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FAO ANIMAL PRODUCTION AND HEALTH



APPROACHES TO CONTROLLING, PREVENTING AND ELIMINATING H5N1 HIGHLY PATHOGENIC AVIAN INFLUENZA IN ENDEMIC COUNTRIES

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paper

APPROACHES TO CONTROLLING, PREVENTING AND ELIMINATING H5N1 HIGHLY PATHOGENIC AVIAN INFLUENZA IN ENDEMIC COUNTRIES

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Foreword

The appearance of H5N1 highly pathogenic avian influenza (HPAI) in southeast Asia in 2003/2004, and its subsequent spread to Europe, Middle East, Africa and South Asia destroyed poultry flocks, had an adverse economic impact on countries exposed to the disease, exacerbated poverty and put public health at risk, leading to over 300 deaths, and the unknown potential for a human influenza pandemic of avian origin.

FAO's collaborative HPAI Global Programme has contributed significantly to limiting the impact of the disease, establishing stronger national systems, and strengthening regional coordination for disease preparedness, prevention and control. The programme has been implemented through 170 projects, actively involving more than 130 countries, of which more than 60 have experienced outbreaks of H5N1 HPAI since 2004.

With the continuous support of the international donor community, national governments, regional and international organizations, development agencies, and international development banks, sustained coordinated action has progressively reduced the number of countries affected by H5N1 HPAI. This was achieved by assisting national veterinary services to develop preparedness and contingency plans, improving surveillance systems, acquiring laboratory resources and disease diagnosis capacity, developing response capabilities, communication and awareness, and promoting biosecurity along the value chain.

Currently, there are at least six countries – Bangladesh, the People's Republic of China, Egypt, India, Indonesia and Viet Nam – where the virus is entrenched, and a number of other countries experiencing sporadic outbreaks. It is expected that for most of the endemic countries and their affected regions, it will take several years, if not decades, to achieve freedom from the virus.

Since its onset, knowledge generated on H5N1 HPAI has increased considerably, with an impact on the disease, including in reducing outbreaks in poultry and human cases.

This document reflects the new knowledge, and is the first detailed and comprehensive analysis of the specific features of countries in which the disease has become entrenched, and the constraints for its elimination. This paper also proposes goals for the next few critical years, and a framework of innovative approaches and activities to control and ultimately, eliminate the virus in each of the six countries.

The preparation of this document was initiated in April 2010 by FAO's regional Emergency Centre for Transboundary Animal Diseases team based in the Regional Office for Asia and the Pacific (ECTAD-RAP), including experiences from Egypt.

We hope that this document will be a useful source of information for all countries in implementing measures to prepare for, prevent and control HPAI.

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The contribution of the key donors who continue to support the HPAI programmes in endemic countries is greatly appreciated, including the United States Agency for International Development (USAID), Australian Agency for International Development (AusAID), the Governments of Japan, the Netherlands, the World Bank and the Asian Development Bank, and the European Union.

We would like to express particular thanks to Les Sims, the FAO consultant who was the principal writer of the Paper; ECTAD RAP Regional Manager, Subhash Morzaria, and team members for initiating, leading and coordinating the process for developing the Paper; and Team Leaders/Chief Technical Advisors of the six countries for their significant technical inputs and for coordinating Country Team inputs; together with FAO Headquarters staff for reviewing the Paper.

We hope that this document will be a useful source of information for the endemic countries in implementing measures to prepare for, prevent and control HPAI.

Acronyms and abbreviations

ASEAN	Association of Southeast Asian Nations (ASEAN)
AVS	Additional veterinary surgeons (Bangladesh)
BCC	Behaviour change communication
C&D	Cleaning and disinfection
CAHO	Community animal health outreach (Egypt)
CAHW	Community animal health workers
CIRAD	French Agricultural Research Centre for International Development
DAH	Department of Animal Health (Viet Nam)
DGLS	Director General of Livestock Services (Indonesia)
DIVA	Differentiating between infected and vaccinated animals
DLP	Department of Livestock Production (Viet Nam)
DVE	Duck virus enteritis
EIDs	Emerging infectious diseases
FAO	Food and Agriculture Organization of the United Nations
FMD	Foot-and-mouth-disease
GETS	Gathering evidence for a transitional strategy (Viet Nam)
GOVS	General Organization of Veterinary Services (Egypt)
HPAI	Highly pathogenic avian influenza
H5N1 HPAI	H5N1 virus sub-type of HPAI
IMCAPI	International Ministerial Conference on Avian and Pandemic Influenza (Hanoi, 2010)
ISO	International Organization for Standardization
KAP	Knowledge attitudes and practices study
LDCCs	Local Disease Control Centres (Indonesia)
LIFSAP	Livestock Competitiveness and Food Safety Project (Viet Nam)
LPAI	Low pathogenic avian influenza
MMWR	Morbidity and mortality weekly report (Viet Nam)
MoALR	Ministry of Agriculture and Land Reclamation (Egypt)
NCBI	National Center for Biotechnology Information (Bangladesh)
NCVD	National Centre for Veterinary Diagnostics (Viet Nam)
OFFLU	OIE/FAO network on animal influenza
OIE	World Organisation for Animal Health
PCR	Polymerase chain reaction
PDSR	Participatory disease surveillance and response
Perda	*Peraturan Daerah* (local government regulations in Indonesia)
PRRS	Porcine reproductive and respiratory syndrome
PVS	OIE performance of veterinary services
siRNA	Short interfering ribonucleic acid

SMS	Short message service
SOP	Standard operating procedures
TADs	Transboundary animal diseases
TOT	Training of trainers
ULO	*Upazila* livestock officers (Bangladesh)
USAID	United States Agency for International Development
VAHIP	Vietnam Avian and Human Influenza Control and Preparedness Project
WHO	World Health Organization

Executive summary

At its peak, highly pathogenic avian influenza (HPAI) caused by viruses of the H5N1 subtype was reported from over 60 countries in 2006. Since then, most affected countries have eliminated the disease, some more than once as a result of multiple incursions of virus. However, in at least six countries in Asia and Africa (the People's Republic of China, Viet Nam in the Greater Mekong subregion, Indonesia in southeast Asia, Bangladesh and India in the Indo-Gangetic Plain, and Egypt in North Africa) H5N1 HPAI virus has remained entrenched, and these countries remain endemic for the disease. It is expected that for most of these countries and their respective regions, it will take a few years to achieve freedom from the virus.

Three main factors have been identified that inhibit progress towards the elimination of H5N1 HPAI virus in the endemically infected countries.

The **first factor** is the structure of the poultry sector. Endemically infected countries generally have the following characteristics, caused in part by the rapid increase in demand for poultry and the unregulated growth of the poultry sector:

- Production and market chains are complex and poorly integrated, with a large demand for locally produced poultry and poultry products.
- A high proportion of poultry are reared and sold under conditions that afford little protection from influenza viruses.
- A significant proportion of the poultry in the country/subregion, such as domestic ducks and poultry in infected markets and collectors yards do not display symptoms of the disease when infected.
- Supporting institutions such as producer and service provider associations are weak.

Changes are being made to the poultry sector (covering both production and marketing) that will reduce the risk of infection with H5N1 HPAI but they will not eliminate all high risk practices such as free-grazing ducks) or prevent all cases of infection with H5N1 HPAI viruses. A study on some of the agro-ecological factors that are associated with persistence of H5N1 viruses (Hogerwerf *et al.* 2010) identified a number of factors that appear to be related to endemicity[1].

The **second factor** is the quality of public and private veterinary and animal production services, which have limited capacity to identify and respond to all cases of infection, fully understand the drivers of value chains and implement needed changes to production and marketing systems. The capacity for systematic outbreak investigation is inadequate and disease investigations and tracing rarely identify the source(s) of infection.

In most endemically infected countries limited linkages exist between the public and private sector, especially between government and the large commercial sector. Disease

[1] The study identified six variables that correlate with virus persistence: agricultural population density, duck density, duck by chicken density, chicken density, and the product of agricultural population density and chicken output/input ratio, and purchasing power per capita.

monitoring and surveillance systems only provide a partial picture of disease/infection status. Disease reporting systems rely on reports of disease from producers, many of whom are wary after unhappy past experiences with government veterinary services, especially those that carried out mass culling or offered poor compensation for poultry destroyed. Border controls and laboratory capacity are also affected by the quality of veterinary services although the latter, in particular, has been subject to considerable investment and improvement in recent years.

The **third factor** is the level of commitment within the poultry sector, governments and the public towards the elimination of H5N1 HPAI viruses. The fear of H5N1 HPAI does not necessarily translate into concrete plans for virus control and elimination. Among the exceptions are those producers who perceive economic benefits in keeping their poultry infection-free, especially if this determines access to markets. Support for the type of measures needed to eliminate H5N1 HPAI from zones or entire endemically infected countries will be half-hearted until most farmers regard H5N1 HPAI as a serious threat to their livelihoods and well being. Strong public support is a prerequisite for the elimination of the virus from endemically infected countries.

Although measures have been introduced in all endemically infected countries to address these three factors, all require further long term commitments and investment if the virus is to be eliminated. It is now generally accepted that the H5N1 HPAI virus is unlikely to be eliminated from poultry in these countries and regions for the next ten years at least.

To move forward, each of the endemically infected countries should implement activities that take them closer to virus elimination and reduce the prevalence of disease in poultry and humans, progressively building on the gains made since they first reported cases of disease. The Food and Agriculture Organization of the United Nations (FAO), in association with national authorities, has developed a framework, based on experiences gained so far in endemically infected countries, covering activities that, if adopted, will help to move each country along the path towards virus elimination. The framework proposed for each of the endemically infected countries/subregions is included as annexes.

Each framework comprises a mix of measures aimed at outbreak control and responses (which remain necessary whenever new outbreaks occur), gathering and analysing information (such as surveillance, disease investigations, other epidemiological studies, market chain studies and factors that influence disease reporting including compensation) and disease prevention and risk reduction. Better information allows control and preventive measures to be targeted at the areas facing the greatest threat from the disease and thus improve the focus of risk-based interventions. The framework for each country is tailored to account for local differences in the poultry sector, the stage of development of the H5N1 HPAI programme, socio-political characteristics and also the strengths and weaknesses in both the public and private sector. However, each activity has clear objectives to enable measurement of progress and to ensure that countries remain focused on the goal of virus elimination. All the activities proposed develop capacity for handling other emerging and re-emerging diseases.

As the virus is unlikely to be eliminated from poultry for some time the risk of emergence of a human pandemic strain from an avian virus will persist and will need manage-

ment. The extended time frame until viruses can be eliminated provides opportunities for research into new and innovative measures for the control and prevention of H5N1 HPAI and influenza A (H5N1). This includes better vaccines that can be delivered easily in the various poultry production sectors and do not require multiple injections of individual birds; methods of developing virus resistance in poultry through genetic manipulation and selection; or universal influenza vaccines for humans that protect against different influenza virus subtypes, therefore minimizing the risk from the virus to human health.

For endemically infected countries in which it may take several years to bring about changes to the way poultry are reared and sold, it may be necessary to explore unconventional control methods. The alternative long-term prospects described above, as well as other novel solutions for control, should be considered because there is no guarantee that the current incremental approach will eliminate H5N1 HPAI, especially if the three main limiting factors are not or cannot be addressed fully. The actions taken will not only assist in containing H5N1 HPAI but also in controlling and preventing other diseases.

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