Executive Summary

Background

1. An outbreak of H5N1 avian influenza occurred in local chicken farms in Hong Kong in February and March 2002, involving 22 farms in three different areas, viz. Kam Tin, Pak Sha and Hung Shui Kiu.

2. The Secretary for the Environment and Food appointed an Investigation Team chaired by the Director of Agriculture, Fisheries and Conservation to investigate the cause(s) of the outbreak and to recommend measures necessary to reduce its recurrence. The Terms of Reference for the Team and its membership are at Annex 1.

3. The Investigation Team commenced its investigation on 1 March. It looked at previous events relating to avian influenza in Hong Kong, including the 1997 and 2001 outbreaks, the surveillance and control measures in place before and after the 2002 outbreak, the events leading to the 2002 outbreak, the action taken to control the outbreak in the local chicken raising industry, and hygiene standards and biosecurity in local chicken farms.

4. The Investigation Team sought views of other experts and drew on studies performed by the University of Hong Kong, in which genes of viruses were analysed, as well as a case-control study conducted in conjunction with Massey University EpiCentre, New Zealand.

Background on the local live chicken industry

5. The local chicken raising industry started off as backyard subsistence farming and has moved towards more intensive production over the years. The industry remains dominated by small family-run businesses. The internal fixtures in many of the farms have been progressively upgraded but land ownership constraints mitigate against major improvements to structures. Most of the farms are small and located in close proximity to each other.

6. At the time of the 2002 outbreak, there were 146 chicken farms in active operation. The total stocking capacity was 2.98 million chickens.

7. On average, some 100,000 live chickens are sold daily. The local chicken industry can supply some 20% of this amount. The remaining 80% is imported from farms located in Guangdong and Shenzhen in the Mainland. All farms supplying chickens to Hong Kong must be registered with the Inspection and Quarantine Bureau in the Mainland.

8. At the time of the 2002 outbreak, all imported chickens and most of the locally produced chickens were channelled through the single wholesale poultry market at Cheung Sha Wan (the Cheung Sha Wan Temporary Wholesale Poultry Market). Some local farms supplied poultry direct to retail outlets. All consignments of poultry (both local and Mainland) were subjected to pre-market inspection and blood testing.

9. Mainland poultry are transported in cages that only travel between the Mainland and the wholesale market. Local birds are brought to the wholesale market in plastic cages provided by wholesalers. The same cages are also used for delivery of birds from the wholesale market to some 850 retail stalls and fresh provision shops located mainly in wet markets. The wholesalers organise cleansing and disinfection of cages returned to the wholesale market and the Agriculture, Fisheries and Conservation Department supervises the cleansing standards.

H5N1 avian influenza viruses

10. H5N1 viruses have been found to be evolving continuously. They have adapted to land-based poultry around 2001 and caused the outbreak at retail markets in May that year. They have continued to evolve and generate more genotypes. None of these recent H5N1 viruses share the same combination of genes as the H5N1 viruses found in 1997 that caused serious disease in both poultry and humans.

11. H5 avian influenza viruses exist as part of nature and cannot be eliminated. They occur naturally in waterfowl and there will always

be potential for H5N1 virus to enter the live chicken system. No combination of tests can entirely eliminate the possibility of infected chickens going undetected, especially newly infected chickens.

Existing control measures for H5N1 avian influenza

12. The Investigation Team noted that a comprehensive system of control and monitoring has been built for avian influenza at local and Mainland farms, at border entry points and at markets following the 1997 outbreak. This was enhanced after the 2001 outbreak with the inclusion of "dead bird" monitoring in markets and implementation of monthly rest days at retail markets. In 2001, new laws were introduced to segregate live quail from other poultry at all levels of production, distribution and marketing, and to require separate packing of waterfowl carcasses and offal in a manner that would prevent these items from contaminating retail outlets selling live poultry.

13. The package of control and monitoring measures introduced after the 1997 outbreak had been effective in preventing H5N1 virus from gaining entry into Hong Kong's chicken population from 1998 until 2001. It allowed detection of changes in avian influenza viruses in waterfowl in the year 2000. It also provided early information on infection with avian influenza virus in 2001.

The 2002 outbreak

14. Three genotypes of H5N1 virus ("Z", "Z1" and "X") were found in local farms. Of the 22 infected farms, 13 were infected by genotype "Z" virus, 8 by genotype "Z1" virus, and one by genotype "X" virus. A total of 6 different H5N1 virus genotypes ("X", "X1", "X2", "X3", "B" and "Z") were detected in samples collected from retail markets between 9 and 16 January.

15. The Investigation Team considers that the outbreak of disease on local farms was probably caused by a small number of introductions of H5N1 virus onto farms, followed by local spread between farms.

16. Spread from farm to farm was likely to be due to the movement of people or items associated with the poultry industry and, for some farms in very close proximity, may have been the result of airborne spread of virus via contaminated dust.

17. From the information available, the Investigation Team considers it likely that direct sales of poultry to retail markets and the movement of people associated with the live poultry trade onto and between farms played a significant role in the spread of this virus.

18. The Investigation Team is of the opinion that transport cages used to hold birds in the markets could play a significant role in the spread of avian influenza if they are not cleaned and disinfected properly.

19. The Investigation Team found that other factors, including day old chicks, livestock feed, faecal waste collection bins, wild birds, overstocking and smuggled birds, were unlikely to have played a significant role in this outbreak. Nevertheless, the Team concluded that any material brought on to chicken farms that has been associated with poultry should be considered potentially infected and handled accordingly. Similarly, any people who deal with poultry must be considered potentially contaminated and appropriate measures taken to prevent them from carrying virus onto farms.

20. The Investigation Team also supports measures already taken to prevent wild birds from entering poultry sheds and to limit the number of poultry that can be raised on individual farms.

Recommendations

21. The Investigation Team recommends that further steps should be taken to reduce the risk of recurrence of H5N1 avain influenza infection in farms. It recognises that any new measures it recommends will not come without some costs to the related trades and can only be implemented after full consultation with and cooperation of the poultry industry.

Improving farm biosecurity

22. The Investigation Team concluded that the number of cases on local farms could have been reduced with improved biosecurity. Improvements in this area can be achieved by farmers adjusting their mindset to critically assess the risk they are being exposed to, and implementing appropriate measures to isolate their farms from the environment outside and other people.

23. The Investigation Team endorses the enhancements to biosecurity that have already been put in place in farms just prior to and after this outbreak, including the prohibition of sale of poultry direct to retail.

24. The Investigation Team considers that farm biosecurity would be further strengthened if farmers :

- avoid contact with markets (e.g. not allowing their staff to go to poultry markets);
- isolate their chicken production areas on farms from other activities (e.g. separate entrances for chicken rearing areas and residences on farm premises; solid fencing of chicken production areas; a requirement for visitors to shower or wear clean protective clothing before entering chicken rearing areas);
- improve their overall husbandry (e.g. segregation of birds by age; complete emptying of sheds between batches of birds);
- prevent the entry of equipment and vehicles onto farms unless properly disinfected (e.g. disinfection of the undercarriage of vehicles entering farms); and
- stop movement between farms (e.g. prevent sale of feed from farm to farm unless it is properly disinfected first).

25. The Investigation Team notes that the implementation of improved biosecurity measures will have serious financial implications for chicken farmers. Some farms may not be able to meet these new requirements due to intrinsic difficulties, such as land constraints, and may have to be closed. The Agriculture, Fisheries and Conservation

Department could assist farmers to formulate appropriate biosecurity measures applicable to specific situations encountered.

Enhancing measures relating to transport cages

26. The Investigation Team recommends that a separate set of colour coded cages for transporting local birds from farms to wholesale markets be used to help reduce cross-contamination between markets and farms. Implementation of this recommendation would require capital input from local farmers and wholesalers and possible reorganisation of the distribution system for local chickens.

Reducing the volume of trade in live poultry

27. The Investigation Team notes that the risk of infection can be reduced by reducing the volume of trade in live chickens. Increased availability of chilled poultry products may lead to reduced demand for live poultry.

Breaking virus cycles in markets

28. The Investigation Team also recommends that consideration be given to introducing an additional market "rest day" to reduce further the virus load in the retail markets and to adjust the rest days so that both wholesale and retail markets have two synchronised rest days each month. However, it is recognised that this would lead to disruption of the trade patterns of retailers and wholesalers.

Enhancing surveillance tools and monitoring for emergence of new viruses

29. The surveillance and monitoring system for viruses must continue. The mix of tests used in the current testing regime for control and monitoring should be kept under constant review and appropriate new testing technologies should be considered for introduction as they become available.

The use of vaccines

30. The Investigation Team noted that vaccine is being used as an adjunct to control H5N1 avian influenza in Pak Sha. The Investigation Team recommends that the results of the vaccination programme should be reviewed before the role of vaccination in the control of H5N1 avian influenza virus in Hong Kong is established.

Conclusion

31. The Investigation Team concluded that as long as there is a demand for freshly slaughtered poultry in Hong Kong, there will continue to be trade in live poultry. As a consequence, there will always be a risk of further outbreaks of H5N1 avian influenza with the accompanying potential risk to public health. The package of measures recommended above can only minimise the risk of avian influenza infecting poultry in markets or farms and makes the task more manageable when it does occur. It is essential that the Government should start consulting the stakeholders as soon as possible in order to implement these measures.