

The Global Strategy for Prevention and Control of H5N1 Highly Pathogenic Avian Influenza

FAO and OIE

in collaboration with WHO

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FOREWORD

Since the current panzootic of highly pathogenic avian influenza (HPAI) caused by viruses of the H5N1 subtype first resulted in transboundary disease in late 2003, it subsequently spread from Asia to Europe and both North and West Africa in 2005 and 2006. It has caused high mortalities in affected poultry flocks, with additional losses due to culling. Farmers and traders have suffered loss of income as a result of market disruption caused by control activities and also market shock due to consumer concerns for human health. For FAO, OIE and others concerned with securing the livelihoods of developing country communities, this is sufficient justification in itself to mount a major campaign to prevent further spread of the disease, contain the disease within infected areas and progressively work towards its eradication.

However, it is the concern for human health, particularly the threat of a human influenza pandemic, that has drawn world attention to HPAI and stimulated donors to support HPAI control and preparedness measures for pandemic human influenza. It is generally accepted that the most important element in addressing the threat of human pandemic influenza is to control HPAI in poultry, thus limiting opportunities for exposure of humans to the virus and minimizing the possibility for development, through adaptive mutation or reassortment, of a virus with the potential to spread easily from human to human.

Following publication of *FAO Recommendations on the Prevention, Control and Eradication of Highly Pathogenic Avian Influenza (HPAI) in Asia* in September 2004, the *FAO/OIE Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza (HPAI)* was first produced in November 2005. Since then, there has been further spread of H5N1 HPAI and a substantial rise in international support, with a notable increase in activities funded through the generosity of a large number of donors, including national governments, and international development banks and development agencies, including FAO.

The OIE/FAO publication *Ensuring Good Governance to Address Emerging and Re-emerging Disease Threats – Supporting the Veterinary Services of Developing Countries to Meet OIE International Standards on Quality* (last updated in August 2006), provides guidelines on limiting the spread of epizootic diseases, including HPAI. Capacity-building formed the main element for elaboration of strategies for the progressive control of HPAI in affected countries and prevention of the dissemination of the disease to unaffected countries.

Although there remain serious gaps in knowledge, there has been an increased understanding of the disease during this panzootic and experience with various control approaches has allowed refinement of strategies at the global, regional and national levels. The revised global strategy presented here is based on the experience and lessons learned from the involvement of FAO and OIE in the global control of H5N1 HPAI over the last three years. The revised strategy provides the long-term vision and goals, identifies priorities and strategic approaches, and proposes short-, medium- and long-term actions at national, regional and global level to control and ultimately eradicate the disease.

This strategy has been developed by FAO and OIE – in collaboration with WHO and a number of experts from OIE/FAO reference laboratories – to give a clear vision for their approach and to communicate that vision to implementing partners, donors and other stakeholders.

ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
AU-IBAR	African Union Inter-African Bureau for Animal Resources
CMC	FAO/OIE Crisis Management Centre (Animal Health)
DPRK	Democratic Peoples' Republic of Korea
ECO	Economic Cooperation Organization
ECTAD	FAO Emergency Centre for Transboundary Animal Diseases
EMPRES- <i>i</i>	FAO information system for transboundary animal diseases
FAO	Food and Agriculture Organization of the United Nations
GF-TADs	FAO/OIE Global Framework for Transboundary Animal Disease Control
GLEWS	FAO/OIE/WHO Global Early Warning System
Hong Kong SAR	Hong Kong Special Autonomous Region of PR China
HPAI	highly pathogenic avian influenza
H5N1	sub-type of influenza virus (H5 haemagglutinin, N1 neuraminidase)
Lao PDR	Lao Peoples' Democratic Republic
OFFLU	OIE/FAO Network of Expertise on Avian Influenza
OIE	World Organisation for Animal Health
PR China	Peoples' Republic of China
RT-PCR	Reverse Transcription Polymerase Chain Reaction (real-time laboratory technique for detecting viral nucleic acid)
PVS	OIE Performance, Vision and Strategy (tool for evaluation of national veterinary services)
SAARC	South Asian Association for Regional Cooperation
TADs	transboundary animal diseases
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
UNSIC	United Nations System Influenza Coordination
WAHIS	OIE World Animal Health Information System
WHO	World Health Organization

EXECUTIVE SUMMARY

The *FAO-OIE Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza (HPAI)* was first developed by FAO and OIE in collaboration with WHO in response to a recommendation from the FAO/OIE Regional Meeting on Avian Influenza Control in Asia (23-25 February 2005, Ho Chi Minh City, Viet Nam). The strategy prepared in November 2005 was focused predominantly on control of the disease in East and Southeast Asia. Since then, the H5N1 HPAI situation has evolved dramatically.

The disease has spread widely in Asia, Central and Eastern Europe, the Near East and Africa, culminating in the current situation that is described in Annex 1. As of December 2006, it was estimated that over 240 million poultry had died or been culled worldwide due to H5N1 HPAI. The widespread nature of the disease, its mounting socio-economic impact, the increasing number of human infections and deaths and the potential threat of human pandemic influenza continue to underline the need for a global approach to H5N1 HPAI prevention and control. The revised Global Strategy presented here takes into account the accumulated experience of national, regional and global efforts to date and the lessons learned from various efforts to control the disease (summarized in Annex 2).

Global progress in HPAI control

Superficial appraisal indicates that HPAI has spread since late 2005 to affect many more countries. However, in reality, efforts over this period have been largely successful both in improving the HPAI situation in previously infected countries and in controlling or eliminating the disease in newly infected countries.

The situation has improved greatly in China, where outbreaks are now mostly limited to certain areas of the country. Progress in Thailand and Viet Nam, both of which experienced a high incidence of outbreaks in poultry and accompanying human infections has been substantial, with outbreaks in poultry now greatly reduced and almost complete success in preventing human disease. Indonesia has struggled to establish appropriate HPAI control mechanisms but systems are being developed, with support from many donors.

India, Pakistan, Afghanistan, Myanmar, South Korea and Japan have all experienced outbreaks of HPAI that were effectively controlled, although in some countries re-introduction of disease has occurred. Most of the countries experiencing outbreaks in Central Asia, Eastern Europe and the Middle East were also able to eliminate the disease although again there have been some recent fresh outbreaks of disease in Russia, Hungary and Turkey. In Africa, Egypt and Nigeria are both facing substantial challenges in achieving effective control of HPAI; they deserve particular international assistance, since such endemically infected countries represent the highest risk both for perpetuation of the disease and for possible emergence of virus strains with human influenza pandemic potential.

Lessons learned from tools and methods used for HPAI control

Risk factors

It has become clear that countries with well developed veterinary services, with strong early disease detection and response capacities, can effectively control and eliminate H5N1 HPAI. Countries that have had most difficulty in achieving effective control are those with weak veterinary capacities and that face major risk factors such as high poultry population densities with poor biosecurity, particularly related to large smallholder production sectors and substantial duck populations. Internal movement of poultry, particularly through live bird markets and illegal movement across international borders, are major contributors to spread of the disease. Migratory waterfowl have been implicated in global spread of the disease, although the epidemiological significance of H5N1 virus infection of wild birds and other species, including pigs and cats, is not well established.

Disease surveillance

It has become evident that many countries lack the expertise to develop and implement effective national HPAI surveillance plans and to collect and analyse data. These weaknesses have compromised efforts to clearly understand specific risk factors and disease epidemiology, poultry production and marketing systems, and to properly assess vaccination programmes. Additional technical support is required to strengthen national capacities and such support must be complemented by further strengthening of networks for information collection, analysis and dissemination at regional and global levels. Limited access to compensation funds and inefficient payment mechanisms discourage farmers from reporting suspicious disease occurrence.

Laboratory capability and capacity

National veterinary diagnostic laboratory capacities are often poorly developed and resourced. OIE/FAO reference laboratories have made a significant contribution in supporting national laboratories but additional support is needed, especially at the regional level. There needs to be improved sharing of virus samples and sequence information globally and there are opportunities for national public health and veterinary laboratories to collaborate more strongly.

Containment of outbreaks

While stamping out has proved effective for containing isolated outbreaks, efforts are compromised by weaknesses in poultry movement control and surveillance around outbreaks. There is an inadequate knowledge and capacity for safe and humane culling and disposal of infected poultry. As the incidence of outbreaks increases, disease control authorities can rapidly become overwhelmed through lack of resources.

Vaccination

Vaccination has been an effective response in reducing HPAI incidence and virus load in the environment, thus minimizing the risk of further spread and human exposure to infection. Planning must anticipate the reinstallation of classical control measures such as stamping out when the number of outbreaks is low. Vaccination has proved very effective in high-risk countries where re-introduction of disease is likely, but it must be conducted in accordance with guidelines, involve vaccines of assured quality and be accompanied by appropriate monitoring of immune response and infection status of vaccinated flocks.

Adjustment of poultry production and marketing chains

In Asian countries where the disease has been present for a long period and where the greatest combination of risk factors are present, experience indicates that stamping out of infected flocks provides short-term improvements in HPAI status but does not guarantee long-term freedom. Appropriate changes are needed in poultry disease management practices on farms and to high-risk marketing practices such as uncontrolled movement of poultry through live bird markets.

Communication

Communication serves as a facilitating mechanism for building an enabling environment, through which the global strategy for the prevention and control of HPAI can be successfully understood and implemented. In addition, despite recognition of the importance of public awareness and considerable efforts made to date, there has been only limited success in achieving the behavioral changes required to control HPAI. It has become very evident that over-reaction of communities to HPAI can have an adverse affect on poultry markets. Balanced, consistent and scientifically sound messages are needed to promote safe poultry production practices and appropriate consumer caution, without precipitating undue market disruptions.

Moving to a revised strategy

Experience and lessons learned at the global, regional and national levels in controlling H5N1 HPAI permit revision of the global strategy with greater understanding of the issues that need to be addressed and the means of achieving progress. The strategy identifies international initiatives at global and regional levels, and approaches that are appropriate for national implementation, in general terms but also in line with the HPAI status of individual countries.

The vision

The strategy envisages a world with greatly reduced threat of H5N1 virus infection in poultry, leading to reduced public health risk, secured national, regional and global markets and trade in poultry and poultry products, and protection of an important element of the livelihoods of poor farming communities.

The priorities

To achieve this vision, three priorities related to country HPAI status must be addressed concurrently:

- In the small number of endemically infected countries, particular attention must be given to reducing the incidence of HPAI.
- In countries in which sporadic outbreaks are currently occurring, intensive efforts to eradicate the disease must be supported; given the current disease situation, this is possible.
- In countries particularly at risk of incursion or in countries suffering severe consequences as a result of incursion, HPAI preparedness and capacity for early detection and response must be improved.

Strategic domains

The strategy proposes approaches at the global, regional and national levels. The global and regional approaches are those that FAO and OIE will follow themselves and will advocate to other donor and implementing agencies in the search for a harmonized approach to addressing the needs. The national approaches outline principles that FAO and OIE recommend as appropriate to various country situations.

The global domain

The goal is to provide global leadership in generating and providing sound technical and policy advice in coordinating and harmonising national, regional and global plans, and in improving the effectiveness and efficiency of programming and implementation of disease prevention and control.

The proposed activities focus on support to countries in planning and implementing their plans for HPAI prevention and control, including provision of technical advice and operational support, and international collaborative initiatives for supporting international research, surveillance, early warning and epidemiological analysis of disease outbreaks and information dissemination. The approach includes the development within FAO of the Emergency Centre for Transboundary Animal Diseases; within OIE, the establishment of the World Animal Health and Welfare Fund directed towards improving governance in veterinary services worldwide; and the establishment of the FAO/OIE Crisis Management Centre to increase capacity for early response to significant disease events.

The strategy also calls for general political support at global, regional and national levels and mobilization of donor funding to address the needs of HPAI prevention and control.

The regional domain

The goal is to enhance cooperation and collaboration among regionally-grouped countries through greater engagement and commitment from appropriate regional organizations for a harmonized and coordinated approach to control and eradication of H5N1 HPAI.

This approach focuses on the development of formal long-term and sustainable cooperation and collaboration, taking into account regional specificities, for the development of policies and regulatory frameworks related to regional trade in livestock and livestock products, harmonization of HPAI control strategies, HPAI surveillance and reporting and HPAI preparedness planning. Regional organizations, including OIE Regional Commissions and the elected Bureaus, are seen as the focal points for such initiatives, supported by OIE and FAO Regional Animal Health Centres, instituted with the coordination of regional GF-TADs steering committees. Strategic initiatives include building of regional capacity and enhancing the role of regional and sub-regional networks for epidemiological and laboratory expertise and networks of economists, social scientists and poultry production specialists. Regional laboratories will be identified and supported to provide reference services, reagents and training to national personnel.

The national domain

The goal is to progressively define the status of countries within the priority categories and, for most of them, eliminate H5N1 virus circulation in poultry populations using livelihoods-sensitive approaches. In those countries in which HPAI is currently endemic, the disease will either be eradicated or greatly reduced in incidence, with its geographic and sectoral distribution well defined.

Recommendations are made for general measures that need to be addressed for HPAI prevention and control and specific measures that apply to different disease situations. The broadly applicable key measures are:

- strengthening of veterinary services and related national capability, including compliance with OIE standards and guidelines on quality and evaluation of veterinary services;
- poultry industry adjustment and changes in husbandry practices to improve biosecurity;
- strategic research initiatives;
- support for public communication; and
- provision of technical assistance, as required

Key among these is overall strengthening of national veterinary services, including OIE assistance in assessing veterinary services by established procedures, strengthening capacity for disease surveillance and epidemiological analysis, and improving operational capacity for disease control, for which early detection and rapid response are essential. Poultry industry adjustment proposals need to take into account not only the benefits of improved biosecurity but also the potential threat of adversely affecting the livelihoods of poor farmers. This threat must also be considered when designing control strategies. Public awareness must be supported to promote practices that limit the risk of HPAI transmission and reduce the risk of human exposure to H5N1 virus.

There are significant gaps in our understanding of the H5N1 HPAI virus and technologies and tools to control it. Thus the strategy promotes strategic research initiatives, including epidemiological studies of HPAI in different farming systems (including risk analysis and critical control point definition within market chains), continuous monitoring of variation in H5N1 virus characteristics, monitoring of wild bird involvement in H5N1 virus dissemination, development of new vaccines and diagnostics, and studies of the socio-economic and biodiversity impacts of H5N1 HPAI incursion and control.

Implementing the strategy

The strategy is designed as a guide to FAO and OIE programmes of support for HPAI prevention and control. However, it is also advocated to other global, regional and national implementing agencies and donors as a means of achieving uniformity of approaches. This is described in Annex 3, together with proposed milestones for monitoring progress in HPAI prevention and control.

The strategy will be implemented progressively over the next ten years, as funds become available, beginning with the highest priorities for 2006-2008. It will be coordinated jointly by FAO and OIE and harmonized with the WHO Strategic Action Plan for Pandemic Influenza 2006-2007*.

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http://www.who.int/csr/resources/publications/influenza/WHO_CDS_EPR_GIP_2006_2c.pdf

BACKGROUND AND RATIONALE

Since outbreaks of H5N1 highly pathogenic avian influenza (HPAI) started in Asia in late 2003 and early 2004, there have been some very substantial developments. In Asia, some countries that suffered extensive dissemination of infection, including Viet Nam, PR China and Thailand, have registered great success in bringing the disease under control. Indonesia remains a country with continuing challenges for significant control. Other countries in the region have suffered sporadic outbreaks but have achieved control or even eradication. Following spread of the disease to Europe and northern and western Africa from the latter part of 2005, many countries were able to eliminate the disease. Notable exceptions are Egypt and Nigeria where the disease is still endemic, and some other African countries which are experiencing sporadic outbreaks.

While the focus of international attention is on the occurrence of human infection and deaths and the potential for development of pandemic human influenza, the disease in poultry (and measures taken to control it) has had a significant impact on poultry industries. It has directly affected farmers, some of whom have been deprived, at least temporarily, of their livelihoods, it has disrupted national and international poultry markets and it has created recognition that, as well as eliminating the disease, measures are needed to minimize the risk of recurrence of HPAI by addressing the risk factors involved in poultry production and marketing.

Development of this strategy takes into account analysis of the current situation, which is described in Annex 1. It is also based on lessons learned during the three years of the panzootic. Annex 2 reviews current knowledge of risk factors for disease introduction and dissemination, and experience with the measures that have been applied. There are weaknesses in disease surveillance and response capabilities, so efforts to strengthen veterinary services are an important component of the strategy. Vaccination has proved to be an effective additional tool for substantially reducing disease incidence, provided that high quality vaccine is used and that it is properly applied with appropriate monitoring. Effective public communication is a critical component for support of HPAI prevention and control strategies and must be supported by international efforts.

Since it is difficult to predict the future course of the panzootic, this strategy calls for implementation over a 10-year period. Caution is warranted in advocating approaches that must often be modified according to particular circumstances. Recommendations are formulated as principles that need to be adapted to particular circumstances, especially at the national level. It is expected, therefore, that the strategy will be reviewed periodically.

THE STRATEGY

1. The vision

The strategy envisages a world with greatly reduced threat of H5N1 virus infection in poultry, leading to reduced public health risk, secured national, regional and global markets and trade in poultry and poultry products and protection of an important element of the livelihoods of poor farming communities.

This vision addresses three main issues:

- The imperative to substantially reduce the risk of exposure of humans to H5N1 virus and to diminish the threat of pandemic human influenza.
- The need to mitigate the impacts of HPAI and its control in disrupting production, markets and trade in poultry products.
- The importance of supporting the livelihoods of poor communities heavily dependent on poultry for income and food security.

REDUCING THE THREAT – MITIGATING THE IMPACT

Over the next 10 years, FAO and OIE will work towards significantly reducing H5N1 virus infection in poultry, as the necessary basis for

- reducing the risk of human exposure to H5N1, thereby diminishing the threat of pandemic human influenza
- mitigating the negative impact of the disease and its control on production, markets and trade in poultry products
- supporting the livelihoods of poor communities heavily dependent on poultry for income and food security

2. The priorities

In relation to country HPAI status, the strategy sets out three priorities to address concurrently:

- In endemically infected countries, particular attention must be given to reducing the incidence of HPAI in order to reduce the exposure of humans to H5N1 infection and also limit the threat of virus dissemination to other countries.
- In countries in which sporadic outbreaks are currently occurring, intensive efforts to eradicate the disease must be supported; this can be achieved given the current disease situation, although it depends on progress made in reducing HPAI in endemically infected countries.
- While all countries are at some risk of HPAI incursion, there are some countries that by virtue of their geographic location, poultry production systems and level of economic development are particularly at risk of incursion or of suffering severe consequences as a result of incursion; in these countries, HPAI surveillance, preparedness and response capacity must be improved.

These priorities are reflected in the goals, objectives and activities set out in the strategy.

3. Strategic domains

H5N1 HPAI prevention and control must be addressed at the global, regional and national levels. The global and regional approaches are those that FAO and OIE will follow themselves, but they will also be advocated to other donor and implementing agencies in the search for a harmonized approach to addressing the needs. National HPAI prevention and control strategies are the responsibility of national authorities but they should incorporate principles that FAO and OIE propose as appropriate to various country situations. They will be promoted for implementation by national authorities, supported in FAO and OIE country activities, and advocated to other partners to achieve uniformity in programme delivery.

Global leadership, regional cooperation and national action

Through their joint strategy, FAO and OIE are tackling HPAI H5N1 at global, regional and national levels.

Globally,

- they will provide leadership in offering sound technical and policy advice
- they will help coordinate and harmonise national, regional and global plans, and
- they will strive to improve programming and implementation of disease prevention and control

Regionally,

- they will enhance cooperation and collaboration among regions
- they will seek greater engagement and commitment from appropriate regional organisations, and
- they will encourage a harmonised and coordinated approach to HPAI H5N1 control and eradication

Nationally,

- they will support national authorities in endemic countries in their efforts to eradicate or greatly reduce the incidence of HPAI
- they will support national authorities in most priority countries in their attempts to eliminate H5N1 virus circulation
- they will promote livelihoods-sensitive approaches in each country, and
- they will identify ways of preventing virus spread through surveillance, early detection, reporting and response

3.1 The global domain

The goal is to provide global leadership in generating and providing sound technical and policy advice in coordinating and harmonising national, regional and global plans, and in improving the effectiveness and efficiency of programming and implementation of disease prevention and control.

The global implications of H5N1 HPAI, its demonstrated ability to spread widely in birds throughout much of the world and the nature of the globally known and accepted control and prevention tools for addressing the disease¹, make it necessary to engage countries internationally and develop commonly agreed control plans. FAO, OIE and WHO are taking a lead in providing international technical support to contribute to the coordination of global control of HPAI. FAO, through its Emergency Centre for Transboundary Animal Diseases (ECTAD) and the OIE, through the World Animal Health and Welfare Fund (directed towards improving governance in veterinary services worldwide), will continue to provide leadership in HPAI prevention and control in poultry and will promote and facilitate technical support for regional and sub-regional networks and national programmes through OIE/FAO reference centres and the OIE/FAO Network of Expertise on Avian Influenza (OFFLU)². The global level of the strategy is also concerned with coordinating the development of new methodologies and technologies, based on analysis of global disease information.

Strategic objectives

1. Ensure coordination, collaboration and information exchange among donors, international and regional organizations, other agencies and national governments to facilitate HPAI prevention and control.
2. Provide technical and operational support to countries for surveillance and preparedness planning, emergency outbreak containment and longer-term disease control and biosecurity interventions.
3. Generate strong political support for H5N1 HPAI control at the national, regional and global level through advocacy and regular communication.
4. Mobilize significant financial resources from donors to support fulfillment of strategic goals and objectives, and ensure provision of adequate emergency funds and manpower for countries that need short-term emergency assistance to control HPAI.
5. Promote a regional approach to controlling H5N1 HPAI consistent with the principles and guidelines agreed upon in the GF-TADs.
6. Improve understanding of the epidemiology of avian influenza viruses by promoting and supporting strategic and applied research on knowledge gaps and issues to improve the quality of technical tools, methods and strategies available to decision-makers for combating HPAI and rehabilitating poultry industries.
7. Support communication and behaviour change directed towards reducing the spread of HPAI and minimizing the risk of human infection with H5N1 virus.

Main activities

- Develop and coordinate centralized management of the FAO response to the HPAI panzootic through the Emergency Centre for Transboundary Animal Diseases (ECTAD), including utilization of the FAO/OIE Crisis Management Centre (Animal Health) to provide emergency technical and operational support to countries affected by HPAI and other animal health emergencies.
- Assist all infected and high risk countries to develop and implement appropriate strategies and plans for medium- to long-term control, detection and prevention of H5N1 HPAI.
- Enhance collaboration among major implementing partners, including FAO, OIE, WHO, UNDP and UNICEF, and clearly define roles among UN agencies for better coordination and communication of the global HPAI control strategy, and to address the priorities of the livestock and public health sectors.
- Improve early warning and information analysis of GLEWS and EMPRES-/ through the integration of databases of agricultural factors that affect disease occurrence and virus ecology, and official reporting of HPAI through the OIE World Animal Health Information System (WAHIS) and other sources of livestock disease information.
- Apply the OIE Performance, Vision and Strategy (PVS) tool under the auspices of the OIE to evaluate capabilities and the veterinary services of countries against OIE quality standards. PVS can be used to identify needs and support the development of proposals for strengthening animal health services in key areas, including those critical for HPAI prevention and control.
- Support the OFFLU network to provide an expanded source of expertise for HPAI programming and to identify, plan and implement identified research initiatives. This includes development of the Global Initiative on Sharing Avian Influenza Data (GISAID) and support to OIE/FAO avian influenza reference laboratories to assist countries in HPAI diagnosis, training and sample testing, including confirmatory testing and isolate characterization. Identification of gaps in knowledge and coordination of research proposals is another OFFLU task.
- Improve global coordination of epidemiological and virological surveillance data analysis, to be seamlessly shared with WHO, including determination of human exposure risk variables.
- Strengthen training of technical staff globally for international assignments in relevant disciplines.
- Carry out economic and social impact assessments of H5N1 HPAI and its control and embed the results more firmly in contingency and long-term strategic plans for HPAI control. Assessment should include livelihood, food security and gender impacts, analysis and mitigation of market shocks, poultry market chain analysis and assessment of trade risk, impact of long-term changes in market chains, and mapping of cross-border trading activities
- Provide research and support for industry restructuring to increase biosecurity, including elucidation of socio-economic consequences and support for national poultry chain restructuring initiatives.
- Assess the impacts on poultry genetic resources of the disease, its control and poultry industry adjustment and rehabilitation measures.
- Develop the UN network on avian influenza socio-economics to promote sharing of knowledge and planning of collaborative activities among UN agencies, member country partners and other development agencies.
- Develop communication tools, in partnership with WHO and UNICEF, to promote international and national awareness of HPAI and to assist in behaviour change to reduce the risk of HPAI spread and human exposure to H5N1 virus.
- Support pilot studies to improve the capability of HPAI infected countries to implement compartmentalization and to help unaffected countries include compartmentalization in their planning and preparedness for possible HPAI incursion.

3.2 The regional domain

The goal is to enhance cooperation and collaboration among regionally-grouped countries through greater engagement and commitment from appropriate regional organizations for a harmonized and coordinated approach to control and eradication of H5N1 HPAI.

The strategy recognizes the importance of regional partnership in tackling problems of a transboundary nature. For HPAI to be controlled widely in any region or sub-region, country-specific efforts must be enhanced by the development of formal long-term and sustainable regional and sub-regional cooperation and collaboration in disease control. Such regional/sub-regional cooperation will serve to develop a common set of policies and regulatory framework related to regional trade in livestock and livestock products, standardization and harmonization of HPAI control technologies, including diagnostic tests and vaccines, surveillance and monitoring protocols, and early reporting and emergency preparedness plans. Regional organizations (e.g. AU-IBAR and ASEAN) play an important role in coordinating regional activities. To support regional initiatives, FAO has located a decentralized ECTAD unit in Bangkok. OIE and FAO are jointly strengthening their Regional Animal Health Centres, an initiative which, although driven by the broader

transboundary animal disease control objectives of GF-TADs, will serve to promote regional support for HPAI prevention and control.

The five Regional Commissions of the OIE and their elected Bureaus, as well as the Regional FAO-OIE GF-TADs Steering Committees hosted by the OIE Regional Representations, are crucial tools for the regional coordination of policies.

Strategic objectives

1. Strengthen the technical and management capacity of regional and sub-regional organizations in order to support regional activities related to HPAI control.
2. Build regional capacity to support implementation of HPAI prevention, detection and control plans.
3. Develop regional technical and scientific information systems and support networks to ensure that national plans can be implemented in a sustainable, technically-sound and socially-equitable manner.
4. Promote coordination and collaboration among global and regional organizations and donor agencies to maximize support to countries and to facilitate synergy and efficiency of donor inputs

Main activities

- Create and continue support for regional networks of epidemiological and laboratory expertise (linked to OFFLU) and establish new networks to promote open and transparent dialogue on improving and sharing disease information, development of harmonized guidelines and regulations for the management of animal movement and control of transboundary animal diseases, wildlife related issues and adherence to OIE guidelines to facilitate regional trade.
- Enhance regional training in aquatic bird monitoring programmes and wild bird disease surveillance programmes.
- Harness and share regional resources and experience in information, education and communication initiatives.
- Create regional groups of national expertise (reinforced with international expertise) to provide guidance and leadership for emergency preparedness planning and to promote national capacity development for disease recognition, primary diagnosis, surveillance and strategy setting.
- Create regional groups of national expertise drawn from government and from commercial poultry organizations to guide in-country capacity development, monitor progress, identify constraints and facilitate peer pressure where needed; ensure that these groups develop regional strategic plans tailored to the particular circumstances of the regions.
- Develop robust, regionally appropriate, country-specific and sector-specific technical options for prevention, detection and control of HPAI.
- Expand decentralized ECTAD regional centres and establish OIE/FAO Regional Animal Health Centres in Bamako, Tunis, Beirut, Gaborone, Nairobi, Bangkok, New Delhi, and later in other locations, to improve communication and collaboration with donors, regional organizations and national governments and ensure appropriate operational support for implementing progressive H5N1 HPAI control programmes.
- Under the general guidance of the GF-TADs Regional Steering Committees, strengthen support to regional networks that support the HPAI prevention and control programmes of each country. Through FAO support within the GF-TADs framework, sub-regional networks on epidemiology, laboratory diagnosis and surveillance have been established in the Southeast Asia region; these will be further developed in other regions and ultimately regional organizations (such as the ASEAN HPAI Taskforce and AU-IBAR) will be encouraged to contribute to managing such networks for long-term sustainability. Networks will be further strengthened to liaise and collaborate with public health counterparts wherever appropriate. The establishment of wildlife networks is also planned.
- Identify and support regional veterinary and public health laboratories which can provide technical assistance, reagents and training to national laboratories and act as immediate and intermediate reference points for virus strain characterization.

- Encourage twinning relationships between laboratories in developing regions and laboratories in industrialized regions.
- Establish networks of economists, social scientists and poultry production specialists to share methodologies and results from national experiences and to contribute to regional assessments of market chains, trade risks and poultry production systems that cross borders in order to implement regional policies related to HPAI control.
- Share and manage knowledge and information on HPAI communication interventions in countries and regions.

3.3 The national domain

The goal is to progressively define the status of countries within the priority categories and for most of them, eliminate H5N1 virus circulation in their poultry populations using livelihoods-sensitive approaches. In those countries in which HPAI is currently endemic, the disease will either be eradicated or greatly reduced in incidence, with its geographic and sectoral distribution well defined.

FAO and OIE propose the following strategic objectives with time frames (short term from 1-3 years, medium term from 3-7 years and long term from 7-10 years), recognising that each country has the responsibility to implement and manage its own disease control programmes.

Strategic objectives

1. Define and greatly reduce the geographic and sectoral distribution and incidence of H5N1 HPAI in China (medium term), Egypt (medium term) and Indonesia (long term) and eradicate the disease from Nigeria (medium term). Vaccination is a key first step for these countries.
2. Achieve HPAI eradication from countries experiencing sporadic outbreaks of HPAI through intensive epidemio-surveillance, rapid elimination of foci of infection and enhanced biosecurity (medium-term).
3. Improve border protection, enhance veterinary capacity and improve biosecurity of poultry production to strengthen HPAI prevention and rapid response capabilities, with an emphasis on countries at high risk or countries facing the negative consequences of HPAI introduction or re-introduction (long-term).
4. Strengthen veterinary services, including laboratory capacities, in the context of the FAO-OIE Global Framework for Progressive Control of Transboundary Animal Diseases (GF-TADs) (long-term).

Main activities

The main activities are outlined in Table 1, which summarizes some of the key technical and supportive measures that should be considered in countries with varying infection and disease status.. The strategy cannot propose detailed, country-specific control measures and disease control tools since these will vary even within a country and must be tailored to match each country's unique sets of circumstances, risk factors and political conditions and infrastructure.

Table 1 Recommended measures for prevention and control of HPAI in countries of different disease status

Country status	Action	Specific measures	Support measures
Disease free	Prevention of disease incursion Emergency preparedness	<ul style="list-style-type: none"> risk assessment of potential pathways of introduction risk-based disease surveillance for early detection, diagnosis and reporting review of poultry production and market chains to identify and address risk factors for HPAI dissemination regulation of poultry imports, including border control development and testing of realistic contingency plans based on actual capacity of veterinary services addressing any critical needs in veterinary services 	<ul style="list-style-type: none"> Veterinary and community awareness and communication Poultry census and farming systems defined and mapped Negotiation of socio-economic aspects of disease control with community dialogue (compensation and rehabilitation issues) Government/ private sector engagement in setting standards for commercial poultry sector Epidemiological investigation to define progress of the disease and effectiveness of control measures Virological surveillance to track evolution of the virus Ongoing contact with public health authorities Strengthening of veterinary services and elimination of critical deficiencies in these services Strengthening of private sector responsibility and capacity for HPAI prevention and control
	Confirmation of freedom after eradication	<ul style="list-style-type: none"> risk-based, structured surveillance meeting OIE guidelines to demonstrate freedom from H5N1 circulation in poultry 	
Isolated outbreaks	Activation of contingency plans Rapid response actions in an attempt to contain and eliminate infectious foci before spread occurs	<p><i>As above, plus:</i></p> <ul style="list-style-type: none"> early humane culling of infected and dangerous contact flocks disposal and disinfection quarantine of infected places surveillance in surrounding zones regulation of movements (poultry and products) management of live bird markets possibility of early recourse to vaccination, if multiple isolated outbreaks in dispersed locations, indicative of unrecognized virus dispersion, are detected ensuring appropriate reporting and sharing of data and isolates informing public health authorities 	
	Extensive outbreaks	<p><i>General measures as above, but also:</i></p> <ul style="list-style-type: none"> possible limitation of culling to infected flocks ring vaccination to control spread around infected places broader strategic, systematic vaccination in identified infected and at-risk areas and production sectors engagement of public health sector to provide consistent exposure risk reduction messages and measures 	
Endemic situation	Endemic disease control	<p><i>Similar actions to those above, plus:</i></p> <ul style="list-style-type: none"> development of long-term strategic plans extension of strategic vaccination livelihoods-sensitive modernization of poultry production and marketing to improve biosecurity 	

3.3.1 Strengthening veterinary services and related national capability

In addition to the measures summarized in Table 1, FAO and OIE are also pursuing the goal of strengthening the capacity of states to rapidly detect the presence of HPAI or other emerging diseases and take the appropriate emergency actions, thus minimizing pathogen load and economic impact. It is important to ensure the efficacy of public services responsible for formulating the relevant legislation and effectively controlling its application. Efficient veterinary services, based on good cooperation between livestock owners and private veterinarians, constitute an important mechanism for early detection of animal diseases. Building and maintaining good epidemio-surveillance networks covering the entire national territory, potentially for all animals and animal diseases, including zoonoses, is an international obligation of all FAO and OIE member countries.

The OIE has convinced countries and the main international multilateral organizations concerned, including the World Bank, that the core functions of the veterinary services are a "global public good". One of OIE's main objectives is to strengthen national veterinary services, in order to help member countries comply with international standards and guidelines for animal health and welfare, and for safe international trade in animals and animal products. This is addressed by application of the PVS tool through which, in collaboration with veterinary services, gaps and deficiencies are identified and national investment programmes facilitated. This provides a framework for seeking funding support from international donors, including the World Bank, and from developed countries that have pledged support to developing countries and countries in transition for the strengthening of their veterinary services. PVS evaluations are conducted under the auspices of OIE and can be used within the framework of the FAO-OIE Crisis Management Centre.

Main activities

- Encourage national veterinary authorities to conduct assessment of their services and rectify deficiencies in order to control HPAI and other transboundary animal and zoonotic diseases.
- Strengthen surveillance and early detection capacity (including training in participatory epidemiology, and training of field veterinarians, para-veterinarians and farmers).
- Strengthen surveillance capacity for H5N1 infection in wild birds in most countries.
- Improve national veterinary laboratory capacity and capability to support diagnosis and surveillance activities for HPAI and other zoonotic and transboundary animal diseases.
- Build operational capacity to respond to incursions of H5N1 HPAI and other zoonotic and transboundary animal diseases.
- Assist countries in improving their capabilities to undertake structured epidemiological studies.
- Develop appropriate policy support to institute measures for reducing risks in live poultry markets, to improve risk reduction measures in poultry-owning households and along the poultry production and marketing chain, and to manage animal movement more effectively to reduce the risk of HPAI dissemination and human exposure in all countries.
- Develop capacity to prepare and implement public awareness campaigns.
- Encourage national veterinary services to form public-private partnerships to undertake disease surveillance and implement HPAI prevention and control measures. This should include promotion of the involvement of para-veterinary personnel (originating from within farming communities) in disease surveillance and reporting, including participatory approaches.
- Ensure that the disease control measures and interventions developed and deployed promote the livelihoods of poor livestock farmers, and are based on sound socio-economic impact studies and cost-benefit analysis of various disease control options.
- Strengthen collaboration with public health authorities to address preparedness, control, prevention and response for HPAI and other zoonotic diseases.

3.3.2 Poultry industry adjustment

Eliminating existing foci of HPAI in poultry is not enough to achieve sustainable reduction in HPAI occurrence. The risk of recurrence of disease must be reduced by addressing country-specific shortcomings. In countries that have experienced prolonged or repeated waves of infection, adjustment of poultry production to enhance biosecurity can be considered.

Adjustment can be a deliberate process (some countries have plans for “modernization” of their poultry sectors), it can result consequentially from changing biosecurity regulations, and it can be an intentional choice of producers. It can involve changes in the type of production, in the location of production, trade, slaughter and processing, and in how the market chain is regulated. Usually, government regulations provide either incentives to change (e.g. favourable credit schemes or tax breaks) or disincentives to not change (e.g. fees or zoning regulations) to which the private sector responds. Large-scale commercial producers are often in a position to respond faster because they have better information or financial capacity, and the difference in speed of response in different poultry production sectors can alter the character of a market chain. Changes imposed too rapidly can disadvantage smaller producers.

In countries that have complex poultry sectors and severe HPAI problems, adjustment may need to be part of the strategy for long-term prevention and control of the disease. However, it is extremely important to review any adjustment plans in advance for their possible impacts and to ensure that banning certain type of production systems does not lead to smuggling with consequences for notification of the disease if it appears or to dissimulation in the context of vaccination campaigns. For example, Viet Nam is currently reviewing the possible social, economic and environmental effects of its poultry sector restructuring plan and expects to initiate pilot activities under controlled circumstances.

Good public awareness communication of biosecurity requirements and clear technical messages about good management practices for producers in each sector (traders, market owner and retailers) are an important component of planned adjustment and of the strategic approach of FAO and OIE.

Depending on how it is managed, adjustment may have negative or positive impacts. For example, it may:

- make the sector more biosecure **or** drive activities into the black market;
- increase production levels and create jobs **or** exclude people and destroy their livelihoods;
- improve food quality and safety **or** widen the gap between rich and poor consumers.

The strategy recommends activities that will increase the positive and minimize the negative impacts. There are also legitimate concerns that a strong shift to intensive industry-based poultry production inevitably puts animal genetic diversity at risk and this requires suitable mitigation.

Main activities

- Review the structure of poultry production sectors and major market chains to identify critical points for HPAI control, needs for activities that may drive or result in adjustment and the possible economic consequences of adjustment for vulnerable people.
- In collaboration with industry, develop and implement auditable biosecurity standards for sector 1 and 2 farms³, and systems for demonstrating ongoing freedom from H5N1 HPAI.
- Develop guidelines for relocation of farms, markets or processing plants based on experience to ensure that relocation is done in an environmentally sustainable manner that does not increase the risk of disease through poor choice of location (e.g. along migratory bird pathways) or excessive concentration of farms.
- Develop and implement appropriate systems to prevent fomite⁴ carriage of virus from slaughterhouses or markets to farms, including improvement of basic hygiene practices.
- Develop and test simple, low input systems that result in the rearing and sale of infection- free poultry from Sector 3 farms, with special emphasis on native poultry and grazing ducks.
- Promote and introduce cost-effective and culturally acceptable measures for improved biosecurity in Sector 3 and 4 poultry production, which may include changes in husbandry and poultry marketing regulations but not elimination of these farming systems.
- Develop and promote sustainable measures to minimize the risk of introduction of HPAI into Sector 4 poultry through enhanced prevention of infection in commercial poultry, especially grazing ducks.

3.3.3 Strategic research

The strategy recognizes that there are some significant gaps in our knowledge of virus ecology and epidemiology and our understanding of the complex issues related to H5N1 HPAI control. FAO and OIE advocate research in a number of these areas that would benefit affected countries and the global community as a whole in addressing the constant threat of this virus. Key areas of research include:

- Epidemiological studies of various disease situations and farming systems to better understand the infection and transmission dynamics of the H5N1 virus, its ecology and genetic evolution. This would include directed field research, coordinated analysis of surveillance data already being generated for determination of risks and development of rational disease control strategies.
- Coordinated local and global analysis of changes in the virus genome in order to develop appropriate vaccines and diagnostic reagents (both antigenic and molecular), as well as to track changes that assist in epidemiological studies and improved understanding of virulence factors, host range and increased transmissibility among humans. To this end, both isolated viruses and their genomic sequences should be shared with the international scientific community in a timely manner (short- to long-term).
- Determination of risks associated with HPAI spread, updated census and mapping of different poultry sectors, market chain analysis and development of critical points for control to enable design of improved and targeted H5N1 HPAI control approaches.
- Investigation of wild birds and ducks and their potential for maintenance and dissemination of H5N1 viruses to include improved understanding of H5N1 virus ecology; wildlife ecology and migration, and the interface between the agriculture and wild bird sectors.
- Development of new vaccines and diagnostics, including methods to distinguish vaccinated from infected animals to include development of combined and efficacious H5 and Newcastle disease vaccines, and rapid diagnostic tests to differentiate HPAI and Newcastle disease.
- Improvement of vaccine delivery strategies in order to facilitate deployment in the backyard poultry sector.
- Re-assessment of the public health risks associated with ongoing H5N1 HPAI virus circulation in collaboration with WHO. This assessment would include evaluation of food and environmental safety and determination of specific human exposure risk variables.
- Studies, including cost-benefit analyses and scenario development and testing, of the socio-economic and biodiversity impacts of H5N1 HPAI incursion and control measures, including poultry industry restructuring.
- Studies to improve understanding of the production and marketing environment (including close monitoring of pathways that are vulnerable to potential H5N1 HPAI introduction through poultry, poultry products and associated fomite transmission) in order to minimize high risk practices.

3.3.4 Strategic communication and awareness

Communication serves as a facilitating mechanism for building an enabling environment, through which the global strategy for the prevention and control of HPAI can be successfully understood and implemented in order to reduce the occurrence of H5N1 virus infection in poultry, thereby reducing the risk to public health, protecting the livelihoods of poor farming communities, and securing national, regional and international markets and trade in poultry and poultry products.

Strategic communication will promote planning and implementation of national HPAI communication campaigns, with specific communication objectives and implementation mechanisms, covering:

- Advocacy, to influence the political agenda and environment, which can best be done in advance of outbreaks;
- Behaviour change communication, to inform and empower communities to adopt preventive practices;
- Social mobilization to build consensus and strengthen partnerships among all stakeholders and at all levels; and

- Capacity-building, to strengthen and sustain communication response capabilities and capacities.

Public awareness communication will focus on:

- Extension of knowledge on home slaughter and carcass preparation as well as food hygiene measures to minimize the risk of transmission of disease to humans, giving a balanced message that does not cause unreasonable concern.
- Improved awareness of husbandry and biosecurity measures that can be taken by poultry producers at every level to prevent introduction and spread of HPAI and exposure of poultry handlers
- Encouragement of people, especially poultry producers, to report any occurrence of high mortality that could be HPAI; communication of existing compensation mechanisms is crucial.

3.3.5 Other general measures

The strategy recommends implementation of a number of supporting measures that are important and integral to the deployment of technical tools to control H5N1 HPAI.

Producer capacity and capability

Create producer responsibility for more biosecure poultry production through greater public awareness and improved capacity for appropriate technical responses.

- Develop community-based training, utilizing both private and public sectors.
- Promote poultry producer associations or cooperatives for collaboration to improve biosecurity, including contract production for larger commercial sectors.

Market research

Review poultry production and market chains, identify and address risk areas, define poultry censuses and map farming systems in order to develop appropriate technical guidelines for safer practices.

Compensation and rehabilitation strategies

Negotiate socio-economic aspects of disease control with the participation of communities and commercial interests.

International trade in birds and poultry products

Strengthen veterinary services, including implementation of appropriate legislation, and improve good governance to make safe trade possible according to OIE standards.

- Review legislation for import controls of poultry and poultry products, ornamental birds and fighting cocks.
- Strengthen capacity for implementing control measures.
- Review methods of illegal importation of products with a view to strengthening border controls, including collaboration with neighbouring countries.

Non-production domestic birds

Birds kept for reasons other than production also fall within the scope of the strategy. Movement of all birds across international borders should be controlled. Public awareness communications should include the goal of promoting awareness of safe practices in handling all birds to avoid possible human exposure to H5N1 viruses.

Fighting cocks and hunting birds may represent a significant risk for HPAI transmission because they are moved over considerable distances and come into contact with other birds. Fighting cocks have also been strongly implicated as a source of human exposure to H5N1 virus. Consideration should be given to requiring vaccination and/or registration or certification for their movement.

Caged pet birds and birds in zoological gardens are generally isolated from others and are probably at low risk of acquiring HPAI, but since they may be of high value consideration may be given to allowing them to be vaccinated. Ornamental bird markets, however, represent considerable risk for viral exchange between species and in the event of outbreaks should be subject to regulation.

Wild birds

Given the likely role of wild birds in transmission of H5N1 viruses over long distances, the strategy specifically supports the following activities:

- Coordination and collaboration among relevant national authorities, veterinarians, biologists and other wildlife surveillance or avian ecology monitoring or research programmes.
- Communication of findings from field studies (including virological data, surveillance efforts and telemetry data) and implications for wild bird and poultry health.
- Guidance, training and facilitation for aquatic bird monitoring programmes and disease surveillance programmes.
- Facilitation and support to wild bird surveillance and ecology studies for improved understanding of H5N1 virus ecology at national and regional levels.
- Transdisciplinary training on wild bird monitoring techniques, wild bird capture, handling and sampling, wildlife ecology and migration, epidemiology studies that evaluate the interface between agriculture and the wild bird sector, and tabletop outbreak simulation exercises.
- Support for and establishment of trained wildlife outbreak investigation teams.

3.3.6 Measures appropriate for particular disease status

Table 2 indicates recommended measures according to the particular HPAI status in a country. Some of the key measures merit further consideration:

- All countries that are free from H5N1 HPAI should have contingency plans developed for the event of a disease incursion⁵. The plans should be negotiated with stakeholders and tested in simulation exercises to ensure that they can be implemented with available resources and that personnel are familiar with their responsibilities. Part of the planning process is to identify risk factors and weaknesses in preparedness and address those issues in advance of an outbreak.
- If one or a small number of outbreaks of HPAI occur, the recommended response is to eliminate the foci of infection by stamping out. However, if the first identification of HPAI indicates that it is already disseminated and is unlikely to be contained before further spread occurs, it may be preferable to immediately institute modified stamping out with ring vaccination. This implies a prolonged eradication process but it may be more cost-effective and less damaging to livelihoods.
- In principle, culling of infected or dangerous contact poultry as a public good should be accompanied by compensation to owners. Plans for compensation mechanisms and provision for funding should be made in advance. Vaccination rather than culling of dangerous contact poultry may reduce the cost of HPAI control and is likely to gain much greater community support.
- If HPAI dissemination becomes more extensive, possibly progressing to endemic status, it is likely that wide area vaccination will become appropriate as a key control measure. As the disease control response becomes more prolonged and extensive, improvements to biosecurity as a way to limit virus spread will become progressively more critical. Biosecurity measures are likely to include restructuring of poultry production and addressing risks associated with poultry marketing.
- As control efforts result in freedom from HPAI in defined areas or production sectors, compartmentalization and zoning as defined in OIE's *Terrestrial Animal Health Code*⁶ may become appropriate.
- After HPAI has been eradicated, carefully structured risk-based surveillance will be essential to confirm the free status of a country.

ANNEX 1 SITUATION ANALYSIS

Highly pathogenic avian influenza (HPAI) caused by viruses of the H5N1 sub-type has spread widely in Asia, Central and Eastern Europe, the Middle East and Africa after the initial reporting of outbreaks of the disease in eight East and Southeast Asian countries in late 2003 and early 2004. The unprecedented geographical spread of this zoonosis has been characterized by high mortality and morbidity in poultry and disease and deaths in humans, several other mammalian species and wild birds. By December 2006, it had been estimated that over 240 million poultry had died or been culled due to H5N1 HPAI worldwide. As of 20 March 2007, WHO reported that 169 of the 281 humans infected with the virus had died. The widespread nature of the disease, the continuing socio-economic impacts and, in particular, the potential threat of human pandemic influenza are the principal drivers and justification for a global approach to HPAI control.

Analysis of the present disease situation, the lessons learned since the beginning of the HPAI panzootic and identification of strengths, weaknesses and opportunities are an important starting point for development of rational strategies for global control of the disease.

SUCCESS IN 2006 ...

- the disease was eliminated from many newly-infected countries
- there was a substantial fall in HPAI incidence in most previously infected countries
- progress was registered in the fight against HPAI H5N1 in endemically infected countries

... BUT WITH LIMITATIONS

- the H5N1 virus was still circulating in some parts of Asia and Africa causing permanent risk of infection or re-infection of new countries

Analysis of the present disease situation, the lessons learned since the beginning of the HPAI panzootic and identification of strengths, weaknesses and opportunities are an important starting point for development of rational strategies for global control of the disease. Currently, robust epidemiological data on the disease are scarce but a broad analysis of various national and regional disease situations in the context of farming systems, poultry and human density, geographical location, socio-political situation, policy environment and capacity to control transboundary animal diseases enables preliminary identification of possible risk factors and improved targeting of interventions for HPAI control.

A1.1 Regional analysis

Table 2 lists the countries that have experienced H5N1 HPAI, indicating the date of the last reported outbreak, together with reported human cases and deaths (as of 20 February 2007). The number of countries experiencing new outbreaks in late 2006 and early 2007 has again increased. This recent upsurge is not unexpected given that influenza, including H5N1 HPAI, is a seasonal disease.

Table 2: Summary of confirmed HPAI outbreaks in poultry and human H5N1 infection (as of 20 February 2007)

Region and country	Last reported outbreak	Human cases/deaths	Region and country	Last reported outbreak	Human cases/deaths
Europe			Asia		
Albania	9 Mar 2006	-	Afghanistan	4 Apr 2006	-
Azerbaijan	18 Mar 2006	8 / 5	Cambodia	24 Aug 2006	6 / 6
Denmark	26 May 2006	-	China	5 Oct 2006	22 / 14
France	26 Apr 2006	-	China (Hong Kong SAR)	9 Feb 2007	18/6
Germany	2 Aug 2006	-	India	18 Apr 2006	-
Hungary	23 Jan 2007	-	Indonesia	28 Aug 2006	81 / 63
Romania	6 Jun 2006	-	Japan	30 Jan 2007	-
Russian Federation	16 Feb 2007	-	Kazakhstan	10 Mar 2006	-
Serbia	16 Mar 2006	-	Korea, Rep.of	9 Feb 2007	-
Sweden	26 Apr 2006	-	Lao, PDR	3 Feb 2007	-
Turkey	15 Feb 2007	12 / 4	Malaysia	21 Mar 2006	-
Ukraine	11 Jun 2006	-	Mongolia	June 2006	-
United Kingdom	27 Jan 2007	-	Myanmar	25 Apr 2006	-
Africa			Pakistan	16 Feb 2007	-
Burkina Faso	20 May 2006	-	Thailand	23 Jan 2007	25 / 17
Cameroon	28 Mar 2006	-	Viet Nam	22 Jan 2007	93 / 42
Côte d'Ivoire	9 Nov 2006	-	Near East		
Djibouti	9 Apr 2006	1/0	Iraq (H5)	1 Feb 2006	3 / 2
Egypt	15 Feb 2007	22/13	Israel	30 Mar 2006	-
Niger	1 Jun 2006	-	Jordan	23 Mar 2006	-
Nigeria	14 Feb 2007	1 / 1	West Bank & Gaza Strip	2 Apr 2006	-
Sudan	4 Aug 2006	-			

A1.1.1 Asia

In terms of achieving sustainable control and eradication of H5N1 HPAI, Asia is still the region of greatest concern. However, over the three-year period since the initial dispersal of the disease, very significant progress has been made. Four countries (PR China, Viet Nam, Thailand and Indonesia) have experienced widespread disease in poultry. Of these, PR China has achieved significant success in controlling the disease in many provinces, Thailand and Viet Nam have controlled the disease to the extent of enjoying long periods with no reports of outbreaks, but they still suffer sporadic outbreaks. Indonesia still has widespread endemic disease. Several other Asian countries, including Malaysia, Myanmar, India, Pakistan and Afghanistan have experienced outbreaks and have apparently eliminated the disease. In some of those countries, weaknesses in disease investigation and reporting may raise questions as to whether H5N1 viruses are still circulating. Some recently identified outbreaks in some of these countries could be a result of such circulation or of re-introduction of the virus.

PR China reported outbreaks in 1997, 2003, 2004, 2005 and 2006. China's poultry population is estimated at five billion, of which about half is in poultry production sectors 3 and 4, mainly in poorer inland provinces. A key control component is mandatory vaccination of all poultry, including ducks, the latter representing about 70 percent of the world's population. This programme, with potentially over 14 billion poultry to be vaccinated twice annually, is the largest in the world. China is politically committed to HPAI control and has achieved substantial success, particularly in the coastal provinces with more resources at their disposal, where restructuring of industry has significantly reduced the risk of dissemination of the disease. The country has adequate resources and strong capacity in all aspects of disease control, including diagnosis and research.

Indonesia became infected with H5N1 HPAI after the disease first emerged in Southeast Asia in 2003-04. Indonesia has had widespread outbreaks of the disease, and has recorded the highest number of human deaths associated with H5N1 virus in the world. There is widespread use of several different types of HPAI poultry vaccine, mostly of undefined quality and efficacy and derived from a number of sources. The continued spread of HPAI and increasing number of human

cases of H5N1 infection demonstrate that the current disease control methods need to be greatly improved. The country has one of the largest smallholder poultry production sectors in Southeast Asia, embedded largely in the densely inhabited areas of growing human population. Throughout this vast archipelago of some 13,000 islands, the decentralized veterinary services are moderately developed but not uniformly so, Human and financial resources are insufficient to tackle the scale of the HPAI problem and other emergency priorities, including the tsunami and earthquakes, have stretched government resources.

Thailand and Viet Nam were among the first countries to be infected following the introduction and spread of H5N1 HPAI in Southeast Asia. Both countries have approached disease control differently. Thailand has consistently used a modified stamping out policy, enhanced biosecurity and an improved and intensive farm level surveillance programme supported by a well coordinated and adequately resourced national disease control strategy. These, coupled with appropriate policies related to compensation, animal movement and progressive restructuring of mixed farming systems separating domestic chickens from ducks, have significantly reduced H5N1 incidence in the country.

Viet Nam has also dramatically reduced disease incidence both in domestic poultry and humans through a combination of stamping out policy, mass vaccination of its predominantly smallholder poultry sector, closure of live bird markets, banning of duck breeding, public education and shifts to centralized slaughtering. Viet Nam has continued to strengthen its veterinary capacity and has mobilized significant national and international resources for implementing HPAI control projects in the field. The government's strong political commitment to control the disease has resulted in enhanced disease reporting from the grassroots level to international level.

Thailand and Viet Nam have reported outbreaks of HPAI in poultry in recent months and are likely to have H5N1 virus still circulating in poultry. Outbreaks currently being reported in Viet Nam are mainly in duck flocks and thought to indicate a failure to have vaccinated such flocks.

India experienced extensive outbreaks of HPAI in commercial poultry in Maharashtra State early in 2005, which were successfully controlled by aggressive action of both government and industry. The country has reported no further outbreaks since declaration of freedom in July 2005. Cambodia and Lao PDR have experienced continuing but sporadic outbreaks of disease, apparently without establishment of endemic disease. Apparently, outbreaks in Myanmar, Pakistan and Afghanistan have been eliminated without further spread and recent outbreaks are likely to be due to re-introduction of the disease. This demonstrates that most of these countries, together with some countries that have not yet experienced outbreaks (notably Bangladesh and Sri Lanka), are considered to be at high risk of re-infection and, with generally weak veterinary capacity, could experience great difficulty in eliminating the disease.

The first reports of H5N1 HPAI came from Hong Kong SAR in 1997, followed by reports in 2001, 2002 and 2003. It has controlled the disease successfully in poultry through a combination of measures including stamping out, strict control over sources of poultry and their movement, enhancements to biosecurity, changes in market management and vaccination of all commercial poultry.

Japan, Republic of Korea and Malaysia became infected during the early spread of H5N1 HPAI in 2003-04. With their strong veterinary capacities supported by adequate financial resources, they eliminated the disease. In late 2006 and early 2007, Japan and Republic of Korea experienced further outbreaks which have been controlled by aggressive stamping out.

A1.1.2 Europe

Denmark, France, Germany and Sweden became infected in 2006 following the spread of H5N1 HPAI from Asia. They were able to eradicate the disease using stamping out, enhanced biosecurity, partial bans on free-ranging poultry and movement control. These countries have well-developed, predominantly commercial, poultry production sectors. The veterinary services are strong and financial resources can be mobilized to stamp out HPAI rapidly, should it recur.

Other European countries, including Russia, Kazakhstan, Albania, Azerbaijan, Serbia, Montenegro and Turkey suffered outbreaks of disease that proved difficult to control in many cases. All of

these countries ultimately eliminated the disease although there is some speculation that H5N1 viruses may still be circulating or have been re-introduced. Infection has again been detected in Hungary and Russia, indicating either continued circulation of the virus or its re-introduction. One outbreak has recently occurred in the United Kingdom.

Several European countries identified H5N1 HPAI in wild birds without experiencing disease in poultry and therefore, consistent with OIE norms, are considered to have had HPAI outbreaks. These occurrences demonstrate that the geographic extent of the risk of HPAI introduction is wider than is indicated by reports of poultry outbreaks.

A1.1.3 Africa

Egypt and West Africa have become the main areas outside of Asia where there is a serious and protracted problem for H5N1 HPAI control.

Nigeria and Egypt were the first two African countries to be infected with H5N1 HPAI in early 2006. In Nigeria, large- and medium-scale commercial enterprises are well represented but are set within a very large and extensive smallholder poultry production system. The government has used a combination of disease control approaches, including modified stamping out and movement control. Vaccination is being used by some commercial operators even when not officially sanctioned. Deficiencies in disease reporting are clearly recognized, particularly in smallholder production systems and in free-range urban and peri-urban and village poultry. Virus is probably circulating in these sectors and thus control efforts need to be sustained and surveillance capacity enhanced.

In Egypt, the response of regulatory authorities to the first outbreaks in early 2006 were mass culling of infected poultry, restrictions on domestic poultry breeding, marketing and local slaughter operations, particularly in urban areas, and later vaccination of both large commercial poultry flocks and smallholder poultry. Despite this, the disease in poultry has resurfaced in different locations demonstrating that virus circulation has become firmly established in poultry. Domestic poultry breeding is widespread and economically vital to millions of low income families in Egypt. Poultry production is mainly confined to areas along the Nile and in the larger cities, where most of the human population resides. Outside Asia, Egypt has had the highest number of human infections and deaths due to the H5N1 virus.

Outbreaks of disease occurred in Sudan, possibly due to spread from Egypt and have apparently been successfully controlled. One outbreak was reported from Djibouti but it is believed that there is no current HPAI there. In West Africa, Burkina Faso, Cameroon, Côte d'Ivoire and Niger have also reported outbreaks, probably due to direct or indirect spread from Nigeria. Some of these countries have not reported disease in recent months but, in general, their H5N1 HPAI disease status cannot be fully determined due to lack of or difficulty in obtaining adequate surveillance data as a result of poor capacity. It is thought that the disease has disappeared at least from Cameroon and Niger.

A1.1.4 Near East

Outbreaks of H5N1 HPAI occurred during 2006 in Israel, Jordan, Iraq and West Bank & Gaza Strip. All outbreaks were controlled and these countries are now apparently free from disease.

A1.1.5 Other regions

Most of the countries in the world have never reported H5N1 HPAI infection, among them large parts of eastern, central and southern Africa, all of the Americas, Australia, New Zealand and the Pacific Islands.

While all countries are at potential risk of incursion, the risks and potential consequences of HPAI introduction vary, depending on a number of factors. Many of these countries are developing economies with inadequate veterinary services and poor financial and human resources and are likely to have difficulties in detecting and controlling the disease. The risk of disease becoming endemic in such countries may be particularly serious if high density poultry populations predominate in sectors 3 and 4, where the level of biosecurity is generally poor.

A1.2 Socio-economic impact

In addition to the human deaths that have occurred due to H5N1 virus, and largely as a result of that, the HPAI panzootic has caused three notable economic and social impacts:

- market shocks;
- negative consequences for livelihoods as a result of the disease and the control processes applied to contain it; and
- changes to the structure of poultry market chains, induced either by heightened biosecurity regulations or created through government policy.

Market shock was the first visible economic effect of H5N1 infection and has occurred even in countries and regions that have not experienced outbreaks. International demand and prices have been disrupted by consumer fears and import bans of trading partners. International bans reduced volumes of global trade in poultry products by eight percent between 2003 and 2004. The reduction in supply of poultry products increased poultry prices by nearly 20 percent after HPAI outbreaks in 2004 and the first half of 2005. Global trade recovered in 2005 and 2006, although less than had been predicted before the HPAI panzootic commenced. Sourcing of poultry products for international trade moved towards South America, with Asia (notably Thailand and PR China) losing their market share. There were also substitution effects as consumers switched to other protein sources.

Domestic market shock has been evident in infected countries, those in which HPAI was suspected and even in countries that have suffered no incursion of H5N1 HPAI. Domestic reductions in demand and prices paid for poultry have caused at least temporary hardship for producers through loss of markets.

Disease control processes, including culling birds without compensation and market closures, have caused disruption and restricted market operations. Few of the developing countries affected by HPAI had compensation systems in place in 2004. HPAI has most severely affected countries in which small-scale, less biosecure poultry flocks predominate (Sectors 3 and 4). Restricting market operations has had livelihood implications for producers and traders even beyond the immediate area of outbreaks. All producers suffer from reduced access to markets following HPAI occurrence. However, smallholders tend to recover more slowly and tend to lose market share to large-scale commercial operations. In Viet Nam, it took many weeks to restock backyard flocks after culling, but the main impact in 2005 was from the closure of markets. The gender impacts of this merit further investigation, since income from smallholder poultry production is under direct control of women, and income controlled by women in poor households is often used for food and education for children.

Where certain poultry farming systems have been seen as a threat for HPAI dissemination, including the grazing of ducks in rice fields and scavenging ducks and chickens for backyard production, bans have been introduced in an attempt to force smallholders into changing their husbandry practices. Such bans have generally not been successful in preventing disease spread. However, they have adversely affected livelihoods and some smallholders have been temporarily or permanently forced out of poultry production. The limited studies that have been undertaken to date indicate that heightened biosecurity measures change the structure of market chains. Supporting the needs of a modernized poultry sector requires investment that many smallholders cannot afford and the outcome of changes is that fewer birds are produced in Sectors 3 and 4, while production increases in Sectors 1 and 2. In a number of countries in which structural change is taking place, sometimes without adequate planning or at too fast a pace, FAO has expressed concern about the negative effects on livelihoods.

ANNEX 2 LESSONS LEARNED

Analysis of the behaviour of HPAI during the panzootic and the success of different disease control efforts permits a number of broad observations regarding lessons learned, such as identification of key risk factors, problems associated with the application of well-defined tools for HPAI control, and regional and international coordination.

MARKERS FOR THE FUTURE

Just over three years after the current HPAI panzootic started in Asia, the international scientific and technical community, strongly supported by FAO and OIE, has learned much about the disease and the best efforts to control and prevent it. These lessons are invaluable markers for the future and form the backbone of the FAO/OIE global strategy.

- HPAI prevention and control requires further strengthening of OIE compliant national veterinary services
- while migrating wild birds have been implicated in HPAI global spread, more attention should be given to the movement of poultry and poultry products
- national disease surveillance capacity needs more support
- stamping out is the best way of containing outbreaks but only if backed by fair compensation, effective movement control and surveillance
- vaccination is effective in reducing HPAI incidence if applied according to guidelines, if quality vaccine is used and if supported by close monitoring and an exit strategy
- long-term HPAI prevention and control will require changes in some poultry husbandry and marketing practices
- advocacy and communication can help create political support for H5N1 HPAI control at the national, regional and global levels
- public awareness is vital for HPAI control to gain community support, create recognition of safe practices and avoid market shocks

A2.1 Risk factors

- Countries with strong national economies generally have well-developed veterinary services and strong disease detection and control capacity for stamping out of HPAI should it be detected. Such countries also tend to have well-organized and regulated commercial poultry sectors with a high level of biosecurity and are therefore at relatively low risk for HPAI incursion. Conversely, countries with weak economies have difficulties in detecting and stamping out HPAI due to weak veterinary services and inadequate capacity in all aspects of disease control, and insufficient manpower and financial resources. Such countries also tend to have predominantly smallholder commercial and backyard poultry production sectors, in which biosecurity is poor.
- Where biosecurity is poor and poultry density high, the disease can spread rapidly, causing high mortality in chickens. Where poultry densities are low, even if biosecurity is poor, the disease spreads slowly and is often self-limiting.
- Market activities represent a serious risk for dissemination of HPAI, especially poorly controlled live bird markets where there is a risk of development of infection cycles within markets, transfer of virus via fomites or by birds being taken alive from a market, either to be returned to their source or transported elsewhere.
- The risk for maintenance of H5N1 HPAI is increased if ducks are an integral part of the smallholder production system because duck flocks are capable of acting as reservoirs of H5N1 infection.
- International trade, especially unregulated or illegal, in poultry and poultry products represents a significant risk for international spread of HPAI. The specific risk factors (risk of transmission from specific products or accompanying fomites) are not well defined and international market chains are not well characterized. Non-infected countries sharing borders with H5N1-infected countries are at high risk if unregulated and informal trade in poultry occurs. Regulated legal trade in poultry in accordance with OIE regulations poses a very low risk.
- There are strong indications that migratory waterfowl have been responsible for long distance dissemination of H5N1 viruses. Countries with large wetlands that are destinations for wild bird migrating directly from infected countries are considered to be at

- relatively high risk of HPAI virus incursion, particularly in areas of high agricultural productivity and where poultry are in contact with wild birds.
- Other wild bird species and also some mammalian species, including cats and pigs, have been shown to be infected with H5N1 viruses. Their epidemiological significance is not well established. At present it is thought to be minor, although in places where these animals are known to have been infected, investigations need to be conducted to establish whether virus continues to circulate in these animals.
 - In the socio-political environment of many countries, governance issues and war and other emergencies confound application of various HPAI control programmes and compromise the ability of international agencies to support control efforts.
 - Disease prevention or control measures which are perceived by communities as unreasonable or which are impractical within a country context because of established cultural norms or economic imperatives will not be complied with. Measures that are acceptable, even if technically weaker, are more likely to be successful in HPAI control. New laws or regulations not accompanied by some level of enforcement will also be ineffective.
 - Endemic disease foci in many countries present a constant risk of H5N1 HPAI spread globally and therefore must remain a first priority for control and eradication.

A2.2 Lessons learned from HPAI control tools and methods

A number of well-defined and tested disease control methodologies and technologies are available⁷. These include surveillance and early detection using various diagnostic tests, biosecurity, stamping out by culling, animal movement control, use of vaccines, cleaning and disinfection, and improved farm and market management. Since the strategy recommends the use of these tools in the control of H5N1 HPAI, some key observations on their application are given below along with some of the lessons learned from communication initiatives.

A2.2.1 Surveillance

Effective surveillance supports effective disease control through early detection of the disease, definition of risk factors, better assessment of vaccination programmes, improved understanding of genetic evolution of the virus, and clearer elucidation of the epidemiology of the disease. Since early disease detection is a prerequisite for limiting exposure of animals and humans, it must be supported by trained professionals at the field level and backed by specialist personnel at diagnostic laboratories and epidemiology units.

Major weaknesses and strengths identified in surveillance systems globally are:

- Surveillance in most of the HPAI-infected countries is weak. As a result, robust epidemiological information on disease incidence, infection and transmission dynamics is lacking, precluding development and implementation of risk-based control measures which are cost-effective and practical.
- Many countries do not appear to have the expertise to develop and implement national surveillance plans.
- Many countries with weak economies do not have well-established disease information systems and thus do not have effective capabilities to share and analyse national data.
- Farm level, participatory and community-based surveillance programmes such as intensive active surveillance (e.g. 'X-ray' surveillance in Thailand using thousands of village volunteers) and pilot participatory disease surveillance (PDS) in Indonesia, appear to be working well for detection of HPAI. However, these require considerable investment and technical support for implementation and sustainability on a national scale.
- International HPAI surveillance is compromised by weaknesses in national disease surveillance. Official reports from national authorities to OIE should be supplemented with mechanisms to investigate informal reports of suspect cases or outbreaks of HPAI, as is carried out by the FAO/OIE/WHO Global Early Warning System (GLEWS). These networks require further strengthening.

A2.2.2 Diagnosis

Accurate and rapid laboratory diagnosis supports surveillance and early response. Every country should be equipped to carry out basic H5N1 diagnosis. In addition, at least one central national laboratory should have the capacity to provide virus detection and characterization as a putative avian influenza H5 sub-type virus (virus isolation and identification or RT-PCR). The following strengths and weaknesses have been identified in this area:

- National diagnostic laboratories are often poorly developed and under-resourced and lack the capacity necessary to contribute to effective surveillance, early identification and confirmation of suspect cases, and characterization of isolated viruses.
- Where national laboratories have the capacity for HPAI diagnosis and virus characterization, they do not often share such virus isolates or gene sequence data with international reference centres which would permit monitoring of changes in H5N1 strains at the global level, including changes in virulence and host adaptation.
- Sample shipment to regional or international laboratories can be complex, costly and should be undertaken by certified specialists. Often there is a lack of planning, including agreements with reference laboratories, arrangements with carriers and supply of specimen transport containers.
- OIE/FAO reference laboratories located throughout the world have made a significant contribution to processing field specimens and providing diagnostic reagents and training to a number of countries that did not have the appropriate capability.
- During the early stages of rapid disease spread in Asia, Europe, the Middle East and Africa, demand overstretched the human and financial resources of many reference laboratories. A need to build more regional diagnostic capacity has been clearly identified. The leading role played by Thailand as a regional HPAI diagnostic facility is a good example for other regions to follow.
- Complementary laboratory capacity for influenza diagnosis may exist in veterinary and public health laboratories nationally, regionally, and globally. Increased collaboration among laboratories can increase global laboratory capacity.

A2.2.3 Containment of disease spread

- Many countries have inadequately developed contingency plans and insufficient financial and manpower resources to apply containment measures. The most common deficiencies include development of plans from generic models without taking into account the specificities of a particular country situation, drawing up plans that do not adequately reflect resource availability, and failure to negotiate plans with other national implementing agencies and stakeholders. Further, on many occasions plans are not tested by simulation exercises.
- Culling of infected flocks must be accompanied by other measures to contain spread, including movement control and, depending on circumstances, vaccination. Surveillance and tracing are essential to determine the source of virus and monitor the extent of spread from an outbreak.
- Many countries do not have provision for compensation of owners whose poultry are culled for disease control purposes. Deficiencies are evident in both planning appropriate arrangements and in funding compensation schemes.
- There is inadequate knowledge and capacity to safely and humanely cull and dispose of large numbers of infected poultry.
- Experiences in East Asia demonstrate that stamping out of infection provides short-term improvements in HPAI status but does not guarantee long-term freedom. Gains made in controlling disease outbreaks may be ephemeral unless they are accompanied by appropriate changes in poultry disease management practices on farms and in high risk marketing practices such as uncontrolled entry of poultry into live bird markets.
- In many countries, infection was already widespread at the time of first recognition. In such circumstances it may be more appropriate to apply a modified stamping out strategy, including ring or area vaccination. In some such countries, surveillance systems were inadequate to detect the extent of infection and, as a result, inappropriate control strategies were adopted.

A2.2.4 Vaccination

The OIE and FAO technical guidelines recommend that vaccination is one of the legitimate control measures for the disease and should be considered by veterinary authorities along with all other measures. Vaccination can help to bring down levels of infection, thus reducing the risk of transmission to humans and other poultry, and can substantially reduce the socio-economic costs of control. The OIE and FAO have made recommendations for the use of avian influenza vaccines manufactured in accordance with the *OIE Terrestrial Animal Health Code* guidelines and several such vaccines are commercially available. According to current OIE recommendations, HPAI-vaccinated poultry should not be excluded from international trade, although specific technical guidelines must be followed to ensure that the vaccine is being applied properly and monitored effectively.

Observations and lessons learned from the use of vaccines in different countries include the following:

- When carried out in accordance with OIE/FAO guidelines and in combination with other disease control measures, including enhanced biosecurity, culling of infected flocks with compensation, poultry movement control and management of markets, vaccination has a powerful impact in reducing disease incidence and virus load in the environment as has been demonstrated in Viet Nam. Vaccination is also extremely valuable in high risk places in which disease has recurred. For example, Hong Kong's poultry industry has remained infection-free for three and a half years following vaccination after repeated outbreaks and despite the presence of infection in wild birds there and in neighbouring provinces.
- Vaccination must be supported by post-vaccination monitoring to ensure that adequate flock protection is being achieved and to determine whether virus circulation is occurring in inadequately vaccinated flocks.
- The high cost of vaccination compared with its perceived benefits, particularly for village level producers, makes it difficult to sustain over a prolonged period. A vaccination programme should be planned as part of an integrated control strategy, subject to periodic review, which anticipates ultimate cessation of vaccination.
- Unregulated and uncontrolled use of vaccines from unknown sources and of dubious quality and efficacy, or without associated disease control measures, may confound efforts to introduce a systematic approach to disease control.
- Improperly vaccinated poultry flocks may perpetuate undetected virus circulation through partially protected birds and remain a source of infection for other birds and humans. Such a situation could increase the risk of emergence of antigenic variants of the H5N1 virus. Active targeted monitoring programmes need to be in place in countries practising vaccination to ensure that any circulating H5N1 viruses are fully characterized and compared with existing vaccine strains for protective capacity.
- The cost and logistic challenges of widespread vaccination, especially in backyard poultry, are major constraints on effective use of vaccines.
- Well-developed vaccination strategies, with advance arrangements for rapid access to vaccines, may offer a significant advantage in controlling and eradicating the disease in a newly-infected country.

A2.2.5 Communication

Although effective communication is a critical tool in influencing acceptance of and compliance with disease control measures, it has been inadequately used.

- Although awareness of HPAI is higher as a result of publicity campaigns and media attention, they have not yet resulted in the behavioural changes required to control the disease.
- Public information initiatives have largely been directed towards avoiding human exposure to H5N1 virus from avian sources. There has been less attention given to elaborating strategies for preventing the introduction of HPAI through engaging the large-scale commercial operators, small-scale poultry producers' associations and civil society.
- In the face of outbreaks of HPAI, media reports have often been alarmist, giving an exaggerated and unbalanced indication of the risk of human exposure to H5N1 infection. This has often precipitated negative consumer reaction and poultry market disruptions.
- Very few developing countries have launched public education campaigns in advance of any HPAI outbreaks.

- It is necessary to coordinate communication between the animal and public health sectors, including support agencies, to ensure that balanced, consistent and scientifically sound messages are provided.

A2.3 Lessons learned from regional and global coordination

A2.3.1 Global coordination and support

- HPAI prevention and control is being coordinated at the UN level by UNSIC. There are a number of UN agencies involved in various HPAI-related activities, including FAO, WHO, UNICEF, UNDP and UNEP. While the roles of the various international organizations and coordination among them have significantly improved, further strengthening of international coordination is necessary in all areas, including support for surveillance, response, communication and building technical capacity in countries.
- Within FAO, the designation of the Chief of the Animal Health Service as the FAO Chief Veterinary Officer has greatly facilitated international-level communication and planning with member countries, OIE and a number of other international partners and donors.
- FAO has recently enhanced the rapid reaction capacity of its existing Emergency Centre for Transboundary Animal Diseases (ECTAD) through the launching of the Crisis Management Centre (CMC). The animal health component of the CMC has been established in collaboration with OIE, and works with national and regional organizations to provide rapid deployment teams and fast technical support when an incursion of HPAI or other animal health emergency occurs.
- International coordination has also supported the development of a research network of global expertise on HPAI through OFFLU, to support sharing of biological materials and data, and to assist member countries in laboratory work through training and in performing diagnostic analysis. The network needs continued funding support to maintain its activities.
- The risks to public health of ongoing H5N1 HPAI virus circulation, including specific human exposure risk variables, require further collaborative initiatives between the public and animal health sectors.
- While wild bird virological surveillance has been conducted by different agencies independently, active collaboration among the public health and veterinary sectors and international agencies such as FAO, WHO, UNEP and the Wildlife Conservation Society could improve.
- Coordination of virological surveillance among national and international public health and veterinary sectors and the international scientific community has not been sufficiently adequate to allow timely and complete tracking of virus evolution.
- Long-term international political and financial commitment has not been as strong as short- to medium-term support. Greater efforts are needed to communicate and mobilize international support for H5N1 HPAI control over the next 10 years in order to plan the coordinated and integrated activities required for long-term control of H5N1 HPAI.
- International coordination has played an important role in regularly communicating the global H5N1 HPAI situation by collating and analysing information and disseminating disease trends to the global community. Currently, collaboration among FAO, OIE and WHO is strengthening the early warning system at the global level through the establishment of GLEWS. This system will also facilitate improved analysis of global data.
- Strategic communication to support HPAI prevention and control requires coordination among international agencies, many of whom have strong capacities and communications expertise. FAO, as the lead international technical agency for the livestock production and animal health sectors, has an essential role to play in providing specific technical guidance.
- International coordination through FAO, OIE, UNSIC and WHO has been highly successful in communicating the importance of H5N1 HPAI as a potential threat to public health and the need to control and eradicate the disease at source in animals.

A2.3.2 Regional coordination and support

- Disease surveillance and diagnostic networks were established during outbreaks of H5N1 HPAI in 2004 in several countries in Southeast Asia. Notable successes include the engagement of

and assistance provided to the People's Democratic Republic of Korea through the East Asian network. However, this approach has not been uniformly successful due to a number of constraints, including lack of adequate resources for the networks and lack of the appropriate technical and implementation capacity of certain regional and sub-regional organizations.

- Many projects executed by various international agencies, donors and regional and sub-regional organizations are being implemented in various countries and different regions. In implementing these projects and programmes, a number of activities such as technical workshops, consultation meetings, deployment of various disease control interventions and training programmes are being conducted. Regional coordination of these activities has been extremely difficult and as a result some duplication of efforts has occurred.
- In addition to the OIE Regional Commissions and Representations, there is an opportunity for regional organizations to play a greater role in coordinating regional activities for HPAI prevention and control. The ASEAN Secretariat is advancing a regional framework for HPAI control, with support from technical agencies including FAO, OIE and WHO. AU-IBAR is coordinating HPAI prevention and control in Africa with support from FAO and OIE. There are other regional agencies with trade or economic portfolios that could function similarly in coordinating regional activities.

ANNEX 3 PARTNERSHIPS AND IMPLEMENTATION

The global nature of H5N1 HPAI, the complexity of the disease ecology and epidemiology, and the potential risk and threat of pandemic influenza necessitate a multi-disciplinary and multi-sectoral approach addressing interactions between technical, policy, institutional and socio-economic issues. A large number of partners are fundamental for effective and sustained HPAI control.

While FAO and OIE, in collaboration with WHO, have taken the lead in developing this technical strategy, they advocate its adoption by donors, by global, regional and national implementing agencies and by poultry producers and other stakeholders. The key partners include:

- national and sub-national regulatory agencies, in particular livestock disease control authorities, which have the primary responsibility for HPAI prevention and control within their jurisdictions;
- FAO and the OIE as the lead international agencies in providing support for livestock disease control support;
- OIE as the lead agency, working with FAO and national veterinary services, for the establishment and development of international standards for HPAI diagnosis and management, and including international trade standards and HPAI compartmentalization;
- other major international partners, including the World Bank, Asian Development Bank, African Development Bank and national donor implementing agencies;
- UNSIC and other UN agencies, including WHO, UNICEF and UNDP for providing coordination of UN efforts, harmonization of livestock and public health sector approaches, and support activities, including communication and public awareness;
- regional organizations, including ASEAN, SAARC, ECO and AU-IBAR, which have the actual or potential capacity to coordinate regional disease control initiatives and harmonize standards, policies and border control agreements in a sustainable manner;
- national and international non-governmental organizations, particularly to benefit from their ability to engage community-level participation in disease prevention, reporting and control initiatives; and
- farmers and livestock traders and participants in poultry marketing who have specialized knowledge of their industries and whose engagement is essential for successful implementation of HPAI prevention and control.

The strategy will be implemented progressively over the next ten years, as funds become available, beginning with the highest priorities for 2006-2008. It will be coordinated jointly by FAO and OIE and harmonized with the WHO Strategic Action Plan for Pandemic Influenza 2006-2007⁸.

A3.1 FAO's Global Programme for HPAI Prevention and Control

FAO has developed a Global Programme to document its operational plan for a three-year period (2006-08). It indicates the goal, objectives, activities and expected impacts of the different components and describes projects for implementation and projected costs. This Global Programme, initially developed in early 2006 and revised in May 2006⁹, is currently being updated to accommodate this revision of the Global Strategy and the realities of a changing situation in the field.

At the global level, FAO coordinates and manages the international effort for an effective HPAI global response in collaboration with OIE. Through ECTAD, it utilizes GLEWS, OFFLU, global wildlife surveillance and the Crisis Management Centre. A knowledge network linking UN agencies working on social, economic and policy analysis of avian influenza with government agencies and research centres in infected and at-risk countries, international research groups and non-governmental organizations, has been established by FAO on behalf of the UN system and will be hosted by FAO for at least a further year.

At the regional level, FAO seeks to provide the regional coordination and harmonization that is vital for controlling transboundary diseases such as HPAI, because infection in one country threatens all countries in a given region. FAO works to build regional strength in veterinary and laboratory infrastructure, epidemiological expertise and disease control. Within the coordinating

mechanism of GF-TADs, decentralized ECTAD regional centres and regional animal health centres are being established in various locations around the world.

FAO's input at the national level is based on each country's specific needs and situation. FAO's vital role lies in providing support in preparedness planning to countries at risk of infection, rapid technical assistance, and the necessary operational support to the governments of affected countries. While emergency and short-term assistance is indispensable, FAO is committed to long-term assistance to secure the control and eradication of the disease and better preparedness for future zoonoses and other transboundary diseases.

FAO estimates current funding needs to continue its Global Programme at US\$ 122,5 million (for 2007) and US\$ 83.2 million (for 2008), a total of US\$ 205.7 million up to the end of 2008.

A3.2 OIE's Programme

Evaluation of Veterinary Services

The OIE's 168 OIE member countries have adopted democratically quality standards and guidelines for the evaluation of veterinary services. These are international standards for surveillance, prevention, control and eradication of animal diseases, as well as for safe trade in animals and animal products. The guidelines for the evaluation of veterinary services help countries, in particular developing countries and countries in transition, to justify contributions requested from national governments and international donors for their capacity building and the strengthening of their veterinary services.

Capacity building of national veterinary services is a key factor for creating and reinforcing effective legal frameworks including early detection networks, rapid notification of suspected cases of diseases, quick and reliable diagnosis, rapid response to outbreaks, national chains of command and public-private partnerships (animal owners organizations and private veterinarians). This allows for rapid response in controlling and containing emerging and re-emerging diseases in the early stages of outbreaks.

For this purpose, the OIE has developed the Performance, Vision and Strategy (PVS) instrument, a useful tool to assess veterinary services in accordance with the OIE standards and guidelines regarding the evaluation of veterinary services (as per Chapters 1.3.3. and 1.3.4 of the *Terrestrial Animal Health Code*).

The PVS instrument is not only an assessment tool, but also a development tool that permits collaboration with veterinary services to identify gaps and deficiencies, facilitate the elaboration of national investment programmes and their follow-up over time, and thus provide a framework and justification for leveraging funds from national budgets and, if necessary, international donors, including the World Bank and developed countries, which have pledged funds to assist developing countries and countries in transition in strengthening their veterinary services. These identified gaps and deficiencies will also provide detailed references for governments to develop policies directed at investments and improvement of veterinary service capacities.

Laboratory support, including OFFLU and twinning programmes

Two of the OIE's main objectives are to collect, analyse and disseminate scientific veterinary information and to provide and encourage international solidarity in the control of animal diseases. The OIE/FAO OFFLU network will be further strengthened, in particular for the collection of animal virus strains and increased transparency.

In January 2005, the OIE Biological Standards Commission expressed its wish "to assist laboratories in developing countries to build their capacity with the eventual aim that some of them could become OIE Reference Laboratories in their own right". The Commission drafted a first template to guide laboratories wishing to make twinning arrangements. These guidelines for applicants, divided into 12 points, give practical help with the constitution of a dossier for a chosen disease. The guidelines consist of three parts: the first requests the names of the laboratories and the experts involved; the second asks for information related to the activity and existing capacity of the applicant laboratory for the disease for which capacity building is required; the third

concerns a detailed work plan and timescales to enable the applicant laboratory to fulfil the requirements of an OIE Reference Laboratory in the future.

The Conference of OIE Laboratories and Collaborating Centers provided an opportunity to advance the programme and worked on practical proposals to promote the twinning concept.

The concept of laboratory twinning aims to encourage the transfer of know-how and technical expertise between OIE reference laboratories and possible/potential new reference laboratories. It involves the exchange of experts between such laboratories and facilitation of the work of medium-term (several months) resident laboratory experts in developing countries and vice versa. FAO will be involved in this programme.

Capacity-building at regional and national level

In all regions, the OIE develops capacity-building programmes for national policy-makers and stakeholders from the private sector in order to improve governance on animal health systems worldwide. Priority is given to regional seminars but some are national (e.g. to build alliances between the public and private sectors). In order to avoid overlaps or gaps, GF-TADs regional steering committees are consulted for regional programme coordination.

A3.3 Significant milestones and expected outputs

Implementation of the global strategy, with adequate funding, well-designed plans and a wide range of partners, is expected to achieve the following important milestones:

1. In the medium term, the four countries that have continuing and widespread H5N1 HPAI outbreaks will have significantly reduced disease incidence, and in the long term one or more of these countries will have eradicated the disease in poultry with others having confined the disease to defined areas or production sectors.
2. In the short to medium term, those countries experiencing sporadic outbreaks will have strengthened their early detection and response capacity further and are expected to have either eradicated disease or limited it to occasional outbreaks confined to a few areas.
3. Countries with indeterminate status following containment of outbreaks will have conducted risk-based surveillance and accurately determined whether H5N1 HPAI is present or absent. Most of the countries are expected to be free of infection within the short to medium term.
4. In all countries, within the medium to long term, the socio-economic impact of H5N1 HPAI will have been minimized. Poor smallholder farmers in many poorer economies are expected to benefit significantly from these disease control programmes.
5. All countries at high risk of HPAI incursion will have strong surveillance programmes in place in the short term and will have developed capacity in early detection and emergency response.
6. All currently disease-free countries will be able to rapidly contain HPAI in the event of incursion to ensure that they remain free of infection in the long term.
7. Human infections due to H5N1 virus will decline significantly over the short term. In the long term, as virus circulation declines and distribution of HPAI in poultry is significantly reduced, human infections are expected to occur only on rare occasions.
8. In the short term, all countries will have their national strategies and emergency preparedness plans prepared and tested.
9. In the short to medium term, the majority of the countries will be conducting regular risk-based surveillance for HPAI and virus isolates will be shared with the international community.
10. All countries, particularly poorer economies, will have progressively strengthened their capacity to control HPAI, including surveillance, diagnosis, epidemiology, disease information management and improved veterinary services.
11. Over the medium to long term, economic and policy studies, improved tools for HPAI control (new vaccines in particular) and better understanding of the epidemiology of HPAI will allow more rational and targeted disease control programmes.

12. In the short to medium term, regional collaboration on H5N1 HPAI control will be strengthened with greater transparency in reporting and exchange of information.
13. In the medium to long term, the networks for diagnosis and surveillance and for policy and economics will be functioning, mainly supported by regional organizations.
14. In the short term, international collaboration among the major stakeholders and coordination among these partners will be enhanced.
15. Greater national, regional and international commitment for HPAI control will be reflected in increased financial resources for long-term capacity development in H5N1 HPAI and other transboundary animal and zoonotic disease control.
16. In the medium to long term, HPAI epidemiology and H5N1 virus ecology and evolution will be better understood. Together with improved capacity in disease control, the threat of existing and other emerging infectious zoonotic disease will be significantly reduced.

Endnotes

- 1 See Annex 2 for details.
- 2 <http://www.offlu.net>
- 3 FAO has categorised four poultry production sectors and the level of biosecurity practised in each sector is a key consideration in developing disease control strategies:
Sector 1 - industrial integrated production with high level biosecurity and birds or products marketed commercially.
Sector 2 - commercial poultry production with moderate to high biosecurity and birds or products sold through slaughterhouses or live poultry markets.
Sector 3 - smallholder commercial poultry production including water fowl, generally with low biosecurity and birds or products usually sold through live bird markets.
Sector 4 - village or backyard production with minimal biosecurity and birds or products consumed locally. It is recognised that there are gradations between sectors.
- 4 An inanimate object or substance that is capable of transmitting infectious organisms from one individual to another.
- 5 The FAO publication *Preparing for Highly Pathogenic Avian Influenza* is a useful reference.
http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html
- 6 Under OIE nomenclature, *compartmentalization* is a process in which defined compartments under a common biosecurity system, such as individual production enterprises or production sectors, can maintain and demonstrate freedom from a disease, even if it is endemic within other production sectors or units within a country.
- 7 *Guiding principles for highly pathogenic avian influenza surveillance and diagnostic networks in Asia*, FAO Expert Meeting on Surveillance and Diagnosis of Avian Influenza in Asia, Bangkok, 21–23 July 2004.
OIE Manual for Diagnostic Tests and Vaccines for Terrestrial Animals.
- 8 http://www.who.int/csr/resources/publications/influenza/WHO_CDS_EPR_GIP_2006_2c.pdf
- 9 *Avian Influenza Control and Eradication – FAO's Proposal for a Global Programme*.
http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian_recomm.html