

THE GLOBAL STRATEGY FOR PREVENTION AND CONTROL OF H5N1 HIGHLY PATHOGENIC AVIAN INFLUENZA

October 2008



THE GLOBAL STRATEGY FOR
PREVENTION AND CONTROL
OF H5N1 HIGHLY PATHOGENIC
AVIAN INFLUENZA

October 2008

FAO and OIE
in collaboration with WHO

Acknowledgements

The Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE) acknowledge and are grateful to the World Health Organization (WHO) for the close collaboration and helpful discussions in producing this revision of the Global Strategy, whereby correctly addressing the issues of prevention and control of avian influenza viruses with a zoonotic potential can avert human illness and a human pandemic.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views of FAO.

All rights reserved. Reproduction and dissemination of material in this information product for educational or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to the Chief, Electronic Publishing Policy and Support Branch, Communication Division, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy or by e-mail to copyright@fao.org

Contents

Foreword	v
Abbreviations	vii
Executive summary	ix
Global progress in HPAI control	ix
Background and rationale	1
The Global Strategy	3
1. THE VISION	3
2. THE PRIORITIES	3
3. STRATEGIC DOMAINS	4
3.1 The global domain	4
3.2. The regional domain	8
3.3 The national domain	10
4. SIGNIFICANT OUTPUTS AND OUTCOMES	25
Lessons learned	29
A1.1 Risk factors	30
A1.2 Lessons learned from HPAI control tools and methods	31
A1.3 Lessons learned from regional and global coordination	36
A1.4 Recent achievements	39
Partnerships and implementation	43
A2.1 FAO's Global Programme for HPAI Prevention and Control	44
A2.2 OIE's Programme	44
Selected references	47

Foreword

The current panzootic of highly pathogenic avian influenza (HPAI) caused by viruses of the H5N1 sub-type has now extended to over 60 countries. It has caused high mortalities in affected poultry flocks, with additional losses of income due to market disruption as a result of control activities and market shock due to consumer concerns for human health. For FAO, OIE and others concerned with safeguarding the livelihoods and ensuring the food security of communities in developing countries, 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.

The concern for human health, particularly the potential threat of a human influenza pandemic, has drawn world attention to HPAI and stimulated donors to support HPAI control and, preparedness measures for a human influenza pandemic. It is generally accepted that the most important element in addressing the potential threat of emergence of a human pandemic influenza virus 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 novel virus that can spread easily from human to human.

Following publication of the *FAO Recommendations on the Prevention, Control and Eradication of Highly Pathogenic Avian Influenza (HPAI) in Asia* in September 2004 (1), the *FAO/OIE Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza (HPAI)* was first produced in November 2005 and revised in March 2007. Since then, there has been further spread of H5N1 HPAI and continuous international support, with a notable increase in activities funded through the generosity of a large number of donors, including national governments, international development banks, development agencies and international organizations, including FAO. In June 2007, a WHO/FAO/OIE technical workshop held in Rome provided an update on the global situation and direction for future work, including a shift in emphasis in countries with entrenched/endemic infection away from emergency measures to longer-term measures that address the factors in the poultry production and marketing systems that allow the viruses to persist.

The OIE/FAO publication, *Ensuring Good Governance to Address Emerging and Re-emerging Disease Threats – Supporting the Veterinary Services of Developing Countries to Comply with OIE International Standards on Quality* (6) (last updated in September 2007), provides guidelines on good governance in relation to 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 gaps in our 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 four 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.

Global control is seen as unlikely in the short-term but progress towards enhanced control and prevention of this disease is expected even in places where H5N1 viruses remain entrenched.

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, to communicate that vision to implementing partners, donors and other stakeholders and, to demonstrate how activities conducted by these international agencies will assist in the control and prevention of this disease.

Abbreviations

ASEAN	Association of Southeast Asian Nations
AU-IBAR	African Union Inter-African Bureau for Animal Resources
CMC-AH	FAO/OIE Crisis Management Centre – Animal Health
ECO	Economic Cooperation Organization
ECTAD	FAO Emergency Centre for Transboundary Animal Diseases
EMPRES	Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases
EMPRES-i	FAO information system for transboundary animal diseases
FAO	Food and Agriculture Organization of the United Nations
GF-TADs	FAO/OIE Global Framework for the progressive control of Transboundary Animal Diseases
GLEWS	FAO/OIE/WHO Global Early Warning System
Hong Kong SAR	Hong Kong Special Administrative Region of PR China
HPAI	Highly pathogenic avian influenza
HPNAI	Highly pathogenic notifiable 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
PVS	Evaluation of Performance of the Veterinary Services (OIE-PVS tool for evaluation of national veterinary services)
RT-PCR	Reverse Transcription Polymerase Chain Reaction (rapid laboratory technique for detecting viral nucleic acid)
RAHC	Regional Animal Health Centres
SAARC	South Asian Association for Regional Cooperation
SFERA	Special Fund for Emergency and Rehabilitation Activities
TADs	Transboundary animal diseases
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations Children’s Fund
UNSIIC	United Nations System Influenza Coordination
WAHID	OIE World Animal Health Information Database
WAHIS	OIE World Animal Health Information System
WB	World Bank
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 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, Europe, the Near East and Africa, culminating in the current situation in which infection remains endemic in a number of countries in Asia and Africa and has infected birds (poultry and/or wild birds) in over 60 countries. The widespread nature of the disease, its mounting socio-economic impact, the increasing number of human infections and deaths and the potential threat of a human influenza pandemic 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 global situation and progress in HPAI control and the accumulated experience and lessons learned from national, regional and global efforts to control the disease (summarized in Annex 1).

GLOBAL PROGRESS IN HPAI CONTROL

Efforts by national and regional authorities supported by international agencies since 2004-05, when extensive transnational spread was reported, have been largely successful in improving the HPAI situation in previously infected countries and in controlling or eliminating the disease in most of newly infected countries.

In Asia, during the past three years the situation has improved. China and Vietnam have reported fewer outbreaks. Progress in Thailand, which experienced a high incidence of outbreaks in poultry and accompanying human infections, has been substantial, with no new human cases reported since 2006. The incidence of outbreaks in poultry as well as human cases in Indonesia has not yet been reduced but systems are being developed for enhanced disease detection and control, with support from many donors. Outbreaks in south Asia are being contained but it appears that an endemic focus could be established in the Ganges delta.

Republic of Korea and Japan have also experienced outbreaks of HPAI in the past two years. They were effectively controlled but re-introduction of disease has occurred in both countries. The latest outbreak in Republic of Korea, detected initially in April 2008, affected poultry farms across large areas of the country. During this period, most of the countries experiencing outbreaks in Central Asia, Europe, the Middle East and Africa were able to control or eliminate the disease although there have been recurrent outbreaks of disease in a number of countries including Hungary, the Russian Federation, Turkey, Nigeria and Ukraine. Egypt is facing substantial challenges in achieving effective control of HPAI.

Endemically infected countries deserve particular international assistance because they represent the highest risk of perpetuation of infection and disease.

LESSONS LEARNED FROM HPAI CONTROL TOOLS AND METHODS

Risk factors

Countries with well developed veterinary services and 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 that face major risk factors such as high human and poultry population densities with poor farm biosecurity, particularly related to large numbers of small scale commercial producers and substantial duck populations. Internal movement of poultry, particularly through poorly regulated live bird markets and illegal movement across international borders, is a major contributor to spread of the disease. The evidence of the role of wild waterfowl in the global spread of the disease is now compelling but in places where HPAI viruses exist, local trade in poultry plays a more important role in their spread.

Disease surveillance

It has become evident that many countries lack the expertise, manpower and other resources to develop and implement effective national HPAI surveillance plans, and to collect and analyse data. In addition, there has been limited success in some countries in engaging communities, so that those who own or deal with poultry and handle wildlife report cases of disease.

Despite important improvements, these weaknesses have compromised efforts to clearly understand all specific risk factors and disease epidemiology, poultry production and marketing systems, and to assess the effects of vaccination programmes and other control measures. 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, but the lack of compensation is not the only factor that limits disease reporting by poultry owners.

Laboratory capability and capacity

National veterinary diagnostic laboratory capacities in affected and at-risk countries are often poorly developed and resourced. However, in a number of countries they have been strengthened considerably as a result of international donor support and programmes implemented by OIE/FAO. The OIE/FAO reference laboratories have made a significant contribution to supporting national laboratories but additional support is needed, especially at the regional level. The OIE¹ Laboratory Twinning establishes a supportive and developmental link between OIE Reference Laboratories or Collaborating Centres with candidate

¹ A guide to OIE Certified Laboratory Twinning Projects, see http://www.oie.int/download/LABREF/A_Guide.pdf

national laboratories to help them to improve their diagnostic capacity and expertise, and to provide support to other countries in their region. The ultimate aim is for the candidate laboratory to reach OIE Reference Laboratory status.

Although sharing of virus samples and sequence information has occurred globally, this needs to be improved further. There are also opportunities to promote stronger collaboration and to create synergies between national public health and veterinary laboratories. OFFLU, the OIE/FAO network of expertise on avian influenza, is developing systems to assist in monitoring viruses for antigenic changes, which is an integral part of surveillance systems in places where vaccination is being used as a control or preventive measure, and to improve sharing of viruses and gene sequences. OFFLU is also addressing relevant technical issues through specific activities undertaken by its network of experts. These activities aim to address specific scientific problems, provide technical advice, improve harmonization of laboratory procedures and strengthen links within OFFLU and with the WHO.

Containment of outbreaks

While stamping out has proved effective for containing isolated outbreaks, efforts are compromised by weaknesses in the areas of early detection, implementation of biosecurity measures, movement control, disease investigations and surveillance around outbreaks. In some countries there is still 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. The trigger points and decision-making criteria for a shift from a traditional disease control approach, based largely on stamping out, to one that involves modified stamping out and other supportive and complementary measures such as vaccination have yet to be incorporated into most emergency management plans. In countries where the disease has been present for a long period and where the greatest combination of risk factors is present, experience indicates that stamping out of infected flocks provides short-term improvements in HPAI status but does not guarantee long-term freedom. To achieve success, adjustments to existing production and management practices will be required.

Enhancing biosecurity

Biosecurity means implementation of practices that create barriers to reduce the risk of the introduction and spread of disease agents. To prevent incursions of H5N1 HPAI virus, biosecurity measures need to be strengthened along the entire production and marketing chain using methods that are easily understood and economically feasible so that they can be implemented readily.

People are key to correct implementation of biosecurity measures and this means that the measures formulated must be hard to avoid, easy to comply with, practical to implement, and sustainable for all, including producers, traders, intermediaries and service providers.

Designing feasible biosecurity programmes requires working with all stakeholders to ensure that those who have to implement the measures accept and see the need to do so and the benefits in doing so.

Technical support is being provided to countries and regions on appropriate measures to implement to reduce the risk of introduction of virus (bioexclusion) and prevention of subsequent spread (biocontainment). Specific measures are being designed that are appropriate for different production systems.

Vaccination

Vaccination is capable of reducing HPAI incidence and virus load in the environment, thus minimizing the risk of further spread and human exposure to infection. Planning of vaccination campaigns must anticipate the reinstallation of traditional control measures to eliminate infection once the factors leading to virus persistence have been identified and addressed, and vaccination has reduced the number of cases to a level that will allow other measures to succeed. Vaccination has proved very effective in places at high risk of infection, but it must be conducted in accordance with OIE international standards and OIE/FAO guidelines (see 8, 9 in Selected References), involve vaccines of assured quality and, be accompanied by appropriate monitoring of the immune response and infection status of vaccinated flocks. Government-funded mass vaccination campaigns currently being used in China, the Russian federation and Vietnam are either risk-based or moving towards a risk-based, targeted approach. This approach should be adopted in all places using vaccination. Since long-term vaccination programmes have been shown to be unsustainable due to high costs and decreasing risks of infection, each vaccination campaign should have an exit strategy.

Significant antigenic variants of H5N1 HPAI virus have been detected in Indonesia and China although the reason for their emergence remains unknown. Studies on the efficacy of vaccination of free-range ducks are continuing.

Socio-economics dimensions and adjustments to poultry production and marketing practices

Eliminating existing foci of HPAI in poultry does not necessarily achieve sustainable long-term control and prevention of the disease. In countries that have experienced prolonged or repeated waves of infection and those at risk, adjustments to poultry production and marketing methods must be considered. These adjustments and all prevention and control programmes should be underpinned by socio-economic analysis examining the consequences of the measures proposed.

Appropriate adjustments are needed to high-risk marketing practices such as uncontrolled movement of poultry through live bird markets. At present, most veterinary and animal husbandry services are not well trained in identifying and mitigating high-risk production and marketing practices or conducting studies of market chains that allow identification of critical points where targeted control and preventive measures will deliver the greatest benefits.

Communication

Communication serves as a facilitating mechanism through which the global strategy for the prevention and control of HPAI can be successfully understood and implemented. There

has been limited success in achieving the behavioural changes required to control and prevent HPAI. In some cases, the message has been absorbed but has not resulted in the expected changes in behaviour. It has become evident that the reaction of communities to HPAI can have an adverse effect 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. Messages need to be tailored specifically for different players in the poultry production and market chains, and the measures promoted must be technically feasible and practical, otherwise they will not be adopted.

MOVING TO A REVISED STRATEGY

Additional experience and lessons learned at the global, regional and national levels in controlling H5N1 HPAI in the past 2 years have provided a greater understanding of the issues that need to be addressed and the means of achieving progress. The New Delhi inter-governmental meeting in December 2007 identified the need for all countries to develop a road map for control and for a shift in the approach on avian influenza that will result in this disease being seen as part of a larger 'one world-one health' initiative. This will lead to a greater focus on control and prevention of emerging infectious diseases. The measures proposed in the global strategy, although aimed at control and prevention of avian influenza, will also assist in managing other zoonotic diseases. This revised strategy identifies international initiatives at global and regional levels, and approaches that are appropriate for national implementation, 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, protection of an important element of the livelihoods of poor farming communities and conservation of biodiversity.

THE PRIORITIES

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

- In the countries with endemic/entrenched² infection, particular attention must be given to identifying and modifying/mitigating the factors that allow infection to persist, as well as implementing appropriate measures to prevent or reduce infection and containing any outbreaks that occur.

² The word 'entrenched' is used to describe those countries in which H5N1 influenza viruses have persisted for at least 12 months since they were first introduced and have proved difficult to eliminate. Some have suggested these should be referred to as 'endemically infected countries', but the term endemic generally implies a relatively constant level of infection, which is not the case in all places with entrenched infection. The prevalence and distribution of infection (or reporting of infection) varies considerably over time in these countries. In June 2008, countries regarded as having entrenched infection included China, Egypt, Indonesia, Pakistan and Viet Nam and possibly Bangladesh. Among these countries, infection is better contained as a result of control and preventive measures in some than it is in others.

- In countries with recent infection, intensive efforts to eradicate the disease must be implemented but an early decision needs to be taken on the use of classical control measures such as stamping out and increased biosecurity combined with implementation of vaccination and the likely success of these processes. If the disease is already widespread, consideration must be given to a shift in emphasis towards containment before moving towards eradication.
- In countries at risk of incursion, HPAI preparedness and the capacity for early detection and response must be improved. The factors likely to allow persistence and spread of infection, if it were to occur, should be identified and, wherever possible, modified.

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 regional organizations, countries, donors 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 in this domain is to provide global leadership in generating and providing sound technical and policy advice in coordinating and harmonizing 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 programmes and activities of FAO and OIE are developed under the umbrella of a joint initiative – the Global Framework for the progressive control of Transboundary Animal Diseases (GF-TADs³). The approach includes the development within FAO of the Emergency Centre for Transboundary Animal Diseases (ECTAD), the Special Fund for Emergency and Rehabilitation Activities (SFERA), and strengthening of the Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES); the establishment within OIE of the World Animal Health and Welfare Fund which is mainly directed towards improving governance and efficacy of veterinary services worldwide, the laboratory twinning programmes and a global AI Vaccine Bank, and the use of the OIE tool for the evaluation of “Performance of Veterinary Services” (OIE-PVS tool); the mobilization of resources for the FAO/OIE Crisis Management Centre – Animal Health (CMC-AH) for early response to

³ The Global Framework for the progressive control of Transboundary Animal Diseases (GF-TADs). For more information, see <http://www.fao.org/docs/eims/upload/189430/GF-TADs%20signed%20version%2024%20May%202004.pdf>

significant disease events; and the establishment of the FAO/OIE/WHO Global Early Warning System (GLEWS) for rumour tracking and verification, epidemiological data analysis, prediction and warning.

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. An emergency fund to be mobilized for immediate actions when an outbreak occurs in a newly infected country should be established. It also requires engagement of transnational poultry companies. It aims to support the development of international trade through reviewing of international legislation for import controls and movement of poultry and poultry products, ornamental birds and fighting cocks.

The regional domain

The goal in this domain 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 approach focuses on the development of formal long-term and sustainable cooperation and collaboration, taking into account regional specificities, for the development of scientifically sound policies and regulatory frameworks related to regional trade in livestock and livestock products, harmonization of HPAI control and prevention strategies, HPAI surveillance and reporting, and HPAI preparedness planning. Regional organizations and the Regional offices and Commissions of the FAO and OIE are seen as the focal points for such initiatives, supported by OIE and FAO Regional Animal Health Centres, instituted within the GF-TADs initiative and the 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 associated networks of economists, social scientists, poultry production specialists and communication specialists. Regional laboratories will be identified and supported to provide reference services, reagents and training to national personnel.

The national domain

The goal in this domain is to assist countries in their efforts to control, prevent and eradicate H5N1 HPAI ensuring that the methods used are sensitive to livelihoods.

The approach focuses on assisting countries to:

- identify and progressively address the factors that allow infection to persist in countries with entrenched/endemic infection, and to consolidate the gains made so far in controlling and preventing disease in these countries
- contain and eliminate infection in recently infected countries where the virus is not entrenched
- implement measures to reduce the risk of infection occurring in poultry in countries currently free from infection and to ensure countries have or develop the capacity to rapidly identify virus incursions
- identify and target interventions to high risk countries and areas within countries that are at risk of infection

These results will not be achieved in a sustainable way without adjustment and appropriate changes in husbandry and marketing practices to reduce the risk of infection, strategic research initiatives; support for public communication; and provision of technical assistance, as required. These adjustments may be implemented progressively or rapidly depending on the local situation and farming systems and should be preceded by socio-economic assessment of their likely effects.

Key among the technical measures is overall strengthening of national veterinary services, based on OIE assistance in assessing veterinary services by established procedures (OIE-PVS evaluations, OIE and FAO Gap Analysis based on PVS outputs, PVS follow-up evaluations), therefore strengthening capacity for disease surveillance and epidemiological analysis, increase operational collaboration with neighbouring countries 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 viruses.

There are still some significant gaps in our understanding of H5N1 HPAI viruses and technologies and tools to control it, especially in developing countries. Thus the strategy promotes strategic research initiatives, including epidemiological studies of HPAI in different farming systems (with 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. Research initiatives should be designed in collaboration with national authorities so that it provides direct support to national control, prevention and eradication programmes. Control and preventive programmes depend on cooperation and support from private sector players in the poultry sector. In many countries, the links between government and the poultry industry are weak and must be strengthened.

IMPLEMENTING THE STRATEGY

The strategy is designed as a guide from, and to, FAO and OIE to develop programmes of support for HPAI prevention and control. It is also advocated to other global and regional organizations, donor agencies and national authorities as a means of achieving uniformity of approaches. FAO and OIE programs are described in Annex 2.

The strategy will be implemented progressively over the next ten years, as funds become available. It will be coordinated jointly by FAO and OIE and harmonized with the WHO Strategic Action Plan for Pandemic Influenza (see 5 in Selected References) and will tie in with the One World – One Health strategy, published in October 2008 by FAO. OIE, WHO, UNICEF, WB and UNSIC, aimed at preventing or minimising the impact of emerging infectious diseases. Expected outputs and outcomes following the implementation of this strategy have been defined covering the short, medium and long term.

Background and rationale

since H5N1 highly pathogenic avian influenza (HPAI) was first reported in Asia there have been some very substantial developments. Some countries have eliminated infection. Others with extensive dissemination of infection, including PR China and Vietnam, have reduced the number of new cases of disease. Still other countries, including Indonesia and Egypt, face continuing challenges in implementing control.

While the focus of international attention is on the occurrence of human infection and deaths and the potential for development of a human influenza pandemic, the disease in poultry (and measures taken to control it) has had a significant impact on poultry producers and related 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 at the poultry source, measures are needed to minimize the risk of recurrence of HPAI by addressing the risk factors in poultry production and marketing that allow persistence of virus and the risk of emergence of a human pandemic influenza virus of avian origin.

Development of this strategy takes into account, analyses of activities already undertaken by FAO, OIE, Regional Organizations national governments, donor agencies and others since 2004.

There are weaknesses in disease surveillance and response capabilities, so efforts to strengthen veterinary services and the involvement of poultry owners in surveillance systems 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 also a critical component for support of HPAI prevention and control strategies and must be supported by international efforts.

Because disease eradication will not be achieved in the short term, this strategy will be implemented over a 10-year period.

GLOBAL PROGRESS AND CHALLENGES IN HPAI CONTROL AND PREVENTION

Much has been achieved and learned in efforts to control Asian-lineage H5N1 HPAI viruses since they first emerged in 1996. This section provides background information on these achievements and existing challenges, setting the scene for the development of the FAO/OIE global strategy.

The current panzootic of H5N1 HPAI is unique because it is the first multi-country outbreak of this disease in the last 50 years. By May 2008, over 60 countries and territories had experienced outbreaks of disease associated with these viruses in poultry and/or wild birds.

Details of the countries affected and information on recent outbreaks are available on the OIE and FAO websites⁴.

Unlike earlier HPAI outbreaks, by the time this disease was recognized or reported in many countries, it was already widespread. As a result, in these countries, the use of traditional measures to control the disease reduced but did not eliminate infection.

Nevertheless, good progress has still been made in control. This demonstrates that the available tools and methods work when necessary resources (including a functioning veterinary infrastructure) are provided to allow them to be applied appropriately.

The following factors leading to continued poor control of the disease in some countries have been identified:

- lack of suitable human resources to detect and control disease – particularly the lack of effective animal health services;
- lack of political commitment to apply appropriate measures and of a centralized chain of command;
- insufficient engagement of private entities in improving animal health and
- insufficient collaboration between the public health and animal health sector; and
- pre-existing structure of the commercial poultry sector and poultry production and marketing practices, especially in places where the biosecurity measures used are not consonant with the threat of infection.

As a result of these factors, control and preventive measures have not always been implemented properly. These measures (including vaccination, movement control, enhanced biosecurity or stamping out), if applied improperly, will not deliver the expected benefits, resulting in perpetuation of infection in some countries.

There is still firm global support for the goal of containing, and ideally eradicating, Asian-lineage H5N1 HPAI viruses. Emergency responses should still be used to contain outbreaks of HPAI in recently affected countries but it is now clear that global eradication will require a medium- to long-term approach through which infection in countries or sub-regions with endemic/entrenched infection will be contained progressively.

Table 2 in Annex 1 highlights recent achievements, progress and related challenges for control and prevention of H5N1 HPAI. Further information on the lessons learned so far in control and prevention of this disease is also provided in Annex 1.

⁴ See www.oie.int and www.fao.org

The Global 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, protection of an important element of the livelihoods of poor farming communities, and conservation of biodiversity.

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 infection with HPAI viruses in order to reduce the exposure of humans to H5N1 infection and also limit the threat of virus dissemination to other countries.
- In recently infected countries, intensive efforts to eliminate infection must be supported; and if vaccination is practised as an eradication measure, an exit strategy e.g. towards intensified surveillance should be elaborated;
- 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 as well as Regional organizations and countries 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;
- help coordinate and harmonise national, regional and global plans;
- strive to improve programming and implementation of disease prevention and control; and
- provide transparent information, global epidemiological analysis and warning messages.

Regionally, they will:

- enhance cooperation and collaboration among regions;
- seek greater engagement and commitment from appropriate regional organizations; and
- 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 contain and, where possible, eliminate HPAI;
- promote livelihoods-sensitive approaches in each country; and
- identify ways of preventing virus spread through identification and adjustment of practices that allow virus to persist, and through enhanced surveillance, early detection, reporting and response.

3.1 The global domain

The goal is to provide global leadership in generating and providing transparent information and warning messages, 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 disease⁶, make it necessary to engage countries internationally and develop agreed control and preventive strategies that are then developed into locally adapted and implementable plans. FAO and OIE under the umbrella of their joint initiative Global Framework for the progressive control of Transboundary Animal Diseases (GF-TADs) in association with WHO with regard to zoonotic diseases are taking a lead in providing international technical support to contribute to the coordination of global control of HPAI. FAO and OIE will continue to provide leadership in HPAI prevention and control in poultry through a series of specific mechanisms and programmes: FAO Emergency Centre for Transboundary Animal Diseases (ECTAD), Special Fund for Emergency and Rehabilitation Activities (SFERA) and Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES), the OIE World Animal Health and Welfare Fund which is mainly directed towards improving governance and efficacy of the veterinary services worldwide, OIE laboratory twinning programme (i.e., support to national laboratories to become international OIE Reference Laboratories; see also section 3.3.3), global AI Vaccine Bank, and evaluation of performance of veterinary services (OIE – PVS). Both organizations will also 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)⁷. FAO and OIE will assist countries in mobilizing emergency responses to outbreaks occurring in newly infected countries through the FAO/OIE Crisis Management Centre-Animal Health (CMC-AH) and advocating for the establishment of an emergency fund. At the global level, the strategy is also concerned with improvement of dissemination of information, epidemiology analysis and early warning through the FAO/OIE/WHO Global Early Warning System (GLEWS), as well as, coordinating the development of new methodologies and technologies, based on analysis of global disease information and enhancing regulations relating to international trade in, and movements of, birds and poultry products. The global strategy for HPAI will tie in with the development of a broader “One World – One Health” (OWOH) strategy. The “One World One Health” strategy aims to build global capacity, as an international public good, in prevention, early detection and rapid response to emerging infectious diseases (EID) and to control them at source to prevent their spread and entrenchment, and decrease zoonotic disease risks.

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.

⁶ See Annex 1 for details.

⁷ <http://www.offlu.net>.

3. Generate strong political support for H5N1 HPAI control at the national, regional and global level through advocacy and regular communication.
4. Support regional networks of laboratories and epidemiology and socio-economic teams.
5. 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.
6. Promote the establishment of an emergency global fund and develop the activities of the CMC-AH.
7. Promote a regional approach to controlling H5N1 HPAI consistent with the principles and guidelines agreed upon in the GF-TADs.
8. Gather information obtained at regional and national levels on the cost and benefits of diseases and prevention-control programmes, evaluation of their impacts on small-holders livelihoods, on rural development and on biodiversity and mitigation strategies in order to develop socially and economically sound strategies to prevent and control HPAI and other major transboundary diseases and zoonoses.
9. 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 adapted to the different contexts and available to decision-makers for combating HPAI and rehabilitating poultry industries.
10. Improve the implementation of standards and regulations for international trade and movements of birds and poultry products. This involves strengthening veterinary services including appropriate legislation and improved governance to ensure safe trade and movements according to OIE standards.
11. Support communication and behaviour change directed towards reducing the spread of HPAI and minimizing the risk of human infection with the H5N1 virus.

Main activities

FAO/OIE will:

- Develop and coordinate centralized management response to the HPAI panzootic through the CMC-AH and the Emergency Centre for Transboundary Animal Diseases (ECTAD), to provide emergency technical and operational support to countries affected by HPAI and other animal health emergencies.
- Enhance collaboration among major implementing partners, including FAO, OIE, WHO, UNDP and UNICEF, and, working with UNSIC, 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 (disease intelligence) of the FAO/OIE/WHO Global Early Warning System (GLEWS)⁸ and EMPRES through the integration of databases of agricultural factors that affect disease occurrence and virus ecology, and

⁸ For a description of GLEWS

See http://www.fao.org/docs/eims/upload//217837/agre_glews_en.pdf

official reporting of HPAI through the OIE World Animal Health Information System (WAHIS) and other sources of livestock disease information.

- Apply the *OIE Evaluation of Performance of Veterinary Services* (OIE-PVS) tool under the auspices of the OIE to evaluate capabilities and the veterinary services of countries against OIE quality standards. PVS will be used by OIE and FAO to identify needs and priorities to 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, to address specific technical issues, to strengthen links within the animal health network and with the public health network, and to identify, plan and implement identified research initiatives. This includes actively encouraging deposition of viral genetic sequences and other epidemiological information into publicly available databases so that such information can easily be shared within the OFFLU network, with WHO and with the wider scientific community. OFFLU aims to support 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 in particular through GLEWS activities.
- 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.
- Support the development of international trade through reviewing and updating of legislation for import controls and movement of poultry and poultry products, ornamental birds and fighting cocks, strengthening capacity for implementing control measures and reviewing methods of illegal importation of products with a view to strengthening border controls, including collaboration with neighbouring countries. Birds kept for reasons other than production such as fighting cocks and hunting birds represent a significant risk of HPAI transmission because they are moved over considerable distances and come into contact with other birds also fall within the scope of the strategy. Movement of all birds across international borders should be controlled.
- Strengthen training of technical staff globally for international assignments in relevant disciplines.
- Support and coordinate the regional and sub-regional animal health centres (RAHCs) and the regional networks of national laboratories and epidemiology and socio-economic teams.
- Provide global leadership in the area of wild bird surveillance and tracking to improve understanding of the role of wild birds in the epidemiology of H5N1 HPAI and other diseases.
- 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.

- 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.
- Assess the impacts on poultry genetic resources of the disease, its control and poultry industry adjustment and rehabilitation measures.
- 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.
- Develop and disseminate appropriate, sound vaccination policies and strategies.

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 scientifically, technically, economically and socially sound control technologies and strategies, 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 in Asia, FAO has located a decentralized ECTAD unit in Bangkok and a supporting unit in Kathmandu to coordinate activities in South Asia. OIE and FAO are jointly strengthening their Regional Animal Health Centres (RAHCs), 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. RAHCs have been established in Bamako (West and Central Africa), Gaborone (Southern Africa), Nairobi (East Africa), Tunis (North Africa) and Beirut (Middle East). There are plans to establish new centres in other locations. The strengthening of sub regional epidemiology, laboratory and socio-economic networks is also part of the strategy at the regional level.

The Regional offices and Commissions of the OIE and FAO, 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, including across national borders.
3. Develop regional technical and scientific information systems and support regional networks to ensure that national plans can be implemented in a sustainable, technically-sound and socially-equitable manner.
4. Support sub regional and regional networks of national laboratories and epidemiology and socio economic teams to develop interactions between these structures and improve quality and transparency of the work.
5. Promote coordination and collaboration among international and regional organizations and donor agencies to maximize support to countries and to facilitate synergy and efficiency of donor inputs.

Main activities

FAO/OIE will:

Under the umbrella of the GF-TADs initiative and under the guidance of their Regional Steering Committees:

- Strengthen support to regional networks that support the HPAI prevention and control programmes of each country. Sub-regional networks on epidemiology, laboratory diagnosis and surveillance have been established in several regions of the world such as Asia and Africa and they will be further developed in other regions. Regional organizations will be associated to managing such networks for long-term sustainability. Networks will be further strengthened to liaise and collaborate with public health counterparts wherever appropriate. This support will come from FAO and OIE and their specialized tools such as OFFLU and other FAO/OIE Reference Centres. The regional networks promote open and transparent dialogue on improving and sharing experiences, strengths and weaknesses, develop capacity building and training activities, harmonize methods and tools, develop control schemes (proficiency testing in laboratories for example) and in so doing improve quality and transparency of information and contribute to the design of prevention and control strategies.
- Within the regional networks 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.
- Enhance regional training in aquatic bird monitoring programmes and wild bird disease surveillance programmes.
- 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.

- Develop robust, regionally appropriate, country-specific and sector-specific technical options for prevention, detection and control of HPAI.
- Strengthen and expand decentralized ECTAD regional units and OIE/FAO Regional Animal Health Centres to improve communication and collaboration with regional organizations, national governments and donors and ensure appropriate operational support for implementing progressive H5N1 HPAI control programmes.
- Sub-regional networks on socio-economic aspects in the field of animal health have been recently established in Africa and will be further developed. The specialist economists, social scientists and poultry production specialists, linked to animal health specialists will share methodologies and results from national experiences and will contribute to regional assessments of market chains, trade risks and poultry production systems, including biodiversity dimensions 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 work closely with national agricultural and veterinary authorities, and through them with the poultry industry, to ensure that appropriate measures are implemented to prevent infection in those countries that are free from infection, to eliminate infection from recently infected countries and to progressively control infection in those countries in which infection is endemic or is becoming entrenched.

Strategic objectives

1. Identify and progressively address the factors that allow infection to persist in countries with entrenched/endemic infection and consolidate the gains made so far in controlling and preventing disease in these countries.
2. Contain and eliminate infection from recently infected countries.
3. Implement measures to reduce the risk of infection occurring in poultry in countries currently free from infection and to ensure countries have or develop the capacity to rapidly identify virus incursions.
4. Identify and target interventions to high-risk countries and areas within countries that are at risk of infection.

Main activities

FAO/OIE will

- Continue to secure ongoing high level political support for HPAI control and prevention in poultry, especially in countries with conflicting priorities for health resources. This will be achieved through international and regional meetings and by assisting in the development of national plans by national governments.
- Provide accurate, unbiased, scientifically-sound, practical advice and information on HPAI to the public, the scientific community and veterinary authorities. This will be achieved by recruiting and retaining the best possible staff and contractors (including NGOs as appropriate), by ensuring that all are aware of current FAO/OIE guidelines,

policies and strategies, and understand the social and economic aspects of the disease, and by maintaining high standards of publications and web-based material through rigorous peer review.

- Provide resources and support to countries that need short-term emergency assistance to control HPAI and other transboundary animal diseases (TADs) and assist in assessing the likelihood of early eradication. This will be provided in particular through the FAO-OIE CMC-AH.
- Accelerate the development and strengthening of veterinary services in developing countries after identification of deficiencies through OIE-PVS evaluations and after gap analysis (identification of needs and priorities), through provision of international funding that ensures sustainable improvements in capacity and capability of veterinary staff.
- Ensure that national staff is trained in applied epidemiology, surveillance strategies, laboratory techniques/quality management socio-economics and assessment of risks in poultry production and marketing.
- Promote research in the field of epidemiology, evolution of the circulating strain, farming systems and market chain, socio-economic and biodiversity impacts of H5N1 HPAI incursion and control.
- Ensure all infected and at-risk countries are aware of the need for and importance of developing and regularly reviewing locally developed strategies and work plans for HPAI control and prevention. This will be achieved through international meetings and negotiations with individual countries or regional bodies.
- Assist all infected and high-risk countries to develop and implement appropriate strategies and plans for medium to long-term control and prevention of HPAI, with an emphasis on minimizing the impact on smallholders of the disease and control measures. This will be achieved through country offices, consulting services provided to countries and technical projects developed with countries to develop plans in those countries where they do not exist and to review/amend existing country plans.
- Support the design and implementation of appropriate vaccination campaigns, either risk-based blanket vaccination or more targeted campaigns according to the epidemiological situations, especially where other control measures cannot control the spread of disease when used alone.
- Support the improvement of biosecurity in farms in various production systems and along market chains, especially in live bird markets.
- Work to ensure that the medium to longer-term control measures implemented by national authorities do not do more harm than the disease itself, especially to vulnerable poultry owners and to biodiversity (through loss of valuable genetic material as a result of rigid adherence to traditional control measures), or due to other unexpected adverse consequences of control measures (e.g. increases in smuggling or unregulated trade due to restrictions placed on sale of live poultry). This will be achieved by working with relevant ministries to ensure that the pitfalls of inappropriate measures are clearly spelt out, alternative strategies are explored and that the costs and benefits (including non-financial benefits such as protection of public health and adverse effects of measures on farmer cooperation) are assessed before implementation.

- Continue to develop and implement appropriate communication strategies that minimize market shocks and maximize appropriate behavioral changes aimed at protecting poultry and public health.
- Assist countries to implement appropriate control and preventive measures (described below in Section 3.3.1) including collaboration with the other public services involved (e.g. customs, police).

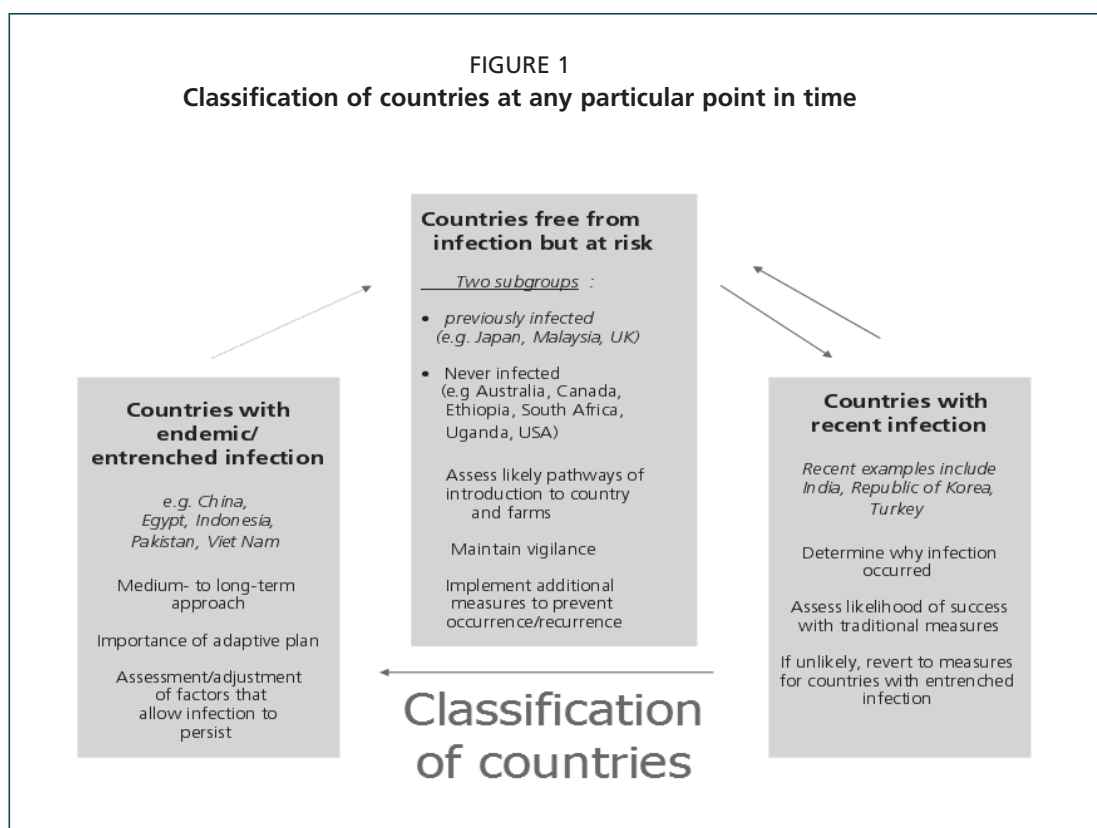
3.3.1 Control and prevention of HPAI at national level

Classification of countries

Countries (and sub-regions) fall into three main categories with respect to H5N1 HPAI status in poultry at any particular point in time:

- those in which the virus has never been eliminated after the initial incursion(s) into poultry flocks (i.e. countries with endemic/entrenched infection),
- those that are recently infected and in the process of trying to eliminate infection, and
- those that are currently free from infection.

Figure 1 illustrates the three country classifications, which describes their status at any particular point in time. This diagram shows that countries can move from one classification to another (e.g. countries with recent infection that eliminate infection return to being countries free from infection; those that do not eliminate infection may move to countries with entrenched/endemic infection).



i) Countries with endemic/entrenched infection

A number of countries infected with Asian-lineage H5N1 HPAI viruses have remained infected for one year or more after the first incursion into domestic poultry (e.g., China, Egypt, Indonesia, Pakistan Viet Nam, and possibly Bangladesh), with some remaining infected for five years or longer. These countries have all implemented measures to reduce the level of infection but they pose a continuing threat to other countries and to other parts of their own country unless progress towards elimination continues.

Elimination of infection from these countries will require many years of consistent engagement and support. A medium- to long-term approach (rather than just an emergency response), is needed to contain HPAI in these countries and sub-regions.

This requires:

- the continued building of capacities in key institutions, including better functioning veterinary services with the necessary powers to implement essential control measures and regulations in collaboration with the other public services involved (e.g. customs, police);
- sustainable adjustments to the poultry sector to reduce the risks of disease and infection in settings where commercial poultry production and marketing practices carry high risks of HPAI;
- effective engagement of private-sector stakeholders (including industrial poultry producers) in these risk reduction efforts;
- sustained political commitment from the highest level of government, reflected in provision of an appropriate resource allocation and enforceable regulations and support to a strong central chain of command;
- the application of appropriate, interim control measures, including stamping out, control of movements, vaccination and biosecurity to contain infection.
- implementation of vaccination in accordance with OIE international standards and FAO/OIE guidelines, accompanied by monitoring of immune response and possible virus circulation. Vaccination programmes can be risk based mass vaccination or more targeted according to the epidemiological situation and each vaccination campaign should have clear objectives and a precise strategy including an exit strategy.

All of these countries must have a sound long-term technical strategy and work plan that is appropriate for local conditions and adaptively managed, addressing how H5N1 HPAI viruses will be progressively contained and high-risk practices modified.

In devising this plan:

- The control and preventive methods applied must be science-based, technically feasible, grounded in an assessment of local situations, and designed to minimize gender, social, environmental and economic impacts.
- All points in the production and marketing chain should be examined to assess areas of high risk and to determine why the infection has remained entrenched/endemic.
- Planning and implementation should closely involve all key stakeholders in the poultry sector.
- Special attention must be paid to alleviating the impact of control measures on vulnerable human populations, which is possible if proper planning and analysis of proposed measures is done through adoption of a long-term approach to disease

control (allowing time for adverse effects of measures to be assessed and mitigated before they are implemented).

ii) Recently infected countries

Recently infected countries will have activated their national contingency plans to eliminate the virus. At the same time they should be assessing the likelihood of early success of this process by determining the extent of infection and the capacity to implement (and the adverse effects of) traditional stamping out as the sole means of control. If one or a small number of outbreaks of HPAI occur, the recommended response is to eliminate the foci of infection by stamping out. If the assessment suggests that infection is already widespread and unlikely to be eliminated rapidly (especially if veterinary capacity is such that surveillance systems cannot detect all infected places or to implement all of the measures required for successful disease elimination) then these countries should adjust their approach to control in line with those for places with entrenched/endemic infection. This implies a prolonged elimination process but it may be more cost-effective and less damaging to livelihoods.

Once control efforts result in freedom from HPAI in defined areas or production sectors, compartmentalization as defined in OIE's Terrestrial Animal Health Code (10) may become appropriate. Zoning may also be used if the risk posed by infected wild birds can be overcome.

After H5N1 viruses have been eliminated, carefully structured risk-based surveillance will be essential to demonstrate the infection-free status of the country.

iii) Uninfected countries at risk of infection

Uninfected countries will examine the likely pathways for introduction of H5N1 viruses and ensure that targeted surveillance is conducted to detect infection at an early stage in wild birds (focusing on dead wild birds), imported birds or poultry products, and in domestic poultry populations which are at higher risk. They should look at pre-emptive measures to prevent infection from becoming established, especially in countries that have had (and eliminated) repeated incursions of virus. This is achieved by determining and rectifying the factors that resulted in these incursions, including the biosecurity measures that did not prevent infection of poultry.

All countries that are free from H5N1 HPAI should have contingency plans developed for rapid response to an H5N1 virus incursion. 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.

3.3.2 Features of control and preventive measures based on country classification

The main activities needed at national level are outlined in Table 1, which summarizes some of the key technical and supportive measures that should be considered. The strategy does not propose detailed, country-specific control measures or disease control tools because they have already been described in the previous documents issued by FAO and OIE (see, for example, 1,2,6,8,9) and also because these will vary even within a country and must

be tailored to match each country's unique set of circumstances, risk factors and political conditions and infrastructure. However general recommendations for countries in each category are provided, including implementation of measures such as strengthening of veterinary services and adjustments to poultry production and marketing systems described below (see Section 3.3.3).

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

Country status	Action	Specific measures	Support measures
Infection free	Prevention of virus incursion	<ul style="list-style-type: none"> • risk assessment of potential pathways of introduction 	<ul style="list-style-type: none"> • Veterinary and community awareness and communication
	Emergency preparedness	<ul style="list-style-type: none"> • 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"> • Poultry census and farming systems defined and mapped; high-risk practices identified • 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
Recently infected	Confirmation of freedom after elimination	<ul style="list-style-type: none"> • risk-based, structured surveillance meeting OIE guidelines to demonstrate freedom from H5N1 circulation in poultry 	<ul style="list-style-type: none"> • Epidemiological investigation to define progress of the disease and effectiveness of control measures • Virological surveillance to track evolution of the virus
	Activation of contingency plans Rapid response actions in an attempt to contain and eliminate infectious foci before spread occurs Aim to return to infect-free status if feasible	<i>As above, plus:</i> <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 • early review of possibility of inclusion of 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 	<ul style="list-style-type: none"> • 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

Endemic/entrenched infection

Endemic disease control

- Similar actions to those above, plus:
- modified stamping out
- development and implementation of adaptively managed long-term management plans with milestones
- strategic vaccination
- livelihoods-sensitive practical adjustments to poultry production and marketing to reduce disease risk

During the 10-year period covered by this strategy, the gains made so far by individual countries in controlling and preventing H5N1 HPAI will be consolidated by focusing on three main pillars of disease control and prevention. These are:

- i) improved early detection of infection;
- ii) improved pre-emptive/preventive measures (to protect the poultry sub-sector from viral incursions); and,
- iii) enhanced action when disease or infection is detected.

Weaknesses in any one of these will likely result in endemic or poorly controlled infection. The relative emphasis placed on each of these three pillars of disease control and prevention will vary depending on the classification of the country. For example, in countries with endemic/entrenched infection, emphasis will be placed on determining why infection and disease persist or recur and then implementing appropriate measures to mitigate or eliminate these factors (i.e. the second pillar).

Each of the pillars relies on the presence of a strong and capable veterinary service, which in many countries is not in place. Strengthening of veterinary services based on proposals built around OIE PVS assessments will be required in all countries where deficiencies in veterinary services are noted (see below). In all places, this requires strong links between producers and veterinary and agricultural authorities – covering all types of production from large integrated farms to communities with village level production.

Improved early detection of infection

All countries will be expected to examine and develop ways of improving the quality and timeliness of reports of infection and disease. This will require enhancing the quality and reach of veterinary services (both field and laboratory) for detection of infection and disease. As a result of improved reporting, all countries will obtain better information on the spatial and temporal distribution of Asian-lineage H5N1 HPAI viruses that will be used to eliminate hot spots and to target interventions.

In countries with large dispersed poultry populations (i.e. many smallholder and village flocks), authorities will work with local communities and poultry owners to improve the likelihood of reporting or detecting infection and disease using methods appropriate to the country and the communities. Greater involvement by communities in disease surveillance/detection will be encouraged by finding ways to overcome the fear of the consequences

of reporting disease. This will require consideration of options beyond compensation for destroyed poultry, which is not always a strong motivator for reporting.

This will also require greater engagement with larger-scale poultry producers and development of systems for improving the likelihood of disease reporting from these enterprises.

Improved identification of infection also requires targeted surveillance systems in high-risk activities such as live poultry markets, free ranging domestic waterfowl production and other production systems in which poultry populations can come into contact with wild birds, as well as surveillance in wild birds. Countries will be expected to implement appropriate systems to monitor these and other potential reservoirs or sources of infection and to use this information to determine where adjustments to production and management practices should be considered.

The surveillance data will also be used to assess improvements resulting from alterations to production and marketing practices, such as vaccination, enhanced hygiene and tighter controls on sources of poultry for markets. Countries will be encouraged to map and share all surveillance data (both positive and negative) on a regular basis. Improved outbreak investigations will be undertaken and the results of these investigations will also be shared internationally.

In endemically infected countries, large, well-managed industrial farms (including vaccinated farms and compartments) will demonstrate ongoing freedom from infection through regular, appropriate active surveillance systems, as a first step in moving towards freedom from infection. This activity will require appropriate field and laboratory support, public/private partnerships (especially between government and industry veterinarians), identification by private sector partners of the benefits of doing this work (such as enhanced market access), and/or, if required, new regulations to ensure that this work is actually carried out.

If there are suspicions that other mammalian hosts are playing a role as reservoirs of infection these possibilities will be fully assessed. Targeted wild bird surveillance will be conducted, focusing particularly on dead birds and geographical risk.

Enhanced pre-emptive measures

As part of the national management plan, all countries, and in particular those that are endemically infected, will be expected to review their poultry production (covering all production systems) and market chains (including illegal imports), establish where key hazards of infection occur or are likely to arise, and then plan and implement sustainable medium- to longer-term measures to reduce or otherwise mitigate these hazards (See Enhanced farm biosecurity and adjustments to poultry production and marketing in Section 3.3.3). This could include measures such as development and enforcement of appropriate biosecurity standards in particular for commercial poultry production, enhanced border controls and law enforcement, vaccination (if appropriate), and improved hygiene for markets (including controls on the sources of poultry).

Governments will be required to pay special attention to smallholder poultry producers in order to establish systems that allow these producers to continue rearing and selling poultry in a manner that does not endanger the health of those rearing poultry, the health

of poultry and the health of others, or lead to spread of infection. In places where this proves impossible, smallholders should be provided with short-term support to mitigate the losses and nutritional stress (where it occurs) associated with control programmes and to support them in moves to other activities that can provide alternative sources of income and food security.

All pre-sale testing, inspection and certification (where used) will be based on sound science that provides information on the infection status of the certified flock at the time of sale to market.

Special attention will be paid to live poultry markets and other places where poultry from different sources aggregate. Current high-risk production systems such as grazing of ducks on paddy fields will be reviewed to determine and implement the most appropriate methods to prevent or reduce levels of infection in these birds, taking into account the environmental, economic and social benefits of these production systems.

Where vaccination is used, systems will be in place to monitor response to vaccination and to detect antigenic variants should they arise (see Vaccination in Annex 1: Section A1.2).

Enhanced action in newly-infected countries or areas

Most countries now have a national pandemic preparedness plan that includes a component on response to detection of infection with H5N1 HPAI viruses in poultry.

The plans will normally be based around traditional methods for controlling HPAI, in particular stamping out, movement control, and cleaning and disinfection of infected premises. These methods remain appropriate for countries in which infection is detected early and the likelihood of elimination of infection through stamping out is high.

However, the plans should include trigger points for shifts in emphasis if it becomes apparent that elimination of infection from the country is unlikely in the short term. This might result in a shift from sole reliance on traditional control methods to use of other methods such as modified stamping out and/or use of vaccination aimed at reducing levels of infection. Countries that do not have such plans will be expected to develop them. All countries will be expected to test their plans for responding to new cases of infection and disease when detected. The plans will be reviewed regularly taking account of previous experiences from control programmes from both within and outside the country as well as findings from surveillance programmes and applied research (which are expected to provide information on the existing extent of infection and best method of addressing the problem).

To address the issues highlighted above, the following specific activities will be undertaken and supported by FAO/OIE.

3.3.3 Specific activities to be undertaken and supported at the national level

Strengthening veterinary services and related national capacity

FAO and OIE are pursuing the goal of strengthening the capacity of states to rapidly detect the presence of HPAI or other emerging diseases and take the appropriate actions to minimize 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 strong centralized chain of command and good cooperation between livestock owners and private veterinarians, constitute an important mechanism for early detection of animal diseases. Building and maintaining good epidemics-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 supported by FAO has convinced countries and the main international multi-lateral 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 OIE-PVS tool through which, in collaboration with veterinary services, gaps and deficiencies are identified and national investment programmes facilitated. This provides a framework to identify the gaps (gap analysis), to prepare investment plans to fill these gaps and to seek funding support from international donors 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 gap analysis based on PVS outcomes is undertaken by OIE and FAO, in partnership with Donors.

Main activities

- Encourage national veterinary authorities to conduct assessment of their services (OIE PVS exercise) and rectify deficiencies in order to control HPAI and other transboundary animal and zoonotic diseases through gap analysis and investment plans to fill the gap.
- Strengthen surveillance and early detection capacity (including training in participatory epidemiology, and training/raising awareness of field veterinarians, para-veterinarians and poultry owners).
- 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 at field level (direct support from FAO to national laboratories or through networking activities and OIE "laboratory twinning programme" - see section 3.1 on Global Domain)
- Build operational capacity to respond to incursions of H5N1 HPAI and other zoonotic and transboundary animal diseases, in collaboration with other public services.
- 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 farmers and para-veterinary personnel and those 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 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.

Socio-economic dimensions and adjustments to poultry production and marketing practices

Eliminating existing foci of HPAI in poultry does not necessarily achieve sustainable long-term control and prevention of the disease. In countries that have experienced prolonged or repeated waves of infection and those at risk, adjustments to poultry production and marketing methods must be considered. These adjustments and all prevention and control programmes should be underpinned by socio-economic analysis examining the consequences of the measures proposed. Before implementation of new measures, appropriate studies should be conducted at the country and local level to understand production sector profiles, marketing circuits, the consequences of HPAI along the value chain, and the cost and impacts on the poultry sector of preventive and control measures, in particular the effects on smallholders and poor households.

Adjustment can be a deliberate national 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 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 (see below on biosecurity and communication).

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.

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. The FAO/OIE strategy recommends activities that will increase the positive and minimize the negative impacts.

Main activities

- Review the structure of poultry production sectors and major market chains to identify critical points for HPAI and address risk areas, undertake poultry censuses and map farming systems in order to develop appropriate technical guidelines for safer practices.
- Carry out assessments and analysis of the cost and benefits of HPAI and prevention and control programmes to better define cost effective policies and strategies.
- Develop analysis on poultry production and market chain sectors to propose policies and strategies for adjustments which take into account possible economic consequences for vulnerable people.
- Review and develop compensation and rehabilitation strategies. This will require negotiation of socio-economic aspects of disease control with the participation of countries and commercial interests.

Enhanced biosecurity at farm and market levels

Biosecurity means implementation of practices that create barriers in order to reduce the risk of the introduction and spread of disease agents. People are key to correct implementation of biosecurity measures and this means that measures formulated must be hard to avoid and easy to comply with, practical to implement and sustainable for all, including producers, traders, intermediaries and service providers.

Designing feasible biosecurity programmes requires working with all stakeholders to ensure that those who have to implement the measures accept and see the need to do so and the benefits in doing so. Activities will be developed by animal health and production specialists, socio-economists and communications specialists working with farmers and traders at all levels along the market chain to develop and implement appropriate measures.

This will create responsibility for those involved in production and marketing for more biosecure poultry production and marketing through greater public awareness and improved capacity for appropriate technical responses.

Main activities

- 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.
- In collaboration with industry, develop and implement auditable biosecurity standards for industrial poultry farms 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 fomite⁹ 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 small farms, with special emphasis on native poultry and grazing ducks.
- Promote and introduce cost-effective and culturally acceptable measures for improved biosecurity in all farms, which may include changes in husbandry and poultry marketing regulations, but not elimination of 'backyard' farming systems.
- Develop and promote sustainable measures to minimize the risk of introduction of HPAI into scavenging poultry through enhanced prevention of infection in commercial poultry, especially grazing ducks.

Wildlife***Understanding the role and minimising the effect of infected wild birds***

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

- Assisting countries at high risk of infection to implement appropriate measures to minimize the risk of transmission of infection from wild birds to poultry (and vice versa).
- Coordination and collaboration among relevant national authorities, veterinarians, biologists and other wildlife surveillance or avian ecology monitoring or research programmes.

⁹ An inanimate object or substance that is capable of transmitting infectious organisms from one individual to another.

- Communication of findings from field studies (including epidemiological studies, 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.
- Identification and monitoring of the interface between poultry and potentially infected wild birds to reduce the risk of virus transmission (in both directions).

Enhanced communication and awareness building

Communication builds an enabling environment through which the global strategy for the prevention and control of HPAI can be successfully understood and implemented. This can 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.

Main activities

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. This will be targeted at specific risk groups.
- Encouragement of people, especially poultry producers, to report any occurrence of disease that could be HPAI; communication of existing compensation mechanisms is crucial.

Strategic research

The strategy recognizes that there are some significant gaps in our knowledge of virus ecology and epidemiology and our understanding of the issues related to H5N1 HPAI control in developing countries with complex market chains. 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 H5N1 viruses, including their ecology and 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 identification 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.
- Assessment of the efficacy of vaccination in grazing ducks.
- Development of new vaccines and diagnostics, including methods to distinguish vaccinated from infected animals, development of combined and efficacious H5 and Newcastle disease vaccines, and rapid diagnostic tests to detect and differentiate HPAI and Newcastle disease at the field level, especially when there is no laboratory capacity available within a reasonable distance.
- 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.

4. SIGNIFICANT OUTPUTS AND OUTCOMES

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

Short term (within 2 years)

- All countries with endemic/entrenched infection and recently infected will have developed and started implementation of appropriate longer-term plans for management of H5N1 HPAI, which will include strong communication components and will incorporate milestones and review points.
 - Recently infected countries will have eliminated infection, determined reasons for the initial incursion(s) and implemented appropriate corrective measures to prevent further outbreaks in poultry.
 - All countries at high risk of HPAI incursion (e.g. those having an infected neighbouring country) will have strong targeted surveillance programmes in place including in wild birds and will have enhanced capacity for early detection and emergency response. They will have revised and tested their emergency preparedness plans and incorporated review points for early assessment of the likelihood of success in eliminating infection using traditional control measures alone and consideration of use of vaccination.
 - All countries will be conducting regular risk-based surveillance for HPAI virus circulation and results and virus isolates will be shared with the international community. Systems will be in place at international, regional and country levels to allow updating of vaccine antigens in the event of emergence of significant antigenic variants, in particular in countries using vaccines.
 - Detailed, costed plans for strengthening of veterinary services based on OIE-PVS evaluations will be prepared and gap analysis carried out.
 - Poultry production and market chain will be analyzed and high risk practices will be identified in all countries. Social, economic and feasibility studies on proposed changes to overcome these problems are completed.
 - Epidemiological and socio-economic studies will have been carried out to provide information to support targeted, risk-based vaccination.
 - Research on wild birds and on other possible H5N1 hosts as well as on new vaccines will have continued particularly focusing on studies that improve the delivery system.
 - Improved public-private partnerships and relationships will be evident between government and the poultry industry.
 - Regional and international collaboration on H5N1 HPAI control and prevention will be strengthened with greater transparency in reporting and exchange of information.

- A new “One World-One Health” strategy will be in place to address the main emerging or re-emerging diseases at the human-animal interface. This strategy is implemented through more investment from the governments and international community, with the support for the international organizations in particular FAO, OIE and WHO.

Medium term (within 3 to 5 years)

- There will be clear evidence of strengthened veterinary services demonstrated by better surveillance, disease control, legislation (and enforcement of legislation) and epidemiological reports.
- There will be evidence of significant changes to high-risk production and marketing practices in countries especially in countries with endemic/entrenched infection but also in those at risk of infection. These approaches to address the roots of the risks of H5N1 HPAI occurrence and resurgence are extended to the main transboundary and emerging diseases of zoonotic nature or to the diseases which can impact on human livelihoods and well being (One World One Health strategy).
- Information from applied research and disease surveillance will have been used to ensure better targeted and socially and economically sustainable vaccination programs in endemically infected countries.
- 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.
- All new infections in countries are rapidly stamped out.
- The role of wild birds in the ecology and persistence of H5N1 HPAI is well understood.

Long term (6 -10 years)

- HPAI epidemiology and H5N1 virus ecology and evolution will be better understood and all high-risk production and marketing practices identified have been modified or the risk of these otherwise mitigated.
- Networks for diagnosis and surveillance and for policy and economics will be functioning, supported by regional and international organizations (FAO/OIE/WHO GLEWS).
- Greater national, regional and international commitment for HPAI and other main diseases control will be reflected in increased financial resources for long-term capacity development in H5N1 HPAI and other transboundary animal and zoonotic disease control.
- As a result of improved capacity in disease control, the threat of existing and other emerging infectious zoonotic disease will be significantly reduced and a new “One World-One Health” strategy is implemented on a long-term basis.

OUTCOMES

Short-term

The number of human cases of H5N1 HPAI stabilizes or falls.

The number of infected countries stabilizes or falls.

Medium-term

The incidence of human cases is falling.

The number of infected countries falls.

The costs of control and prevention fall in endemically infected countries.

Infection-free compartments are clearly identified in countries in which infection persists.

Long-term

Human cases do not occur.

No occurrence or threat of Asian-lineage H5N1 HPAI in poultry.

ANNEX 1

Lessons learned

analysis of the behaviour of HPAI during the current 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

Almost five 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, greater attention should be given to the movement of poultry and poultry products in countries and subregions where infection is endemic.
- national disease surveillance capacity needs more support.
- prevention and control programmes must be based on strong socio-economic analysis on the cost and impact of diseases and of the prevention and control programmes
- stamping out is the best way of containing outbreaks if these are detected rapidly 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.
- 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.

A1.1 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 of 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 of dissemination of HPAI, especially poorly controlled live bird markets where there is a risk of development of infection cycles within markets, or 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 of maintaining H5N1 HPAI is increased if ducks are an integral part of the production systems in particular in the small holder systems because duck flocks can potentially be short-term reservoirs of H5N1 infection.
- International trade, especially unregulated or illegal, in poultry and poultry products represents a significant risk of international spread of HPAI. Under such circumstances the specific risk factors (risk of transmission from specific products or accompanying fomites) are not well defined. Spread of disease by long distance trade in poultry products has been identified in several instances. 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 international standards poses a very low risk.
- There are strong indications that migratory waterfowl (especially Anatidae) 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 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 and what is their epidemiological role in HPAI virus transmission.
- In the socio-political environment of many countries, governance issues and wars or civil unrests and other natural disaster emergencies confound application of good governance and of HPAI control programmes, compromising 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.

A1.2 LESSONS LEARNED FROM HPAI CONTROL TOOLS AND METHODS

A number of well-defined and tested disease control methodologies and technologies are available (see for example 1,2,6,8,9). These include surveillance and early detection using various diagnostic tests, enhanced farm biosecurity and other adjustments to production and marketing methods, stamping out by culling, animal movement control, use of vaccines, and cleaning and disinfection. However, more analysis and assessments of the socio-economic dimensions and contexts (cost of diseases, cost and benefits of prevention and control programmes, poultry production and market chain analysis to identify risk factors and practices) are needed for long-term strategies which will better address the roots of emergence and maintenance of diseases such as HPAI. 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.

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. Improvement of public-private partnership is indispensable because the private producers, traders and other stakeholders are in the forefront for surveillance and reporting of disease.

Major weaknesses and strengths identified in surveillance systems globally are:

- Surveillance in many of the HPAI-infected countries is not optimal. 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 the participatory disease surveillance (PDS) pilot 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, and therefore such mechanisms should be set up in close cooperation with veterinary services.

- International HPAI surveillance is compromised by weaknesses in national disease surveillance. Support for international and regional organizations to the national surveillance teams should be strengthened in particular through the development of long-term sustainable regional networks of national laboratories and epidemiology teams (see below).
- Official reports from national authorities to the OIE should be supplemented with mechanisms to investigate informal reports of suspect cases or outbreaks of HPA and the use of this information should be better strengthened at regional and global levels for data analysis/disease intelligence and delivery of warning messages, as is carried out by the FAO/OIE/WHO Global Early Warning System (GLEWS).

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 always 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 and associated in the OFFLU network have made a significant contribution to processing field specimens and providing diagnostic reagents, specimen transport containers 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 in South East Asia is a good example for other regions to follow.
- Complementary laboratory capacity for influenza diagnosis may exist in public health laboratories nationally, regionally, and globally. Increased collaboration among laboratories can increase global laboratory capacity.

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.

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 costs of control. The OIE and FAO have made recommendations for the use of avian influenza vaccines manufactured in accordance with guidelines in the OIE Terrestrial Animal Health Manual (8) and a number of such vaccines are commercially available. According to current OIE recommendations (9), HPAI-vaccinated poultry free from infection 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:

- In countries with endemic/entrenched infection vaccination can be used as a mean of bringing down levels of infection before its elimination.

- 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 Hong Kong SAR, PR China and Vietnam. Vaccination is also extremely valuable in high-risk places in which disease has recurred. For example, Hong Kong's poultry farms have remained infection-free for over four years following vaccination (which was introduced after repeated outbreaks), despite the presence of infection in wild birds in Hong Kong and in poultry in neighbouring provinces in mainland China.
- Vaccination must be supported by appropriate post-vaccination monitoring to ensure that adequate flock protection is being achieved, to determine whether virus circulation is occurring in inadequately vaccinated flocks and especially whether antigenic variants have emerged.
- A vaccination programme should be planned as part of an integrated control strategy, subject to periodic review, which anticipates ultimate cessation of vaccination once the factors leading to virus persistence have been identified and addressed, and vaccination has reduced the number of cases to a level that will allow classical measures to succeed.
- The cost and logistic challenges of widespread vaccination, especially in backyard poultry, are major constraints to effective use of vaccines and to sustain the programmes over a prolonged period. The cost of vaccination campaigns must be shared with the commercial poultry sector and be subsidized in village backyard sector as a public good activity (prevention of regional and international crisis and of human pandemic emergence).
- 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 virus circulation through partially protected birds and remain a source of infection for other birds and humans. 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.
- 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.

Communication

Effective communication is a critical tool in influencing acceptance of and compliance with disease control measures, but 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 and prevent 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.

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 PR China and Thailand) 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. 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, small and middle size holders as well as backyard village systems 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, because 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. In addition, they have adversely affected livelihoods and some smallholders have been temporarily or permanently forced out of poultry production. The studies that have been undertaken to date indicate that adjustments to marketing systems 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 2¹⁰. Socio-economic analysis is required to understand the poultry sector and market chains and to assess the cost of diseases and disease control programmes, to define strategies and policies to mitigate the negative impact of diseases, control programmes and major restructuring or adjustments of the poultry production and marketing sectors. 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.

A1.3 Lessons learned from regional and global coordination

Global coordination and support

- FAO and OIE have developed increased collaboration under the umbrella of their joint initiative GF-TADs which has allowed working together in many ways including preparation of strategies and guidelines, organization of meetings, implementation of activities and programmes in the field of surveillance, disease intelligence, warning, laboratory support, biosecurity, socio-economics, communication or capacity building.
- 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

¹⁰ In 2004, FAO described four poultry production sectors:

Sector 1 - industrial integrated production with birds or products marketed commercially.

Sector 2 - commercial poultry production with birds or products sold through slaughterhouses or live poultry markets.

Sector 3 - commercial poultry production, including water fowl, with birds or products usually sold through live-bird markets.

Sector 4 - village or backyard production with birds or products usually consumed locally.

Note: The original FAO definition of Sectors 1-4 drawn up in 2004 included an element related to biosecurity measures. There is no automatic link between size of farms and biosecurity: some very large commercial poultry enterprises may demonstrate strikingly inadequate biosecurity, no better than in many small-scale commercial production units.

organizations and coordination among them have significantly improved, further strengthening of international coordination is achieved through the UN System Influenza Coordination (UNSIC).

- International coordination through FAO, OIE, WHO and UNSIC 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.
- FAO has recently enhanced the rapid reaction capacity of established Emergency Centre for Transboundary Animal Diseases (ECTAD, 2004) through the launching of the CMC-AH, established in collaboration with OIE; it 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. 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
- International coordination has also supported the development of a network of global expertise on HPAI through OFFLU, to support sharing of biological materials and data, to address specific technical issues through collaboration, to collaborate with the public health network 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 and research has been conducted by different agencies, the strengthening of their programmes and improvement of collaboration among the public health and veterinary sectors and, international agencies such as FAO, WHO, UNEP and the Wildlife Conservation Society are necessary.
- 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.
- International Organizations play an important role in supporting countries and Regional Organizations through the development of regional networks of national and reference laboratories, epidemiology, and socio-economic teams (see below).
- 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 and to expand the objectives from H5N1 HPAI to a wider approach of main emerging or re-emerging crisis of zoonotic and transboundary nature and the ones which can have severe impacts on human well being (“One World-One Health” strategy).
- 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 and OIE as lead international technical agencies for the livestock production and animal health sectors, have an essential role to play in providing specific technical guidance in strong collaboration with UNICEF and WHO.

Regional coordination and support

- Disease surveillance and laboratory diagnostic networks were established during outbreaks of H5N1 HPAI in 2004 in several countries in Southeast Asia and later in other parts of the world. These networking activities are indispensable and notable successes have taken place. 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.
- Various international agencies, donors and regional and sub-regional organizations are implementing projects in different countries and regions. In executing these projects, 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 not always been optimal and as a result some duplication of efforts has occurred.

In addition to the OIE and FAO 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.

A1.4 RECENT ACHIEVEMENTS

Table 2 provides details on the achievements relating to control of avian influenza covering animal health and communication aspects (3). It also lists related challenges that are addressed by the global strategy.

Table 2

Recent achievements, progress and related challenges in the prevention and control of HPAI

Recent achievements/progress	Related challenges
<p>Enhanced surveillance and openness are providing better information and understanding on the evolution of H5N1 viruses and the epidemiology and control of HPAI.</p> <p>Improved laboratory capacity in a number of countries is assisting surveillance programmes.</p> <p>Regional networks of national laboratories and epidemio-surveillance teams have been established to support country activities.</p> <p>Global epidemiology information data analysis and warning have been improved through GLEWS.</p> <p>Understanding of real roots of emergence of HPAI and other main diseases is improving as well as the strategies to address them.</p>	<p>Veterinary capacity, the structure of the poultry sector and, in some places, the failure to engage poultry owners in developing countries, still makes surveillance difficult. Some countries are still not sharing viruses or reporting genetic information on viruses.</p> <p>The capacity and quality management of laboratory and epidemio-surveillance services require strengthening, covering both national systems and regional networks.</p> <p>Laboratory capacity remains weak in some countries, both at national and at regional (sub-continental) level. This is not only due to a lack of adequate equipments but is also a management, personnel training and budgetary issue.</p> <p>The procurement of modern lab equipment which is often not adapted to local conditions (e.g. no reliable water and electricity supply), does not solve all the problems.</p> <p>Global long-term and cross cutting strategies to prevent emerging diseases are still not developed enough.</p>
<p>Gaps in veterinary services are being identified through the OIE PVS process, including the quality of veterinary education and strength of the national chain of command.</p> <p>Support to Veterinary Services has increased in many countries.</p>	<p>Central command for Veterinary Services is not in place in all countries and it needs more political commitment from governments.</p> <p>Legislation and regulations related to animal disease prevention and control are often outdated, or incomplete. This, and the failure to enforce existing regulations, undermines any programme directed towards early detection and rapid response mechanisms.</p> <p>Sustainable operational budgets for veterinary services are insufficient and very far below the pro rata contribution of animal farming activities to the national GDPs, or inadequate when compared to the livestock population of the country.</p> <p>Staff resources and staff education and training (initial training as well as continuing education) are a source of concern in almost every country evaluated. In some countries the length of initial veterinary education is less than two years.</p>
<p>Disease has been eliminated from a number of newly- infected countries demonstrating increased preparedness and response capacity.</p>	<p>Not all countries have appropriate, tested HPAI emergency preparedness plans. These are needed because HPAI will remain a global threat while infection persists in some countries.</p>

Recent achievements/progress	Related challenges
<p>It is recognized that the disease is not going to be eliminated in the short to medium term globally or from some countries with entrenched infection.</p>	<p>There is a need for longer-term strategies and work plans, evaluation and strengthening of veterinary services (including laboratories), better engagement of industry/farmers and partnership with the public sector, appropriate improvements to farm biosecurity and modification of high-risk marketing methods.</p>
<p>It is recognized that sustained control in places with entrenched/endemic infection depends on identifying and overcoming high-risk commercial production and marketing practices.</p>	<p>A large communication and regulatory gap still exists between veterinary authorities and the commercial poultry sector in some countries.</p> <p>Social and economic factors result in slow or no changes to existing commercial practices, in both infected and uninfected countries.</p>
<p>Use of vaccination has assisted in containing or preventing infection and disease, with large-scale campaigns in a number of places including Hong Kong SAR, PR China and Viet Nam.</p> <p>Vaccination appears to have reduced levels of infection and the need to cull poultry and therefore the complications associated with compensation.</p>	<p>Difficulties of sustaining government-sponsored large scale vaccination campaigns need to be overcome through cost sharing with the commercial producers and greater targeting of vaccination to areas and farming systems where high-risks exist.</p> <p>Better vaccines are required that are easier to administer than current injectable products.</p> <p>Not all countries using vaccination have prepared integrated control plans that include appropriate methods for post-vaccination surveillance and review points for assessing the need for and ongoing scope of vaccination programmes.</p> <p>Communication with the commercial sector on the implementation of vaccination needs to be increased.</p> <p>There is a need to review currently used vaccine licensing procedures in certain countries.</p>
<p>Viruses against which current poultry vaccines do not provide protection (which was predicted to occur) have been detected, although the selection pressure that led to their emergence (if any) is unclear.</p>	<p>Improved mechanisms to monitor these viruses and to allow rapid incorporation of new antigens into vaccines when required are needed. This requires ongoing sample submission to reference laboratories and review of existing vaccine licensing procedures in some countries.</p>
<p>It is recognized that wild birds are playing a role in the dissemination of these viruses, especially transboundary spread.</p>	<p>The relative contribution of trade versus wild birds in the introduction and spread of virus is not always known but one cannot afford to ignore either source.</p> <p>The exact role of wild birds and other mammalian species as reservoirs of HPAI virus is still not well known.</p>
<p>Improved information is available on social and economic effects of this disease, the control measures implemented and market shocks.</p>	<p>More information on social and economic effects is required. Comprehensive baseline work is needed to allow vulnerable groups to be identified and protected before the disease occurs or adjustments to production and marketing are undertaken.</p> <p>Regional networks of socio- economists, farming system and biodiversity specialists, and their links to animal health specialists have to be strengthened.</p>

Recent achievements/progress	Related challenges
<p>Most countries affected by outbreaks have sought to establish active intersectoral partnerships including national inter-agency communication task forces, and they have advocated with relevant ministries to develop and implement communication plans.</p>	<p>Preliminary research in a number of affected countries indicates that although public awareness of avian influenza is quite high, this has not necessarily translated into a reduction in risky behaviors or practices among vulnerable populations, due to a number of socio-economic barriers.</p> <p>The risk with regard to avian and pandemic influenza is generally not well understood among both the public and national decision-makers.</p>
<p>In countries where there have been advance preparations, the emergency communication responses to new outbreaks (in the form of outbreak communication) have often been very effective in supporting the management of media and, to a certain degree, promoting public trust and compliance in prevention/control efforts to rapidly stamp out the disease.</p> <p>Communication interventions, some of which have been led by the private sector, have also helped countries recover from market shocks (e.g. in Thailand and Turkey).</p>	<p>The ongoing public confusion in distinguishing among avian influenza (HPAI) in poultry, human zoonotic infections with avian influenza H5N1 viruses and human pandemic influenza remains a communication challenge.</p> <p>In countries where HPAI has either already become, or could become, entrenched/endemic, concerted communication efforts will be needed for at least another 5 – 7 years.</p> <p>There will need to be a shift from short-term emergency communication campaigns to significant mid- to long-term investments in better communication capacities across key ministries – animal health, human health and communication/information.</p> <p>Inputs from robust multi-disciplinary research are needed to build effective communication strategies.</p>
<p>The need for enhanced cooperation between communication professionals and technical experts is recognized, as is the need for shared understanding of issues and barriers to change.</p> <p>Discussions among communicators and technical partners have stressed that controlling HPAI requires particular attention to animal health communication issues.</p>	<p>The actions to be taken by poultry farmers, transporters and marketers to reduce the risks of HPAI transmission among poultry are complex and communication interventions need to be crafted specifically for different occupational groups.</p> <p>Communications strategies require further elaboration especially in settings where HPAI is entrenched.</p> <p>Communicators and veterinarians and public health workers need to work jointly in determining the appropriate behaviours that should be promoted in resource poor settings, especially for small-scale and village-level producers.</p>

ANNEX 2

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 multidisciplinary and multisectoral 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 OIE as the lead international agencies in providing global strategies and direct support for livestock disease control;
- OIE is the lead agency, working with a network of over 200 international Reference Laboratories and Collaborating Centres, national Delegates to OIE (most of the time CVOs), for the establishment, adoption and development of international standards for animal disease control particularly regarding laboratory diagnostic and surveillance tools, international trade standards or other areas such as zoning and compartmentalization;
- other major international partners, including the World Bank, the European Communities, Asian Development Bank, African Development Bank and national donor implementing agencies;
- UNSIC and 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 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 10 years, as funds become available, beginning with the highest priorities for 2008-2010. It will be coordinated jointly

by FAO and OIE and harmonized with the WHO Strategic Action Plan for Pandemic Influenza 2006-2007(5)

A2.1 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)(4). It indicates the goal, objectives, activities and expected impacts of the different components and describes projects for implementation and projected costs. A new Global Programme for 2009-2011 is currently being finalized which takes into account the results achieved in 2004-2008 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. The two organizations develop the use of mechanisms such as GLEWS, OFFLU, and the CMC-AH. 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. FAO has embarked on several initiatives to coordinate wild bird surveillance networks. A communication unit with a team of specialists has now also been established to support countries in animal health communication interventions.

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 in collaboration with OIE works to implement and/or support regional networks of surveillance, laboratory and socio-economic teams. Decentralized ECTAD regional teams have been put in place and they are located in Regional Animal Health Centres in various locations around the world which have been established within the FAO-OIE GF-TADs initiative.

FAO's input at the national level is based on each country's specific needs and situation. FAO's 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 including support to laboratories and epidemiology teams, studies or socio-economic, farming system and biodiversity, support to implement vaccination campaigns, improvement of biosecurity, communication campaign and capacity building. 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.

A2.2 OIE'S PROGRAMME

The OIE's 172 Member Countries and Territories have adopted quality standards and guidelines for the evaluation of veterinary services. Together with the Terrestrial Animal Health Code and the Manual for Diagnostic Tests and Vaccines, these represent international standards for surveillance, prevention, control and eradication of animal diseases as well as for safe trade in animals and animal products.

Strong veterinary services are a key factor for preventing and controlling diseases. They need centralized national chains of command and public-private partnerships (animal owners' organizations and private veterinarians). This allows in particular for rapid response

in controlling and containing emerging and re-emerging diseases in the early stage of outbreaks.

For this purpose, the OIE has developed the Evaluation of Performance of Veterinary Services (OIE-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 will permit 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. This gap analysis based on PVS outcomes will be undertaken by the OIE and FAO in collaboration with other donors such as WB and EC. The identified gaps and deficiencies will also provide detailed references for governments to develop policies directed at investments and improvement of veterinary service capacities.

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". This led to the launch of the OIE Laboratory Twinning Programme (7), the aim of which is to improve the geographical distribution of laboratory diagnostic capacity and expertise by extending the OIE reference network to developing countries and areas where there is a need. Each project, within the programme, is a sustainable supportive and developmental link between an OIE Reference Laboratory or an OIE Collaborating Centre and a candidate national laboratory; this link facilitates a flow of knowledge and expertise leading to improvements in the candidate laboratory. The ultimate aims are for candidate laboratories to reach OIE reference status and be able to provide technical and diagnostic support to other countries within their region. The programme will lead to more countries having ready access to diagnostic capacity and expertise. Several projects, across the globe, are underway and the OIE continues to review and approve new proposals.

In all regions, the OIE develops capacity building programmes for national high level public policy-makers (CVOs and their direct collaborators) 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 and this training will be developed in collaboration with FAO.

Selected references

1. Food and Agriculture Organization (2004) Recommendations on the Prevention, Control and Eradication of Highly Pathogenic Avian Influenza (HPAI) in Asia Available at <http://www.fao.org/docs/eims/upload//246982/aj126e00.pdf>
2. Food and Agriculture Organization (2004) 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.
Available at www.fao.org/docs/eims/upload//210749/Gui_principlesHPAI_july04_en.pdf
3. Food and Agriculture Organization, World Organisation for Animal Health (OIE), World Health Organization (2007) Final Technical Report, Technical workshop on highly pathogenic avian influenza and human H5N1 infection 27-29 June 2007 Available at <http://www.fao.org/docs/eims/upload//232786/ah671e.pdf>
4. Food and Agriculture Organization (2008) Global Programme for the control and prevention of H5N1 highly pathogenic avian influenza Available at <ftp://ftp.fao.org/docrep/fao/010/ai380e/ai380e00.pdf>
5. World Health Organization (2007) Strategic action plan for pandemic influenza Available at http://www.who.int/csr/resources/publications/influenza/StregPlanEPR_GIP_2006_2.pdf
6. World Organisation for Animal Health (OIE) and Food and Agriculture Organization (2007) Ensuring Good Governance to Address Emerging and Re-emerging Disease Threats – Supporting the Veterinary Services of Developing Countries to Comply with OIE International Standards on Quality. Available at http://www.oie.int/downld/Good_Governance07/Good_vet_governance.pdf
7. World Organisation for Animal Health (OIE) (2006) A Guide to OIE Certified Laboratory Twinning Projects at http://www.oie.int/downld/LABREF/A_Concept.pdf
8. World Organisation for Animal Health (OIE) (2008) Avian Influenza in Manual of Diagnostic Tests and Vaccines for Terrestrial Animals Available at http://www.oie.int/eng/normes/mmanual/2008/pdf/2.03.04_AI.pdf
9. World Organisation for Animal Health, Food and Agriculture Organization, Istituto Zooprofilattico Sperimentale delle Venezie (2007) Conclusions and recommendations, Scientific meeting on Vaccination – a tool for control of avian influenza, Verona Italy Available at http://www.oie.int/eng/info_ev/Other%20Files/A_Guidelines%20on%20AI%20vaccination.pdf
10. World Organisation for Animal Health (2008) Terrestrial animal health code Available at http://www.oie.int/eng/normes/mcode/en_sommaire.htm

