Successful strategies in controlling avian influenza

Please read this note in conjunction with INFOSAN Information Note No. 7/2005(Rev 1.5 Dec) – Avian Influenza ‘Highly pathogenic H5N1 avian influenza outbreaks in poultry and in humans: Food safety implications’ see: http://www.who.int/foodsafety/fs_management/No_07_AI_Nov05_en.pdf

SUMMARY NOTES

• The continuing outbreaks of highly pathogenic avian influenza in several South-East Asian countries that began in late 2003 and early 2004 have been disastrous to the poultry industry in the region and have raised serious global public health concerns.

• Worldwide, 238 humans are known to have contracted the infection, of which 139 have died.

• Over 220 million domestic poultry have either died or been destroyed and economic losses to the Asian poultry sector alone are estimated at around US$10 billion.

• Countries have applied a number of different strategies to control avian influenza, focusing on the control in poultry and on massive communication campaigns to the general population.

• While most countries with smaller outbreaks have often relied primarily on stamping out in the relevant animal population, several countries with larger outbreaks have initiated vaccination campaigns in such animal populations.

• Larger outbreaks have mainly affected developing countries - these countries have responded using efficient strategies including stamping out (e.g. Thailand) and vaccination (e.g. Viet Nam).

Introduction

The outbreaks of the highly pathogenic H5N1 avian influenza virus, that began in South-East Asia in mid-2003, and have now spread to more than 50 countries in Africa, Asia, Europe and the Near East, are the largest and most severe on record1. To date, 238 human cases have been reported from 10 countries, 139 of which have resulted in death. Of the countries initially affected, some have managed to control the disease in the poultry population which has contributed substantially in reducing the risk of further human cases. These measures together with public health measures led to a steep decrease in the number of human cases of H5N1. Additionally, preventing further human cases reduces the risk that the virus - if given enough opportunities - will change into a form that is highly infectious for humans and spread easily from person to person. Such a change could mark the start of an influenza pandemic. Such opportunities arise each time close contacts between humans and infected birds occurs.

1 Background information is available on page 4 of the INFOSAN Information Note No. 7/2005 (Rev 1.5 Dec) – Avian Influenza ‘Highly pathogenic H5N1 avian influenza outbreaks in poultry and in humans: Food safety implications’, (http://www.who.int/foodsafety/fs_management/No_07_AI_Nov05_en.pdf).
This INFOSAN Information note is intended to briefly describe the main interventions taken by these countries to control the disease in the bird population and to educate the public in order to prevent human cases.

The four examples described here have been chosen for the diversity of the socioeconomic and geographic situations they represent. The countries also have different capacities to detect and contain a highly infectious disease like highly pathogenic avian influenza. It is hoped that the sharing of these examples could serve as inspiration and guidance for other countries.

**Japan**

In early 2004, four outbreaks of highly pathogenic avian influenza, caused by H5N1 strains, were confirmed in Japan. In all cases, a series of control measures against highly pathogenic avian influenza were strictly and rapidly introduced. These measures were based on a stamping-out policy without vaccination, but included movement control, cleaning and disinfection of affected premises. As a result, no further outbreaks of highly pathogenic avian influenza have been confirmed since the last case in March 2004, which shows that early detection and containment were successfully implemented and that highly pathogenic avian influenza is likely to have been completely eradicated in Japan.

In June 2005, the first case of low pathogenic avian influenza\(^2\), caused by a H5N2 strain, was confirmed, and a further 40 poultry cases were also confirmed by the epidemiological investigations or serological surveillance. Although these cases were not caused by highly pathogenic avian influenza, the same strict control measures were introduced under the Domestic Animal Infectious Disease Control Law. After the last confirmed case in December 2005, no further cases have been confirmed. It should also be noted that owing to the proper use of personal protective equipment none of the health officers involved in infection control were found to be infected.

The Food Safety Commission, the Ministry of Health, Labour and Welfare (MHLW) and the Ministry of Agriculture, Forestry and Fishery (MAFF) released advice on public health and food safety to the Japanese public. It mentioned that there had been no human cases of avian flu infection from the consumption of eggs or poultry meat and advised consumers to cook these products thoroughly. This message is found to be important not only for avian influenza, but also for preventing a range of other diseases transmitted through raw or undercooked poultry.

**The Netherlands**

In February 2003, an outbreak of highly pathogenic avian influenza, H7N7 was detected in a poultry-dense part of the Netherlands. The Ministry of Agriculture, Nature and Food Quality is responsible for dealing with infectious diseases in food animals. To control the outbreak in poultry, the affected farms and other farms within a one kilometre radius were depopulated. Regulatory measures put in place included the ban on movement of live poultry, used litter and poultry dung within a 10 kilometre radius of an affected farm. Within this radius all poultry was kept in their sheds, pet poultry were kept indoors and cases of dead or sick poultry had to be reported to a veterinary officer. The outbreak eventually spread to a second region, where it was contained relatively quickly. A total of 30 million chickens from 1145 farms (255 with infection) and poultry from 16 490 hobby farms were culled in the course of two months.

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\(^2\) Information on avian influenza and its high and low pathogenic forms is available on page 4 of the INFOSAN Information Note No. 7/2005(Rev 1.5 Dec) – Avian Influenza ‘Highly pathogenic H5N1 avian influenza outbreaks in poultry and in humans: Food safety implications’ [http://www.who.int/foodsafety/fs_management/No_07_AI_Nov05_en.pdf](http://www.who.int/foodsafety/fs_management/No_07_AI_Nov05_en.pdf).
Other measures in place included a ban on the export of live poultry or hatching eggs from the Netherlands. In addition, poultry markets, sales, auctions and quality inspections were banned during the outbreaks within the Netherlands. The movement of people to farms in the restricted regions was also limited. Sentinel birds were introduced in affected sheds after cleaning, disinfection and a sanitary waiting period of at least 40 days to ensure that the areas were free of the virus. Additional measures were taken to alleviate the financial and social consequences for affected farmers and their staffs.

During the outbreaks, serological screening revealed the presence of antibodies to H7 viruses in a significant proportion of pigs on five of the 13 farms that had these animals in addition to the poultry. These pigs were slaughtered under controlled circumstances.

During the outbreak, conjunctivitis was reported by more than 10% of farmers and poultry workers, and was thought to be caused by H7N7 infection. Virologically confirmed infection occurred in 89 cases, one of which resulted in fatal disease. This included three cases of confirmed infection in household members of affected poultry workers with no direct poultry contact. On the basis of serology a much more widespread rate of transmission of H7N7 to humans was substantiated. Oseltamivir was given prophylactically to poultry workers and farmers, and was shown to be effective. A follow-up survey showed that a high proportion of farmers reported stress-related complaints, mostly related to worries about the future of the business.

**Thailand**

In January 2004, the highly pathogenic avian influenza virus subtype H5N1 was first confirmed in poultry and humans in Thailand. Conventional control measures, e.g. culling affected poultry flocks, restricting poultry movement and improving hygiene, were implemented. Poultry populations in 1417 villages in 60 of the 76 provinces were affected in 2004. A total of infected flocks confirmed by laboratories were backyard chickens (56%) or ducks (27%). Outbreaks were concentrated in the central region, the southern part of the northern region, and the eastern region of Thailand, which are wetlands, water reservoirs and dense poultry areas. More than 62 million birds were either killed by highly pathogenic avian influenza viruses or culled, a number of domestic cats, captive zoo tigers and leopards also died of the H5N1 virus after being fed fowl that had died from the disease. The highly pathogenic avian influenza virus subtype H5N1 caused 22 human cases and 14 deaths in Thailand in 2004 and 2005. Between December 2005 and June 2006, no human cases or poultry outbreaks were reported. However, in late July 2006 the virus reappeared in poultry and one human case has been notified. Investigations are ongoing to understand the reappearance of the highly pathogenic avian influenza virus subtype H5N1.

Several measures were taken after the first isolation of highly pathogenic avian influenza virus in January 2004. Initially, all poultry, their products, feed, bedding, waste and manure from infected flocks were destroyed immediately by the authorities. Culling infected birds in each flock was generally completed 1–2 days after the virus was confirmed by virus isolation (confirmatory diagnosis took 2–8 days after submission of samples). Meanwhile, restriction on the movement of poultry and their products within a five kilometre radius around the infected flocks was enforced by veterinary services inspectors in collaboration with local law enforcement officers. Control checkpoints were temporarily established in these areas. Infected premises and equipment were cleaned and disinfected.

In July 2004, the Department of Livestock Development (DLD) implemented a series of control measures to enable quick action. Specifically, if the poultry death rate in any facility was >10% within a single day, all birds, their products and other potentially contaminated materials had to be destroyed without delay. Cloacal swabs of affected flocks were then collected for laboratory confirmation. Subsequently, neighbouring flocks were destroyed immediately or quarantined until H5N1 laboratory confirmation. Upon a confirmative laboratory result quarantined flocks were culled. Furthermore, the
movement of poultry and their products was restricted to within a one to five kilometre radius around the infected area.

After July 2004, pre-emptive culling was implemented only within a village within an area of one kilometre around an outbreak, or on suspected farms, instead of within a 5 kilometre radius as was done before. This new strategy was adopted because the density of poultry flocks decreased after the massive culling during the first half of 2004 and was also influenced by the negative public reaction to mass culling.

Since January 2004, a stamping-out policy with compensation for affected farmers, has been used to control avian influenza outbreaks in Thailand; vaccination has not been allowed. In addition massive education campaigns have been developed and promoted in rural areas to inform populations about the need for broad participation in addressing the highly pathogenic avian influenza outbreaks in animals. Village volunteers were recruited to conduct house-to-house surveillance and early reporting of new outbreaks in animals in an effort to facilitate early detection and prompt response. These campaigns also included raising awareness on the risks associated of close contact with sick and dead poultry. In January 2005, the Government of Thailand endorsed a national strategic plan to control avian influenza and influenza pandemic preparedness with a total budget of US$120 million.

**Viet Nam**

Viet Nam was among the first countries to report cases of highly pathogenic avian influenza at the start of the current panzootic. In December 2003, after the first confirmed cases of H5N1 in animals, the disease was detected throughout the country. At the peak of the epidemic in Viet Nam, 24% of communes and 60% of towns were affected. By March 2004, approximately 17% of the poultry population had died or been culled. In 2005, a second wave of the disease affected the country and by April of that year 670 communes were affected. From April to December 2005, there were 276 infected communes in 28 provinces and approximately 3.7 million culled birds. Since 2004 more than 50 million birds have been culled. Between October 2005 and January 2006, a national poultry vaccination programme was undertaken in all 64 provinces administering 246 million doses to 170 million chickens and 76 million ducks. A post-vaccination programme was developed together with guidelines for its implementation. Since December 2005 no new outbreaks in poultry have been reported.

From the very start of the epidemic human cases of avian influenza infection were recorded. Viet Nam has reported the highest number of human cases of any country. By the end of December 2005, Viet Nam’s human toll was 93 cases, including 42 deaths, mainly confined to the Red River Delta provinces in the north and the Mekong Delta Region in the south, matching the distribution of poultry outbreaks.

Viet Nam developed national strategic plans for animal health and human health including the disease control centres, technical guidelines on animal control measures, early warning systems, risk communication and border control. Conventional control measures (e.g. culling infected flocks and surrounding at risk flocks; bio-security improvements at farm level; movement control of poultry in affected provinces) were successfully combined with strategic vaccination of domestic poultry and ducks to curb the number of new outbreaks in animals and prevent further human cases of H5N1. These measures were supplemented by a public awareness campaign and a temporary ban on hatching of ducks, known to be asymptomatic carriers. In order to improve the participation of the population in the surveillance and control efforts, compensation to farmers during stamping out efforts was raised from 10% of the market value in 2004 to 50% in 2005.
Conclusion

The continuing outbreaks of highly pathogenic avian influenza (HPAI) in several South-East Asian countries that began in 2003 and 2004 have been disastrous to the poultry industry in the region and have raised serious global public health concerns. Globally, over 220 million domestic poultry have either died or been destroyed and over two hundred humans have contracted the infection, of which 139 have died. Indonesia has been the latest country in which human cases and fatalities are being reported. Economic losses to the Asian poultry sector are estimated at around US$10 billion.

To date, highly pathogenic avian influenza H5N1 outbreaks have been stamped out in Japan, the Republic of Korea and the Netherlands. The experience in Viet Nam with vaccination as an additional tool in disease control, has contributed greatly to curbing virus circulation. After 14 difficult months, Thailand has made tremendous progress in controlling the disease through enhanced surveillance, strict biosecurity measures and culling of infected poultry. While these countries have been successful in controlling highly pathogenic avian influenza H5N1, reappearance is possible as seen in Thailand in July 2006 and therefore vigilance is required in all countries that have been affected or countries which are at risk of being affected, to ensure any reintroduction or introduction is managed successfully.

Most of these countries have the resources to deploy the necessary control measures and provide improved veterinary services and surveillance to support highly pathogenic avian influenza control. Viet Nam, with strong political backing, launched a successful vaccination campaign and seems to have brought the disease under control with no more human or poultry cases to date in 2006. While these success stories provide encouragement that concerted efforts do in fact pay off in the control of avian influenza, they also clearly point to the high level of investment required to support an integrated highly pathogenic avian influenza control strategy, not always available to countries less endowed with the necessary human or physical resources.

Lessons learned:
- Avian influenza control is multisectoral in nature involving close collaboration between the health, agriculture, finance and planning sectors, among others.
- Health and Veterinary services need to be adequately resourced to respond effectively to emerging and remerging zoonotic pathogens in order to protect animal and public health.
- In Africa and Asia, in particular, the livelihoods of rural poor are particularly threatened. For poor households depending for their livelihoods on poultry, highly pathogenic avian influenza has meant the loss of income and increased food insecurity. For example, survey data in Viet Nam show that the poorest households rely more than three times as much on poultry income than do the richest, so there are also adverse distributional effects with the smallholders having suffered the most from the epidemic.
- Control strategies to prevent further outbreaks and human cases must include public information and awareness raising campaigns aimed at behaviour changes to reduce high risk practices.

References


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