

SUMMARY

Shiro Yoshimura

After December 2003, worldwide outbreaks of highly pathogenic avian influenza (HPAI) by avian influenza virus (AIV) subtype H5 have been reported, and contentious ones were confirmed particularly in Asia. The total number of chicken in the world that AIV might infect was approx. 20 billion and more than half of them were in Asia. Thus, control of HPAI is an important task for veterinary hygiene and for prevention of livestock epidemic in Asia. Since human infections and deaths by H5-subtype have been confirmed after 2003 and those by H7-subtype have been confirmed in 2013, HPAI has become a major public health problem.

With these as background, this thesis was composed of three chapters that investigated effective HPAI control in Asia, particularly in Southeast Asia (SEA): Chapter 1, analyses of the situation and factors of the HPAI outbreak in Asia; Chapter 2, investigation of the problems in prevention and control measures (P/C measures) of epidemics at the national level; Chapter 3, evaluation of results from HPAI P/C measures which had been taken by international projects.

Chapter 1. Analyses of situations and factors of HPAI outbreak in Asia

Owing to the emergence of human influenza (H5N1) in Hong

Kong in 1997, HPAI began receiving more attention not only in veterinary hygiene but also in public health. In this chapter re-evaluations were made on the situation of HPAI outbreaks, on related literatures and on factors related to the outbreak and expansion of the infection which may disturb the prevention.

The HPAI outbreak spread sequentially from East Asia and SEA after 2004, and outbreaks were reported from 64 countries by 2012. In Japan, HPAI outbreaks were reported from 2004 through 2011, and the involvement of wild birds was suggested in the HPAI outbreaks particularly in 2010-2011.

As for the outbreak factors of HPAI, investigations were made on poultry farming systems, and on movements of wildlife including birds, people and goods, to evaluate the involvement of birds. As a result, in China and SEA poultry farms with their poultry outside were found to be in lower biosecurity and wild birds could easily come in contact with the poultry, suggesting that this form of poultry farming greatly contributed to the HPAI outbreak. It cannot be denied that wild birds infected with AIV (H5N1) were involved in HPAI outbreaks in Japan, and the epidemiological relationships were suggested between the disease and wildlife, resident birds, movement of persons and vehicle of farms.

On the other hand, it was found that in some cases HPAI broke out in places where live birds are gathered (such as live bird market in SEA etc.), and that the pathogen was carried with poultry meat exported from China. As for veterinary management and social

factors related to outbreak and expansion of HPAI, it was estimated that as a result of lengthy vaccination, infection spread and lasted contrary to an initial strategy and expectation because many poultry with subclinical infection were left without being killed. Asian traditional culture such as cock fighting was also found to become an indirect factor in the HPAI outbreak and the expansion. Further, motorcycles were suggested to contribute to the HPAI outbreak because they are used to carry live poultry, in SEA.

Therefore, problems were pointed out in the evaluation of biological, physical and social factors for outbreak, its expansion and control of HPAI in this chapter.

Chapter 2. Legislation for prevention of livestock epidemics, and analysis of the problems

In this chapter problems that hinder HPAI control were investigated by comparing the law and P/C measures in countries (including Japan) that have succeeded in HPAI control, and those in countries where infection still continued.

Historically, GM Lancisi in Italy and T Bates in England introduced the world first active control measures to kill infected animals, to restrict movement and to incinerate/bury the killed animals, and the measures were established in the 1700s and adopted throughout the world. The measures including “payment of compensation” by Bates is notably said to have become the model of the current stamping-out.

As for Japan, the idea of stamping-out of infected livestock was introduced in the “Rinderpest Control Law, in 1871”, and since then the Law and its subsequent laws were subject to revision and abolition. The older version of the “Animal Infectious Disease Control Law” was enacted in 1922 and the current “Animal Infectious Disease Control Law” in 1951. In Japan, foot and mouth disease, HPAI etc. have been brought under control with revised “Animal Infectious Disease Control Law, 1951”, “Disease control guidelines” for ensuring rapid coordination and cooperation, and “Law on special measures” enacted as needed. These facts made **evident** the utility **and necessity** of preparation of law having legal force and its enforcement to effectively reduce outbreaks of animal infection and the damage.

Although Asian countries also have similar laws, it was found that there were some laws covering only prevention of livestock epidemics and others covering livestock production and veterinary affairs in addition. Although in some countries no signs of disappearance of HPAI is seen despite the national measures such as those in Japan, others showed that the HPAI outbreak was controlled by increasing the number of staff involved in the prevention of the livestock epidemic and by proper surveillance, etc.

Therefore, in this chapter it was found evident that an adequate levels of budget and staff, and an accurate grasp of epidemiological information were essential for HPAI control in addition to preparation of laws.

Chapter 3. HPAI control project internationally implemented in SEA

Human cases of avian influenza (H5N1) due to AIV H5-subtype have become an important problem in public health because of the high mortality of approximately 60%. In this chapter, the effectiveness of the HPAI project in SEA the author participated in was analysed and the result was evaluated. HPAI, firstly reported in Korea and Indonesia in December 2003, and spread widely in East Asia and SEA including Thailand, and international action to HPAI P/C measures was started thereafter. The author joined the measures as an official of the Ministry of Agriculture, Forestry and Fisheries from the beginning.

At the “International Pledging Conference on Avian and Human Pandemic Influenza” in January 2006 held in Beijing China, followed by the “International Conference on Avian and Human Pandemic Influenza” held in Bamako (Republic of Mali), international budgetary assistance was first proposed for avian and human influenza (Beijing Declaration) and Japan pledged to support a budget, capacity-building, provision of equipments and others.

The author was assigned temporarily to the OIE office in Bangkok in 2006, and engaged for one and a half years in the support project (phase 1) that OIE took responsibility targeting Thailand, Cambodia, Laos, Myanmar, Malaysia, Indonesia, Vietnam and the Philippines.

(1) In the analyses of law, although all countries have an animal hygiene-related law and guidance for HPAI prevention, there were differences in their content, and some were sufficiently equivalent to the international standard and others not. Then, even if a law existed, some countries lacked sufficient personnel, equipment and budget needed for effective enforcement of the law.

For countries whose strategies were insufficient, an official proposal was made to improve and strengthen the strategies in close collaboration with the countries.

(2) In information sharing for local early-warning systems reinforcement, some common problems existed among countries. Thus, workshops, development of computer software and infrastructure improvement were performed to strengthen the local early-warning system, and a positive outcome was achieved.

(3) Problems became clear about diagnostic equipment and techniques. In this respect a positive outcome was also achieved from provision of diagnostic equipments and on-the-job training, and national training for diagnostic techniques reinforcement.

(4) Since a level of knowledge and techniques of veterinarian and para-professional were not sufficiently high, workshops were organized to help all of them gain similar levels of technical expertise for HPAI prevention, and then, a positive outcome was achieved.

In this chapter, it was clarified that the project achieved a

positive outcome by “the Japanese support for HPAI P/C measures in poultry” that the author joined.

In conclusion, problems were first highlighted by reevaluation of biological, physical and social factors related to HPAI control based upon the analyses outbreaks. In the next, preparation of laws, an adequate level of budget and staff were essential for HPAI control, and then from the analysis of the HPAI outbreak, it was also demonstrated in SEA that the appropriate enforcement of laws and related regulation were effective for control of the livestock epidemic. The project that the author joined succeeded in HPAI control in several countries. These results should be considered when planning measures for rapid and effective HPAI control, and are considered to be meaningful for those involved in veterinary hygiene and public health.