimal extent, the risk cannot be completely eliminated. Given that the wholesale market is one of the largest holding place of the live poultry in Hong Kong, relocating the wholesale market can reduce the exposure of potential virus to the public. In the worst case if the virus mutates and emerges with the ability to cause human-to-human

transmission, the speed and scale of infection can be significantly reduced if it is situated in a more remote area.

Preliminary study shows that Fu Tei Au could be a potential location for the relocation of CSWTWPM. The population density in Fu Tei Au is much smaller than that in Sham Shui Po. Relocation of the wholesales poultry to Fu Tei Au can help reduce the exposure of potential virus to the public, and thus reduce the risk of human infection of AI.

7.2.2

Upgrade of Retail Outlets

It is clear that retail outlets are the main contact points between the general public and the live poultry. Therefore, separation at retail level should be enhanced to avoid potential human infection.

According to the Handbook on Standard Features for Public Markets and Cooked Food Centres ("Handbook") published in December 2011, poultry stalls are recommended to be equipped with fully segregated holding area for the storage and display of live poultry. For a newly "relocated" premises¹⁹, a new FPS (fresh provision shop) licence for selling live poultry is required and will be issued only upon compliance with relevant licensing requirements including segregation of live poultry area, slaughtering area and retailing area as well as provision of a separate drainage system and ventilation system. At present, however, these establishments with physical barriers are only realised in a small number of live poultry retail outlets. On the other hand, in some public markets poultry stalls are located at a separated area (with a door separating the area from other sections of the market).

Although it may not be readily feasible for all existing retail outlets, especially existing licensed FPS selling live poultry, to upgrade their layout design to standards specified in the Handbook due to different reasons (e.g. space constraint, extensive renovation works, financial implications, etc.), it is recommended that the Government shall implement enhancement as far as possible (through providing physical barriers such as separate holding area, separation door, etc) and consider providing additional support (including financial subsidy) for the live poultry retail operators in overcoming specific difficulties in the design and implementation of the upgrading work. The suggested separation may be conducted in different degree in view of various constraints confronted by different live poultry retail outlets such as their physical locations, scale of operation, a need for re-designing of the market, etc., and

¹⁹ At present, FEHD still withhold the issue of new FPS licence for selling of live poultry. However, to facilitate the existing licensee to continue business, FEHD would only consider on a case-by-case basis the removal of a FPS selling live poultry to a new address due to compelling reasons like building demolition which merits special consideration.

should be handled with certain flexibility. Dedicated study and layout design may be required for individual outlets to enhance separation to some extent.

7.2.3

Reducing Staying Time of Minor Poultry in CSWTWPM

Overnight stocking of poultry is allowed at CSWTWPM. In particular, minor poultry types such as pheasants, chukars and pigeons, are allowed to stay longer than one day (as compared to unsold chickens which can stay for a maximum period of 24 hours) in CSWTWPM so that they can be transported in bulk to make shipment from the Mainland economically.

Overnight stocking extends the time in which the poultry may be exposed to potentially virulent surfaces or wild bird that may carry the virus. Eliminating overnight stocking would reduce the risk of AI infection in poultry at the wholesale level. Such elimination, however, affects the flexibility of wholesalers to fulfil any ad hoc daily market demand and economics of bulk shipment. It may also discourage importation of minor poultry to Hong Kong due to high operating costs.

Alternatively, setting a maximum number of days for minor poultry, say 3-4 days, plus compulsory emptying of poultry keeping cages for thorough cleansing is considered reasonable. By reducing the staying time in the wholesale market, the AI risk at the wholesale level can be further reduced.

7.3

Enhancing Monitoring

7.3.1

Introduction of H7 Vaccine

Currently, both local and imported poultry are vaccinated against H5 AI. The main risk of infection relating to H7 (versus H5) is the lack of vaccination. Therefore, it is recommended that the Government should explore the feasibility of introducing additional vaccination in local chicken farms against the emergence of new challenge posed by H7N9 AI virus.

7.3.2

Pre-sale PCR Testing on Local Poultry

For local poultry, the PCR testing on H5 and H7 is only conducted once per month. At pre-sales level, only serology test on H5 is conducted. This is arguable as there might be risk of not detecting any potential infection if it occurs after the PCR test and before delivery to the wholesale market. This risk is especially significant for H7 virus as there is no vaccine applied to local live poultry yet.

It is noted that the test practice was set up when H5 vaccination has been implemented and virulent H7N9 virus has not emerged yet. As virulent H7N9 emerges, it is highly recommended that virological testing on local poultry should be conducted before delivery to CSWTWPM, which is consistent with the current testing practice for imported live poultry.

7.4 Enhancing Traceability

7.4.1 Numbering of Cages

Currently there is no tracking system for cages used for transporting the live poultry in Hong Kong. These cages could potentially be misused for transporting illegal live poultry. Therefore, some stakeholders come up with the suggestion of managing cages through using a numbering system instead of simple management by human counting of the number of cage used. In this way, each transported cage can be assigned with a dedicated number for better tracking and deterring inappropriate usage.

However, there are operational difficulties of this measure which could undermine the effectiveness of the measure (e.g., fake numbering of cages). At the same time, even though the management of the cages can be improved, illegal live poultry, if any, can still sneak in the supply chain using other cages. After all, there has been no evidence showing that the AI infection cases in Hong Kong were related to any illegal live poultry.

The feasibility and effectiveness of the measure will be further assessed in the following section.

7.4.2 Tagging Individual Poultry

Instead of depending on paper trails, tagging each individual poultry with farm and flock information could possibly enhance the overall efficiency of tracing of live poultry history from farms to retail outlets. When an AI case is identified in a flock, tag information on individual poultry enables AI control authorities to recognise which poultry came from that flock and may be infected. Some other important benefits include i) deterring the possibility of mixing alien flocks and ii) easy tracing of poultry origins (e.g., to the specific farms). The viability of this control depends on several factors including the method of tagging and the cooperation from local farms and Mainland registered farms.

However, the existing measures (e.g. affixing the transportation trucks with official CIQ seals; consignment accompanied by health certificate) could already maintain traceability of imported poultry consignments. At the same time, the effectiveness of this measure is also challenged by some health experts.

7.5 Evaluation of Effectiveness and Feasibility of Potential Improvement Measures

7.5.1 The Assessment

Two aspects of the potential measures are evaluated, i.e.

- *effectiveness* in terms of AI risk mitigation, and
- *feasibility* in terms of implementation difficulty.

The results of the assessment serve as the basis for the final recommendation of improvement measures to be implemented and inform the prioritisation of the measures.

7.5.2 Effectiveness

The effectiveness of the potential improvement measures is evaluated against the existing measures and categorised under three levels, i.e.

- Significant – Compared with existing measures, the new improvement measure can significantly reduce the risk of AI infection.
- Notable – Compared with existing measures, notable improvement on risk of AI infection can be expected from imposing the new improvement measures.
- Minimal – Compared with existing measures, it is expected the new improvement measure will have no improvement or minimal improvement in risk mitigation.

Table 7.1 Effectiveness of the Potential Improvement Measures

Measures	Expected Effect	Existing Measures	Evaluation of Improvement	Improvement Level
Relocation of Wholesale Market	Reducing the exposure of potential virus to the public. Limiting the scope of infection especially in the worst case where virus emerges with the ability of human-to-human transmission.	CSWTWPM as a standalone facilities separated from general public. AI tests are applied before delivering live poultry to CSWTWPM.	Although the possibility of contact between nearby residents and live poultry in CSWTWPM is low, relocation of wholesale market does reduce the virus spreading in the worst case.	Notable
Upgrade of Retail Outlets	Direct contact of general public with live poultry in retail outlets can be significantly reduced.	Currently, physical barrier is realised in only a few live poultry retail outlets.	Providing physical barrier to more live poultry retail outlets can further reduce the contact of the general public with live poultry. (However, this should be handled with certain flexibility and on a case-by-case basis.)	Significant
Reducing Staying Time of Minor Poultry	Reducing staying time can shorten the period of possible exposure to virus.	Currently, one-day staying is applied to chicken, which represents the majority of live poultry.	Although minor poultry represents less than 1% of live poultry population, there is still risk for them to be infected. Therefore, the improvement should be notable.	Notable
Conducting Pre-sale PCR Testing on Local Poultry	Further improvement on testing and hence infected live poultry cannot be delivered to the market.	Currently, local chickens are taken PCR testing once a month. At pre-sales level, only serology test on H5 is conducted.	The possibility of any infected live poultry to be delivered to the market can be significantly reduced.	Significant
Introduction of H7 Vaccine	Vaccine reduces the quantities of virus shed into the environment, in turn reduces human exposure.	Currently, only H5 vaccine is applied to local live poultry.	Significant reduction of human exposure to H7 virus shed by any potentially infected poultry.	Significant
Numbering of Cages	Cages can be traced with dedicated numbers. Inappropriate usage of these cages can be deterred.	Cages are managed by trade associations. Loss of cages sometimes happens.	Even though the management of the cages can be improved, illegal live poultry, if any, can still sneak in the supply chain using other cages.	Minimal
Tagging Individual Poultry	Allowing instant tracing of possible source of infected live poultry and deterring illegal live poultry.	Currently, strict culling policy applies when AI virus is detected. Tracing of poultry source be done through paper trail.	According to health experts, AI virus is highly contagious among poultry, tagging individual poultry may not ensure the traceability of source of infection. However, it can deter any illegal live poultry in the market.	Minimal

Source: BMT

7.5.3

Feasibility

The feasibility of implementation of improvement measures is affected by both commercial feasibility and operational feasibility.

- Commercial feasibility depends mainly on the cost of implementing the measures.
- Operational feasibility depends on the technology required, impact to the current operations, etc.

As the improvement measures need to be supported and implemented by different stakeholders (including the Government), the general views of relevant stakeholders are collected and would be taken into account by the Study Team when conducting assessments.

The feasibility of the potential measures is assessed and categorised into:

- Highly feasible – The cost for implementing the measure is reasonable and will not affect the commercial viability of the business. At the same time, there is no major operational difficulty in implementing the measures;
- Feasible – The cost for implementing the measure is reasonable and will not affect the commercial viability of the business provided government financial support. At the same time, the measure can be implemented with a minimum impact on existing operations; or
- Not feasible – The implementation of the measure will affect the commercial viability of the business, or there is foreseeable major operational difficulty for the implementation.

Table 7.2 Feasibility of the Potential Improvement Measures

Measures	Commercial feasibility	Operational feasibility	Stakeholder views	Feasibility
Relocation of Wholesale Market	Commercially viable with reasonable construction cost paid by the Government. (Ball park cost estimate: Capital cost: HKD 450 million)	Operationally feasible while detailed design is needed.	No major difficulties.	Feasible
Upgrade of Retail Outlets	Commercially viable with upgrading cost supported by the Government. (No appropriate cost reference available)	Operationally feasible as several retail stalls have been upgraded with dedicated study and design are conducted for each outlets to enhance separation to some extent.	Some retailers worry about the limited space for the upgrade.	Feasible
Reducing Staying Time of Minor Poultry	Commercially viable if the maximum staying time allows the economic shipment size of minor live poultry. (Minimal cost is expected)	Operationally feasible with key operation procedures unchanged.	No major difficulties.	Feasible
Conducting Pre-sale PCR Testing on Local Poultry	Commercially viable with reasonable cost. (Minimal cost is expected comparing to existing practice)	Operationally feasible as there is no operational difficulty.	No major difficulties.	Highly feasible
Introduction of H7 Vaccine	Commercially viable with reasonable cost. (Ball park cost estimate: Recurring cost: HKD 5 million)	Operationally feasible, with procedure similar to existing H5 vaccination.	Subject to the study on the H7 vaccine.	Feasible
Numbering of Cages	Commercially viable with reasonable cost. (Ball park cost estimate: Capital cost: about HKD 0.5 million; Recurring cost: about HKD 0.5~1.0 million)	Operationally feasible as there is no operational difficulty.	No major difficulties.	Feasible
Tagging Individual Poultry	Commercially not viable as the additional cost is expected to deter both local and mainland poultry business. (Ball park cost estimate: Recurring cost: about HKD 6~9 million)	Operationally feasible.	The trade is not willing to be responsible for the tagging due to commercial consideration.	Not feasible

Source: BMT

7.6

Recommended Improvement Measures

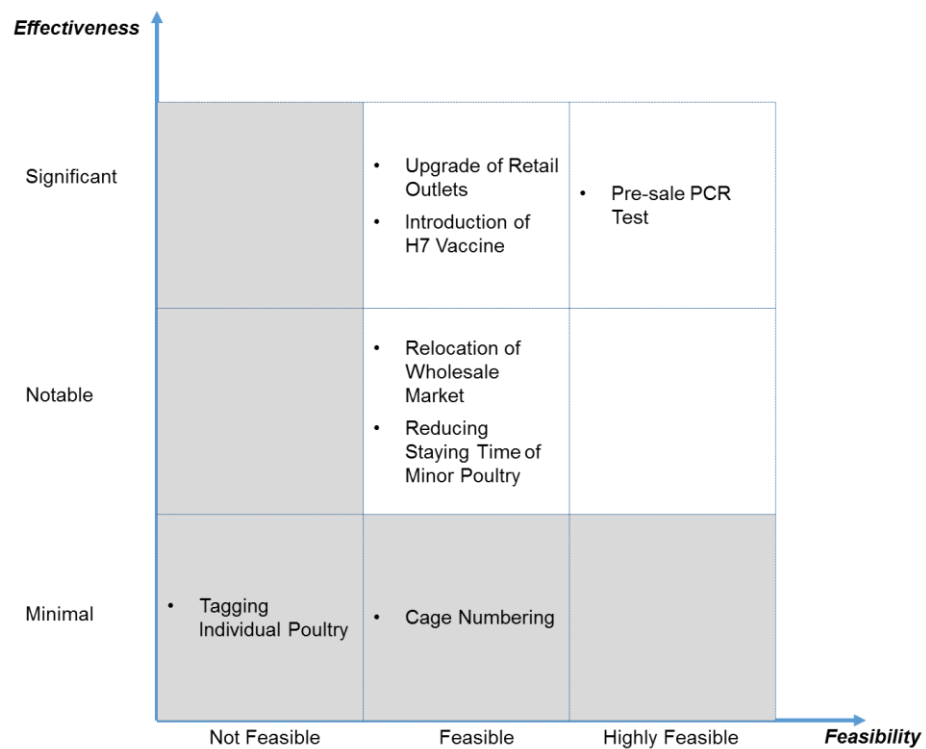
7.6.1

Recommended Improvement Measures

The following chart summarises the result of the assessment of the potential measures. Those measures that are both effective in risk mitigation and feasible to be implemented are recommended to be implemented, namely:

- Pre-sale PCR test
- Introduction of H7 vaccine
- Upgrade of retail outlets
- Relocation of wholesale market
- Reducing staying time of minor poultry

Figure 7.1 Recommended Improvement Measure



Source: BMT

8 Conclusion

8.1 Live Poultry Trade and Culinary Preference

Poultry is an important source of meat in Hong Kong. Over the past 20 years, the total poultry consumption in Hong Kong has shown an increasing trend. Poultry is available in different forms in the market including live, freshly slaughtered, chilled, frozen and prepared. According to AFCD, in 2016 the local poultry industry produced HKD400 million worth of produce, which accounted for over 38% of the total produce produced by the local agriculture industry.

Despite the occurrence of a few AI cases in the past two decades, a recent survey shows that nearly half of the respondents still preferred the consumption of live chickens to other forms of chickens.

8.2 The Way Forward

8.2.1 Live Poultry Trade

Based on the following key findings, it is concluded that with existing effective safeguarding measures, live poultry trade in Hong Kong should be maintained. This will preserve the culinary culture of Hong Kong people and minimise the impact on the trade operators.

- Consumption of live poultry is considered a unique culinary culture of the Hong Kong population. Despite the occurrence of some AI incidents of live poultry infections in the past two decades, the survey results showed that nearly half of the respondents still preferred the consumption of live chickens to other forms of chickens. Survey results also showed that about 43% of Hong Kong people would be dissatisfied or very dissatisfied if they could no longer purchase live chickens in Hong Kong.
- On the other hand, numerous safeguarding measures have been imposed by the Government to prevent the outbreak of avian influenza in Hong Kong. The system of measures adopted in Hong Kong is considered comprehensive, which includes preventive, surveillance and remedial measures that cover all levels of the supply chain.
- Although there have been several AI incidents of live poultry infections at different levels of the supply chain since the first outbreak in 1997, there has been no locally infected human case of H5 or H7. Hence the safeguarding measures are considered effective in preventing human infection.
- The annual expenditure incurred on the safeguarding measures is assessed to be around HKD 8 per kilogram of live poultry, which is considered reasonable compared to the endurable price the survey revealed.
- All health experts attending the panel discussion or being interviewed were of the view that the existing set of AI control measures imposed by

the Government had been effective. All health experts participated in the discussion supported maintaining the local poultry rearing industry.

8.2.2

Mode of Operation

There have been discussions on whether the existing mode of operation for the live poultry trade should be changed in order to further reduce the risk of AI infection in human. Two possible changes to the current mode of operations were identified, i.e.:

- ***Banning of live poultry importation***, with the consideration that there are views of concern over the compliance of safeguarding measures by Mainland farm operators;
- ***Banning of live poultry trade at retail level***, with the consideration to minimise human contact with live poultry including potentially infected ones.

As stringent safeguarding measures are imposed on the registered farms on the Mainland (and hence imported live poultry), and no evidence has been identified to show that imported live poultry from registered farms in Mainland delivered carry higher risk of AI than local live poultry, there is no strong basis for banning the importation of live poultry. Moreover, the AI tests conducted by Hong Kong Government on import consignments are of essence, and serve as the effective gate keeper for virus detection.

To cease live poultry sales in retail outlets, live poultry will need to be slaughtered before delivery to the retail outlets. However, slaughtering at individual farms or centralised slaughtering are considered unviable due to either space constraint, technical or commercial reasons.

The above potential changes in operation modes are considered either not preferred at this stage or commercially infeasible to be implemented.

Nonetheless, the above recommendations are made on the basis of current risk level. If AI risk level will increase significantly in the future (which is beyond current comprehension), the Government may wish to reassess the necessity of changing mode of operation of live poultry trade, even banning of the live poultry trade. Based on the consultation with health experts, signs of increasing risk level can be identified as follows:

- Confirmed local case of human infection;
- Increasing detection of AI in live poultry or environment in Hong Kong;
- Occurrence of sustained human to human transmission.

While the live poultry trade remains in Hong Kong, it is strongly recommended that improvement measures be further improved under the existing operation mode of live poultry trade.

8.3 Improvement Measures

Potential improvement measures have been explored. Both the effectiveness in AI risk mitigation and feasibility of implementation of these potential measures have been studied. Measures that are both effective in mitigating AI risk and feasible to be implemented are recommended for Government's consideration and further study.

First of all, in addition to the bivalent Re6+Re8 vaccine (which can provide sufficient protection against prevailing clades of H5 AI virus) currently used by all local chicken farms, and registered farms on the Mainland, considering the increasing risk of H7N9, it is strongly recommended that the Government should explore the feasibility of introducing additional vaccination in local chicken farms against the new challenge posed by H7N9 AI virus.

Second, for local live poultry, further to the monthly PCR test (virological testing) and regular and pre-sale serological tests, it is recommended that PCR test should be conducted for each marketable batch before delivery to the wholesale market. This could provide an additional safeguard for detecting AI virus, and thus reducing the possibility of any infected live poultry entering the market.

Third, the live poultry retail outlets are the main contact points between the general public and live poultry. Although numerous safeguarding measures, including stringent hygiene code, regular inspection and sampling, have been applied in the retail outlets, it is recommended that the outlets be upgraded to enhance separation by providing physical barriers. The suggested separation may be conducted in different degree in view of various constraints confronted by different live poultry retail outlets such as their physical locations, scale of operation, a need for re-designing of the market, etc., and should be handled with certain flexibility. Dedicated study and layout design may be required for individual outlets to enhance separation to some extent. The physical barriers in the retail outlets are expected to further minimise the contact between the general public and potential viruses, hence reducing the risk of human infection.

Fourth, it is recommended that the wholesale market at Cheung Sha Wan be relocated to a less populated suburban area. Given that the wholesale market is one of the largest holding place of the live poultry in Hong Kong, relocating the wholesale market can reduce the risk of virus exposure to the public.

Finally, it is recommended to set up a maximum number of days (e.g. 3 to 4 days) for minor poultry staying in the wholesale market plus compulsory emptying of poultry keeping cages for thorough cleansing. By reducing the staying time of live poultry in the wholesale market, the AI risk at the wholesale level can be further reduced.