

FAO/OIE/WHO Consultation
on Avian Influenza and
Human Health:
Risk Reduction Measures in
Producing, Marketing and
Living with Animals in Asia



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REPORT

FAO/OIE/WHO CONSULTATION ON AVIAN INFLUENZA AND HUMAN HEALTH:
RISK REDUCTION MEASURES IN PRODUCING, MARKETING,
AND LIVING WITH ANIMALS IN ASIA

Convened by:

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NOTE

The views expressed in this report are those of the participants in the FAO/OIE/WHO Consultation on Avian Influenza and Human Health: Risk Reduction Measures in Producing, Marketing, and Living with Animals in Asia and do not necessarily reflect the policies of the Organization.

This report has been prepared by the World Health Organization, Regional Office for the Western Pacific for governments of Member States in the Region and for those who participated in the FAO/OIE/WHO Consultation on Avian Influenza and Human Health: Risk Reduction Measures in Producing, Marketing, and Living with Animals in Asia, which was held in Kuala Lumpur, Malaysia, from 4 to 6 July 2005.

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Keywords:

Influenza, Avian / Animals / Risk management / Food safety

SUMMARY

The joint FAO/OIE/WHO Consultation on Avian Influenza and Human Health: Risk Reduction Measures in Producing, Marketing, and Living with Animals in Asia was held in Kuala Lumpur, Malaysia, from 4 to 6 July 2005. The Consultation was attended by 29 temporary advisers who were drawn from nine countries and areas of Asia, as well as a temporary adviser from the Netherlands, 12 observers and representatives from Malaysia, Japan International Cooperation Agency (JICA) and the United States Department of Agriculture (USDA); and 23 members of the joint Food and Agriculture Organization of the United Nations (FAO), World Organisation for Animal Health (OIE) and WHO secretariat.

The objectives of the Consultation were:

- (1) to identify current practices employed in the production and marketing of live animals in Asia that might have potential human health implications;
- (2) to assess the scope and effectiveness of current regulatory control measures applied to the production, distribution and marketing of live animals for food in Asia to minimize the human health risk;
- (3) to provide guidance applicable in developing countries regarding appropriate regulatory controls in the production, distribution and marketing of live animals for food;
- (4) to identify effective interventions that would (a) enhance community awareness and understanding of high-risk human behaviours and practices contributing to the emergence and prevalence of avian influenza in humans and poultry; and (b) facilitate change aimed at reducing the risk of zoonoses to human health; and
- (5) to determine research that needs to be undertaken to strengthen regulatory controls.

The Consultation concluded that if countries were to focus on situations where humans appear at greatest risk, priority must be given to sectors 3 and 4 farms and associated communities where humans live in very close proximity to the animals they or other community members are raising. However, there is still a need to reinforce biosecurity measures in sectors 1 and 2 also.

In the situation where there is a significant challenge from highly pathogenic avian influenza (HPAI) and biosecurity cannot be improved in a particular country or area, veterinary authorities should consider vaccination strategies in animals (as a part of a multi-element response to avian influenza) to better protect human health. In some countries, or parts of countries, massive vaccination could be the only way to first reduce the infection in poultry so as to further reduce human exposure and infection. The use of vaccination must be coupled with appropriate surveillance and must be carried out with appropriate products manufactured and quality controlled to ensure compliance with international standards referred to in the OIE *Manual for Diagnostic Tests and Vaccines for Terrestrial Animals*. "Stamping out" remains a primary measure to be implemented in case of outbreaks. The methods and tools to be used to prevent and control avian influenza have been fully described in the FAO document "FAO

Recommendations on the Prevention, Control and Eradication of HPAI in Asia”, which was prepared in collaboration with OIE in September 2004.

There is an urgent need to strengthen disease notification to human health and veterinary authorities, especially in association with sectors 3 and 4 farms, including considering all appropriate options to increase the willingness to report.

There is also an urgent need to know more about the virus and how it circulates. Thus one of the first areas for joint action for animal and health authorities should be to enhance the intelligence available to international organizations by providing more human and animal viruses for sharing with animal and human laboratory networks. Collaboration between the joint FAO/OIE network of avian influenza (OFFLU) and the WHO influenza networks should be encouraged. Efforts should also be made to share data from seroprevalence studies, studies of infections transmitted among humans and studies of infections transmitted from animal to humans.

There are a few key actions that are needed in the short to medium term: good farming practices, including enhanced biosecurity, at poultry farms and associated premises; interspecies segregation by fencing on sector 3 farms (segregation should apply to chickens, ducks and pigs as well as quails and other relevant species); and limited or modified farming practices that would otherwise facilitate viral spread.

In relation to legislation, although deficiencies in regulatory control were identifiable in a number of countries of the Region, the regulatory situations in these countries seem to be adjusting relatively quickly in response to the occurrence of outbreaks. Thus, while regulations could be further enhanced in the Region, the efficacy of regulatory enforcement remains an issue of greater concern. There remains, in many countries, a significant gap between legislation and enforcement, particularly in the least developed countries where there are limited human resources, infrastructure and financial resources. Such deficiencies result in less than optimal enforcement and an inability to effectively control HPAI. Major efforts need to be committed to enhancing governance and increasing effective enforcement of existing legislation.

Wherever possible, legislation should aim to be risk-based. This allows regulators to focus on laws and regulations that when implemented will have an impact on the risk. In some areas, information on the epidemiology of the virus is limited. Hence, it is crucial to better understand the role of certain animal species such as wildlife and pigs in the epidemiology of avian influenza before authorities implement regulatory controls, in particular those relating to the culling of these animals.

To enhance regulatory controls, a number of supporting elements must also be in place, including improved disease awareness and communication at all levels from policymakers to grassroot levels; resource mobilization to effectively enforce the regulations; information system and mapping of poultry distribution and movement flow to support decision-making; incentives such as adequate compensation to support the notification and stamping out measures; international support to facilitate the development of legislation; the active involvement of stakeholders in formulating new regulations; and research related to implementation of legislation (e.g. economic as well as social impacts of prevention and control measures).

The consequences of control measures, as well as the restructuring of the poultry sector, will have significant social and economic consequences. These must be specifically addressed and mitigation measures must be foreseen and included in policy planning and implementation.

There is also a need for an enormous effort to bring about behavioural change through education, awareness and health promotion. As in any effort to bring about change a diversity of approaches should be considered with an emphasis on community-based participatory action and mass media community awareness campaigns.

National, provincial and local authorities should also consider the appropriateness of the healthy settings approach and of other approaches in efforts to reduce the risks to human health associated with the wet markets of Asia. In so doing consideration should be given to describing the marketplace, identifying high-risk areas and practices in the marketplace; identifying the members of the market community; engaging champions and drawing up a prioritized list of possible changes to fit the local situation; identifying changes that may be relatively simple and likely to show positive impact and start with these; exploring various possible sources of finance; engaging the interest of politicians and local government. To address all the steps necessary, including those that relate to pre-market action, a medium- to long-term approach needs to be taken. The healthy markets approach uses a participatory process and intersectoral collaboration in a way that will allow effective control of avian influenza.

Recognition that developing a comprehensive approach to preventing and controlling avian influenza will have social and economic consequences which may impact greatest on sector 3 and 4 is essential. Therefore, close attention must be given to ensuring that impacts are assessed in advance of implementing any strategy to reduce the risk of avian influenza to human health, and mitigation measures are built into the strategy.

Any comprehensive approach to avian influenza prevention and control will require significant technical and financial resources to be provided by the governments. However, as many low income countries are involved, they are unlikely, on their own, to have sufficient resources to meet all requirements. The support of the international community is therefore crucial.

In order to reduce the risk of avian influenza to human health, it is essential to consider the countries according to their current situation. For those countries in which sectors 3 and 4 farms are a dominant feature of the production systems, or where humans live in very close proximity to the animals, and where the majority of human cases are occurring, there is an urgent need for the following actions:

- (1) Vaccination
 - (a) Implementing vaccination programmes (as part of a multi-element response) in particular in sector 4 farms.
 - (b) Coordinating vaccination programmes with surveillance and monitoring activities for virus circulation and evaluation of programme efficacy.
 - (c) Carrying out vaccination with appropriate products manufactured and quality controlled to ensure compliance with international standards referred to in the OIE Manual for Diagnostic Tests and Vaccines for Terrestrial Animals.
 - (d) In sector 4 farmers in areas where HPAI is endemic, identifying sources of suitable expertise and funds. In such circumstances, and given that vaccination of backyard chickens will benefit the wider poultry sector and reduce risks to human health, there is justification for financial support from governments.

In this context it is reiterated that stamping out defined infected flocks remains the primary measure to control HPAI in case of outbreaks.

(2) Improving biosecurity

- (a) Upgrading sector 3 farms through improved biosecurity (e.g. by fencing, netting, species segregation), increased surveillance and banning certain high-risk farming practices (e.g. use of contaminated water, recycling of poultry faeces).

However, while the above priority actions are necessary in the less biosecure farms and communities, there still remains a need for the following activities in all sectors:

(3) HPAI epidemiology, diagnosis and vaccination measures

- (a) Undertaking joint medical/veterinary epidemiological analysis to better understand risk contamination pathways between infected animals and humans.
- (b) Strengthening veterinary services to improve capacity to implement services including surveillance sampling and analysis.
- (c) Undertaking additional research in areas such as epidemiology, vaccines and rapid diagnostic tests.

(4) Legislation

- (a) Strengthening legislation in key areas of outbreak management as a short-term priority concern.
- (b) Overcoming the significant gap between legislation and enforcement, particularly in the less developed countries by strengthening veterinary services, human resources and infrastructure and by ensuring adequate financial resources are available to authorities to address this important public health function.
- (c) Ensuring a number of supporting elements are in place to enable legislation to be effectively enforced. One very important supporting element in the short term is the implementation of incentives such as adequate compensation to support notification and stamping-out measures.

(5) Education

- (a) Establishing an education strategy is particularly important to reduce the public health risk, especially in sectors 3 and 4. Implementing effective education as a particularly important means of reducing the risk to those producing, marketing and living with poultry, especially in sectors 3 and 4 farms.

(6) Taking action in the wet markets of Asia

- (a) Taking action at an appropriate level (national, provincial, local authority or market level) to enhance the biosecurity of the wet markets in Asia in order to reduce their role in the emergence and persistence of avian influenza.

Call to action by countries of the Region and support from the international community

Countries are urged to take guidance from the findings of the Consultation in developing, modifying and implementing their national avian influenza prevention and control programmes.

As a consequence of the significant public health concern associated with the avian influenza situation in animals there is also an urgent need for more investment in preventing, controlling and eradicating avian influenza disease in Asia. There is an urgent need for assistance from the international community to enable infected countries to put into place vaccination programmes and initiate improved biosecurity in sector 3 and 4 farms. At the same time, there is a need for the long-term sustainability of such programmes from national funds to be addressed.

Without substantial national and international financial and technical support, avian influenza will continue to be a significant public health and animal production issue in many countries in Asia and the risk of a human influenza pandemic occurring will remain.

ABBREVIATIONS

ASEAN	Association of South East Asian Nations
DIVA	Differentiation of Infected and Vaccinated Animals
FAO	Food and Agriculture Organization of the United Nations
HPAI	Highly Pathogenic Avian Influenza
IMR	Institute of Medical Research, Malaysia
JICA	Japan International Cooperation Agency
MAAI	Minister for Agriculture and Agro-industry
OFFLU	FAO/OIE network of avian influenza
OIE	World Organisation for Animal Health
USDA	United States Department of Agriculture
WHO	World Health Organization

1. INTRODUCTION

1.1 Background

The unprecedented widespread outbreaks of avian influenza in many countries in Asia and the demonstrated capacity of the avian influenza H5N1 strain to directly infect humans and cause death have together significantly increased the risk of the emergence of a human influenza pandemic. However, the virus has yet to develop efficient human-to-human transmission. Thus, there is still the opportunity to take action that focuses on reducing the risk of the virus establishing the attributes and prevalence necessary for a pandemic. With this in mind, there is an urgent need to address the root cause of the situation – the way in which humans interact with and handle the production, distribution, processing and marketing of animals for food.

There is a need for enhanced regulatory control to: (1) be implemented along the length of the food production and marketing chain as well as in rural communities; and (2) operate in an environment where effective biosecurity is absent or limited by the very nature of many of the current operations producing animals for food in Asia, where animals are frequently raised as free range and where the animals are commonly slaughtered either in the home or at a live animal market. Such regulations must address better biosecurity on farms; the transportation of animals to the market; improved hygiene and sanitation; segregation of different species; and slaughter conditions, as appropriate to the particular developing country and rural situation. In addition to regulatory control, it is also imperative that all community members better understand the risks to human health that are associated with the ways in which humans live with and handle animals in Asia. Together, national and local authorities, health workers, agriculture and veterinary health authorities, farmers, and community activists need to identify and implement risk management and risk communication strategies and actions that would protect human health and could be undertaken at the national and local levels.

1.2 Objectives

- (1) To identify current practices employed in the production and marketing of live animals in Asia that might have potential human health implications.
- (2) To assess the scope and effectiveness of current regulatory control measures applied to the production, distribution and marketing of live animals for food in Asia to minimize the human health risk.
- (3) To provide guidance applicable in developing countries regarding appropriate regulatory controls in the production, distribution and marketing of live animals for food.
- (4) To identify effective interventions that would (a) enhance community awareness and understanding of high-risk human behaviours and practices contributing to the emergence and prevalence of avian influenza in humans and poultry; and (b) facilitate change aimed at reducing the risk of zoonoses to human health.
- (5) To determine research that needs to be undertaken to strengthen regulatory controls.

1.3 Participants

The Consultation was attended by 29 temporary advisers who were drawn from nine countries and areas of Asia, as well as a temporary adviser from the Netherlands, 12 observers and representatives from Malaysia, Japan International Cooperation Agency (JICA) and the United States Department of Agriculture (USDA); and 23 members of the joint Food and Agriculture Organization of the United Nations (FAO), World Organisation for Animal Health (OIE) and WHO secretariat. Annex 1 provides a full list of temporary advisers, observers, representatives and the members of the joint FAO, OIE and WHO secretariat in attendance.

1.4 Meeting structure and organization

The Consultation was conducted from 4 to 6 July 2005 at the Renaissance Hotel in Kuala Lumpur, Malaysia.

At the opening session, Dato Dr Hj Abdul Aziz Mangkat, Director of Epidemiology and Veterinary Medicine Division, Ministry of Agriculture and Agro-based Industry, was elected Chairperson for the Consultation. Dr Haji Ramlee bin Haji Rahmat, Director of the Disease Control Division, Ministry of Health, was elected Vice-Chairperson. Dr Howard Wong, Senior Veterinary Officer, Agriculture, Fisheries and Conservation Department, Hong Kong (China), and Dr Andrew Kiyu, Deputy Director (Public Health), Sarawak Health Department, were elected Rapporteurs.

The Consultation agenda (Annex 2) was adopted and the opening session continued with the Chairperson introducing the background and objectives of the Consultation, and giving general guidance on the programme, small group work sessions and plenary sessions, which included group presentations and joint discussions. Selected temporary advisers from a diversity of countries and areas and the FAO, OIE and WHO secretariat provided technical presentations in support of the subsequent working group activities. The temporary advisers, representatives, observers and secretariat were then divided into groups and assigned an appropriate topic to consider in the subsequent working group sessions. Guidelines were provided to each group to direct them towards the Consultation's objectives. Group discussions to draft clear guidance, conclusions and recommendations followed. The groups then reported back to a plenary session and subsequently all participants, in a final plenary session, reviewed a summary of the group findings and adopted a plan of action to reduce the human health risk from avian influenza in Asia.

2. PROCEEDINGS (REPORT OF THE SESSIONS)

2.1 Opening session

Y. Bhg. Dato' Dr Hawai Hussein, Director General, Department of Veterinary Services, Malaysia, warmly welcomed all delegates to Kuala Lumpur and emphasized that avian influenza had been widely recognized as a trans-boundary disease, causing losses to human life, the livestock industry and the economy in Asia. He noted that the Consultation had, as a main outcome, the development of practical guidelines to improve the production and marketing of live animals for food in Asia. He further noted that to address avian influenza in a timely manner, effective communication is essential and considered that the Consultation would, in addition to its main goals, also enhance networking and therefore subsequent communication. In closing, he expressed his appreciation to the Minister for Agriculture and Agro-Industry for his commitment to the subject, and to the steering committee for its efforts in organization. He wished the delegates a fruitful meeting.

Dr Haji Ramlee bin Haji Rahmat further welcomed delegates on behalf of the Ministry of Health, Malaysia. In so doing, he commented that in the present era, many diseases that infect animals, such as avian influenza and Nipah encephalitis, not only pose a threat to the agro-based industry sector, but also threaten human health. Therefore, it is essential for all sectors to work closely to ensure human health is not compromised. Dr Haji Ramlee bin Haji Rahmat also expressed his gratitude to the Department of Veterinary Services (DVS), Malaysia, for their excellent proactive actions taken during the avian influenza outbreaks in the northern Malaysian state of Kelantan in August 2004. Even though no human was affected by avian influenza in Malaysia during that incident, he recognized that the threat of avian influenza to humans is real and consequently expressed a desire for all countries in Asia to adopt the joint FAO/OIE/WHO guidelines for action that would be produced by the three Organizations following the Consultation.

Dr Joseph Domenech, Chief of Animal Health, FAO, welcomed all participants on behalf of FAO. He noted the severity of the avian influenza crisis in Asia and highlighted the commitment of countries in fighting the disease. In providing an update and in presenting FAO's considerations, Dr Domenech emphasised the tripartite FAO, OIE and WHO support for vaccination; raised the need for further investigation of the role of wildlife and pigs in transmission of the disease; noted the need to ensure that new research findings are confirmed before making the findings publicly aware; and requested information on the use of antiviral drugs in China. Dr Domenech then highlighted the diversity and extensive nature of FAO action in response to avian influenza, including having established clear guidance on avian influenza control strategies. He concluded by reinforcing the purpose behind the Consultation and urged the participants in the Consultation to focus on identifying practical ways in which to reduce the risk of avian influenza to humans.

Dr Teruhide Fujita, Regional Representative of the OIE regional representation for Asia and the Pacific, made an opening presentation on behalf of OIE Headquarters and the Regional Representation for Asia and the Pacific, Tokyo. Dr Fujita commented that avian influenza is a complex disease that warranted a relentless global fight. He brought to the attention of the Consultation that OIE, FAO and WHO have collaborated and spared no effort in responding to the outbreaks of avian influenza in the Region. Dr Fujita then informed the Consultation of recent activities and developments related to OIE standards, guidelines, recommendations, networks and committees, including the launching of a joint FAO/OIE network of expertise on

avian influenza (OFFLU). Dr Fujita also reminded the participants that the effective implementation of risk reduction measures would require veterinary services to be provided with the necessary infrastructure and resources, and emphasized the importance of funds being made available not only to combat a human pandemic, but also to combat the disease at source – in animals.

Dr Shigeru Omi, WHO Regional Director, Western Pacific Region, made the opening address on behalf of WHO. Dr Omi expressed concern about the risk of a global human influenza pandemic, stating that the avian influenza virus continued to present a grave danger to global public health. Dr Omi reported that H5N1 had so far resisted all attempts to dislodge it from the environment and that it remained endemic across large parts of the Region. He noted that the virus had now reappeared in China, killing thousands of migratory birds in Qinghai; that in Indonesia, continued outbreaks had led to the slaughter of hundreds of thousands of poultry in the first five months of the year; that in Cambodia, where there had been no human cases until December last year, there were now four recorded cases; and that in Viet Nam there were roughly twice as many human cases this year as last year. He informed the Consultation that there was still a chance to make a mark on history by stopping this virus by establishing a comprehensive and realistic strategy that the three organizations and the affected countries can use to declare all-out war on avian influenza. He then highlighted three key areas that he considered central to any strategy: (1) intelligence (the need to know more about the virus's habits and movements, both in humans and animals); (2) the need to employ vaccination of birds as part of a comprehensive elimination strategy; and (3) the need to go back to the interface between humans and animals and change the dangerous ways in which animals are raised and marketed for the table. Dr Omi recognized that action would be costly but noted that the window of opportunity to prevent a pandemic was limited. He urged countries to speed up their work on pandemic preparedness.

The opening session then concluded with a formal welcome from His Excellency, Tan Sri Dato' Haji Muhyiddin bin Haji Mohd. Yassin, Minister of Agriculture and Agro-industry (MAAI) on behalf of the Government of Malaysia. The Minister, in recognition that the avian influenza virus may be mutating, that there may be many variations of the avian influenza virus in circulation, and that the close proximity of humans to animals during rearing and handling could be increasing the risk to humans of becoming infected, noted the importance and timeliness of the Consultation. His Excellency, Tan Sri Dato' Haji Muhyiddin bin Haji Mohd. Yassin, also welcomed the close collaboration and cooperation between the three international organizations that deal with animal and human health, i.e., FAO, OIE and WHO, and stated that such cooperation was essential for effective outbreak response. Such multisectoral cooperation should also extend to national, provincial and local authorities if avian influenza is to be controlled. An example of effective collaboration was, it was reported, illustrated by the cooperation shown by agriculture, health, customs, police and security forces during the 2004 outbreak in Malaysia. The Minister then provided a brief description of Malaysia's experience with Highly Pathogenic Avian Influenza before highlighting that until and unless the disease is eradicated in the animal population, the risk to human health and the possibility of a human pandemic would remain.

His Excellency, Tan Sri Dato' Haji Muhyiddin bin Haji Mohd. Yassin, then informed the Consultation of the establishment of the ASEAN HPAI Taskforce as agreed by the Twenty-sixth Meeting of the ASEAN Ministers on Agriculture and Forestry (AMAF) and the Fourth Meeting of the ASEAN Ministers on Agriculture and Forestry Plus Three (ASEAN +China, Japan and Korea), held in October 2004 in Yangon. The task force, under the chairmanship of Malaysia, is in the process of finalizing a programme and action plan. The Minister then urged OIE, FAO and WHO to use this platform for regional collaboration. In conclusion, His Excellency, Tan Sri Dato' Haji Muhyiddin bin Haji Mohd. Yassin, reminded the Consultation that it was better to

identify a few practical and achievable risk reduction measures than a number of ideal measures that countries could not implement.

2.2 Session 1a: Identifying current high-risk practices and regulation gaps in Asia

Dr A. McLeod, FAO, opened the first technical session by describing the animal production systems in Asia and their relationship to the spread of avian influenza in birds. In this presentation, the diversity of systems throughout Asia was highlighted. Some issues relating to this that were raised for the Consultation's consideration included how the poultry population and total output have grown rapidly since the mid 1980s, matching a growing demand for poultry products. Growth is projected to continue for the next 10-20 years. In East and South East Asia, supply and demand for pigs are also growing. The livestock that play a part in avian influenza (AI) epidemiology also make an important contribution to GDP.

Dr McLeod further noted that at least five types of production systems can be found, including caged songbirds and fighting cocks, making it impossible to develop a "one size fits all" recommendation for avian influenza control. In different Asian countries, each system assumes a greater or lesser level of importance. Every country has some smallholder producers and in many countries they are very numerous.

Dr McLeod then brought to the attention of the Consultation key factors affecting the spread and control of avian influenza including:

- the production ecology (e.g. ducks in wetlands, backyard systems where multiple species scavenge together and have contact with wild birds, proximity of birds and people, intensification of production, where densely packed commercial units may create a heavy virus load for workers and nearby farms);
- the entrepreneurial nature of small commercial producers and traders; and
- the different ways that commercial and smallholder systems manage.

Dr McLeod then addressed the need for the Consultation, in the following days to consider two types of changes:

- (1) changes to the management of livestock production systems, based on existing technical knowledge. Each recommendation carries potential social and economic consequences; and
- (2) changes to the way that we view the problem in its institutional and environmental setting, so that we may be able to propose solutions previously not considered.

Dr J. Gilbert, WHO, together with Dr Ly Sovann, Ministry of Health, Cambodia, updated the temporary advisers on the current situation with respect to avian influenza, its transmission and its risk to humans. The latest epidemiological curve was presented and it was noted that human outbreaks have occurred in three phases or waves. Dr Gilbert told the Consultation that in Thailand, although there have been no cases confirmed since October 2004, the Government remains highly vigilant. Since 1 January 2005, 615 suspect cases have been investigated and excluded, and currently 2 patients are under investigation. Reviewing publication of a series of 12 cases in Thailand and 10 cases in Viet Nam, it was noted that all patients had exposure to ill or dead poultry or were involved in slaughtering or preparation of poultry for consumption. These confirmed the current hypothesis that exposure to infected poultry presents the principle risk to humans. Preliminary unpublished data from the 87 cases in Viet Nam further supports

this hypothesis as contact with poultry or high-risk behaviour was documented in 56 of these patients. Dr Gilbert and Dr Ly Sovann also pointed out that limited human-to-human spread cannot be ruled out. The situation of four cases in Cambodia (all fatal) also supports this, although limited information is available on their exposure history. However, it was known that two of these cases had previously handled poultry carcasses.

Dr T. Fujita, OIE, addressed the importance of stopping the risk of avian influenza for humans and animals at source. He highlighted the need to: enhance surveillance and diagnosis capacity; establish transparent and timely notification; ensure early detection; implement early responses supported by appropriate regulations related to animal movement control, stamping-out policy, carcass disposal and hygiene including disinfection; and strategically use vaccines where appropriate, under the supervision of veterinary authorities, and with a post vaccination monitoring system. Dr Fujita also noted that there were a number of supporting elements that needed to be acted upon to enhance the effectiveness of the aforementioned control measures. These supporting elements include the strengthening of national veterinary services; improving regulatory enforcement; establishing good communication and networking with all stakeholders; implementing joint action by veterinary and human health services; and strengthening public awareness of and preparedness for avian influenza.

Dr Arayan Trangarn reminded the experts at the Consultation of key market chain determinants and socioeconomic impacts of HPAI. In so doing, he stated that poultry production has a lengthy supply chain that, according to FAO, could be grouped into four sectors.¹ In addition, certain features of market chains including structure and governance are likely to have a major effect on the spread of avian influenza and the control process. Since there are diverse determinants in risk reduction for each market chain, a single across-the board resolution would not be effective to control AI. Furthermore, economic consequences from any control measures for each market chain are undoubtedly dissimilar. Dr Trangarn concluded that all stakeholders should commonly assume that AI is now endemic in the region and thus public resources should be sufficiently allocated in terms of loans, subsidies, or grants to control the disease.

2.3 Session Ib: Group discussions to identify current high-risk practices and the regulatory environment in Asia

Group discussions to (1) identify current practices employed in the production and marketing of live animals in Asia which can have potential human health implications; and to (2) assess the scope and effectiveness of current regulatory control measures applied to the

¹ Sector 1: Industrial integrated system with high-level biosecurity and birds/products marketed commercially (e.g. farms that are part of an integrated broiler production enterprise with clearly defined and implemented standard operating procedures for biosecurity).

Sector 2: Commercial poultry production system with moderate to high biosecurity and birds/products usually marketed commercially (e.g. farms with birds kept indoors continuously; strictly preventing contact with other poultry or wildlife).

Sector 3: Commercial poultry production system with low to minimal biosecurity and birds/products usually entering live bird markets (e.g. a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed; a farm producing chickens and waterfowl).

Sector 4: Village or backyard production with minimal biosecurity and birds/products consumed locally.

production, distribution and marketing of live animals for food in Asia were conducted. Each group had a facilitator, rapporteur and member of the secretariat to help in its deliberations. Group discussions are reported in Annex 3.

2.4 Session IIa: Regulatory control and risk reduction measures

Dr Howard Wong presented a paper entitled "Guidance on appropriate regulatory control and risk reduction measures along the production and marketing chain", which was accompanied by a supporting paper prepared by Ms Rhonda Lo entitled "Preventive and surveillance measures in retail outlets in Hong Kong, China". The presentation described the control measures used by authorities in Hong Kong (China) in previous avian influenza outbreaks; the surveillance programme currently in place along the production and marketing chain; biosecurity measures implemented at all control points (including farms, wholesale markets and retail markets) and regulatory measures introduced by the Government. The poultry vaccination programme was also described. Dr Wong stressed that vaccination was not a panacea but only part of a wide-ranging set of measures designed to keep the virus out of the poultry industry and also reduce the direct contact of poultry by humans. He also reported that Hong Kong (China) had, over the past five years, tested more than 9000 blood samples from pigs and no H5 positive serology had so far been detected.

Dr Vincent Martin, FAO, and Dr Dwi Asih, Animal Health Division, Indonesia, identified practical avian influenza risk reduction measures on sector 1-4 farms in Asia. They stressed that to better understand the risk that avian influenza poses to human health, there is a need to better understand: the epidemiology and ecology of the virus; the cultural practices, behaviour and awareness and education of the people in Asia; and Asia's production systems. Dr Martin then focused attention on four risk reduction measures: (1) increased biosecurity; (2) surveillance; (3) animal vaccination; and (4) education and training. He then went on to identify the key issues and challenges associated with each of these measures and concluded that priority must be given to sector 3 and 4 farms; that any risk reduction strategies will have political, legislative and financial implications; and that action now would be an investment in the future.

Dr Andrew Kiyu, in his presentation on risk reduction in the wet markets of Asia, noted both that wet markets are a way of life in Asia and that transmission of avian influenza from poultry to poultry and from poultry to humans can take place in these markets. With this in mind, Dr Kiyu identified risk factors in such markets and discussed various risk reduction strategies and actions. In so doing, he employed frameworks which addressed (1) short-, medium- and long-term risk reduction measures; (2) the avian influenza disease status of the situation (e.g. free, endemic, epidemic, and post-epidemic); (3) disease prevention levels; (4) epidemic control; and (5) the use of a healthy settings approach. Dr Kiyu recommended a coordinated plan for risk reduction measures using a healthy marketplaces approach. In such an approach, the need to identify and involve all key stakeholders to undertake a situation analysis in markets and to develop a healthy market plan were described.

Dr Nguyen Hung Long and Dr Ly Sovann presented on reduction measures in living with animals and handling food in Asia. The former speaker provided a background on key agencies involved in avian influenza response in Viet Nam and laid out priority actions being undertaken to respond to and control avian influenza in that country. These included: continued and intensified surveillance; early detection and management of the outbreaks; public education on television, radio and newspapers; establishment of a comprehensive plan for response and preparedness in case of a pandemic; coordination between health and agriculture authorities; implementation of clean-up campaigns, making them routine activities at a community level; investment in appropriate laboratories; and continuing internationally collaborative research.

Dr Ly Sovann pointed the Consultation to the real difficulties encountered in reducing the risk of avian influenza to humans when: many families have back yard poultry which are used for income generation; poultry raising is considered a useful poverty alleviation strategy by nongovernmental organizations; dead and sick birds are commonly consumed as they are considered an important source of protein; a lack of compensation to farmers who report sick birds limits their willingness to report; surveillance is not optimally effective as use of public health facilities in general is very low; and when private doctors are not required to report the occurrence of disease in humans. Despite such concerns it was recognized that there was an urgent need to introduce risk reduction measures in living with animals and handling food in Cambodia. Dr Ly Sovann reported efforts to employ public education (through mass media, community participation through village volunteers, use of non-government organizations such as Medicam, and public forums) to reduce the risk. Key messages were focused on minimizing contact with dead or sick poultry; good personal hygiene including frequent hand washing and bathing; protection during culling or slaughtering; good food hygiene; and reporting of sick and dead poultry. In addition, it was reported that it was useful to train public and private clinicians and village health volunteers to assure early detection of cases; to train and expand rapid response teams; to use intersectoral collaboration; and to carry out research on knowledge and practice, on seroprevalence in the community, and on cases and carriers.

Ms Malichanh Srithriath spoke on effective education as an important tool for risk reduction. In the presentation, the attention of the temporary advisers was drawn to the need to set up clear objectives; to be clear about what behaviour changes are to be targeted; to identify the right audience; and to select the right tools for getting the information to the correct audience. As an example of a useful approach to education, Ms Malichanh Srithriath provided the approach taken by the Lao People's Democratic Republic in relation to avian influenza. She highlighted the use of diverse communication tools including print media, posters, radio, press releases, and regular informal person-to-person communication. The speaker further provided a number of recommendations including: study what tools are most appropriate to the situation; establish a collaborative network to synergistic effect; and properly budget and finance efforts at education.

Dr D. Sibartie, OIE, focused the Consultation's attention on the need for strengthening of veterinary services to better control avian influenza. In his presentation he noted that veterinary services cover the veterinary administration, veterinary authority and all persons registered by the veterinary statutory body. Thus, any strengthening of veterinary services needs to address both public and private veterinarians. Dr Sibartie further advised the Consultation that strengthening of veterinary services would enhance efforts to prevent entry of avian influenza into a country; enable greater attention to preventative surveillance; facilitate prompt and reliable diagnosis of avian influenza; permit immediate stamping-out followed by disinfection; and strengthen many other control measures, including vaccination, that would prevent the spread of the infection to humans. In his presentation, Dr Sibartie also made reference to the OIE Terrestrial Animal Health Code and the *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*, especially in relation to preventative surveillance. In conclusion, he emphasized that by strengthening veterinary services one could better combat the virus in the animal source, and that if this was done in collaboration with public health inspectors, avian influenza could be more effectively controlled. Together, they would be able to apply risk reduction measures along the whole production and marketing chain and increase the probability that the spread of avian influenza to humans on a wider basis than now being observed could be prevented.

Dr Haji Ramlee bin Haji Rahmat provided the Consultation guidance on efforts needed to strengthen the capacity of health workers to reduce the risk of avian influenza infecting humans. In so doing, he noted that Malaysia views the threats of emerging infectious diseases seriously as it had experienced an outbreak of EV 71 encephalitis, which killed 35 children in 1997, mainly in the state of Sarawak, and an outbreak of Nipah encephalitis, which resulted in 105 deaths in

1999. Dr Haji Ramlee bin Haji Rahmat provided details of how Malaysia is strengthening its capacity to deal with emerging and re-emerging infectious diseases including increasing human and laboratory resources in the Institute of Medical Research and National Public Health Laboratory; renovating six Ministry of Health's state hospital mortuaries for carrying out infectious diseases post-mortems; strengthening the existing surveillance system; initiating an epidemic intelligence programme; and training of medical teams in infectious diseases management.

In response to the outbreak of avian influenza in Kelantan, there was enhanced surveillance; opening of operations rooms at state and district levels; enhanced risk communication and public health education, including daily reporting to the Minister of Health, Director-General of Health and other relevant stakeholders; enhanced infection control measures in hospitals receiving patients with respiratory infections; fast tracking of analyses; and monitoring of staff from the Ministry of Health and from the Veterinary Health Department who were involved in any way with infected poultry. In conclusion, Dr Haji Ramlee bin Haji Rahmat noted the importance of cooperation, coordination and sharing of valuable information on outbreaks by relevant agencies in the country and abroad.

2.5 Session IIb: Group discussion on regulatory controls and risk reduction measures

Group discussions to draft clear guidance, conclusions and recommendations on regulatory controls and risk reduction measures were conducted with each group having a facilitator, rapporteur and member of the secretariat to help each group in its deliberations. Four groups were established in this session on the following topics:

- (1) guiding regulatory control to address avian influenza in Asia;
- (2) risk reduction measures on sector 1-4 farms in Asia;
- (3) risk reduction measures in living with animals and handling food in Asia; and
- (4) risk reduction measures in the wet markets of Asia.

Findings from group discussions are captured in Annex 4.

3. FINDINGS

3.1 Unprecedented widespread outbreaks of avian influenza

The unprecedented widespread outbreaks of avian influenza in many countries in Asia, and the demonstrated capacity of the avian influenza H5N1 strain to directly infect humans and cause death, have together significantly increased the risk of the emergence of a human influenza pandemic.

To date, 108 cases of infected humans have been reported across three countries with 54 deaths, the majority of who were people who had been closely associated with sector 4 farms, i.e. backyard or scavenging chicken farming. However, the virus has yet to develop efficient human-to-human transmission. Thus, there is still the opportunity to take action that focuses on reducing the risk of the virus establishing the attributes and prevalence necessary for a pandemic.

With this in mind, there is an urgent need to address the root cause of the situation – the way in which humans interact with and handle the production (especially backyard farming production), distribution, processing and marketing of animals for food.

3.2 Current practices employed in the production and marketing of live animals in Asia which can have potential human health implications

The urgency for action by international and regional organizations; national and local authorities; and the farming and marketing community itself is required by the diversity of high-risk practices associated with the production and marketing of animals for food, the way in which humans live with animals in Asia and the way in which animals are prepared for food.

In farming of poultry, high-risk production practices include the farming of multiple species of animals, including poultry and waterfowl, within one farm unit; the keeping of chickens over fish ponds; the use of untreated chicken faeces as fertilizer or livestock feed; the inappropriate disposal of dying and dead birds; the use of surrogate birds to incubate eggs of different species; and the lack of adoption of "all-in, all-out" husbandry systems.

The Consultation also recognized the role that live animal/wet markets have played in the emergence of avian influenza. In 1992, live poultry markets in the United States of America were considered the "missing link in the epidemiology of influenza". They were identified as the source of the H5N1 infection in chicken farms in Hong Kong (China) in 1997, when approximately 20% of the chickens in live poultry markets were found to be infected. The same situation was seen in Viet Nam, where the circulation of H5N1 in geese in live bird markets in Ha Noi had been documented three years before the 2004 outbreaks in chicken farms.

In this regard, it was noted that a number of high-risk practices are commonly employed in the wet markets of Asia². These include an apparent regional preference for 'warm' meat which in itself is a contributing factor leading to the persistence of live bird markets in Asia; the limited

² In essence, a wet market is a place either fixed or temporary, where members of the public go to buy small animals and birds that are: (a) live and slaughtered there, (b) live and taken home to be slaughtered, or (c) already slaughtered and sold as meat.

application of good hygiene, cleaning and disinfection; the keeping of multiple species together and in confined spaces; the stacking of cages on top of one another; poor ventilation; the lack of pre-marketing health checks; a lack of training and education of stall owners; and a lack of personal protective equipment for stall owners. It is also considered a high-risk practice for birds that have been held for selling in markets (but which have not been sold) to be returned to the farms from which they came.

In the general community, especially in communities associated with sector 4 (backyard) farms, birds commonly enter homes without restriction, children keep poultry as pets and in many cases prized birds (especially fighting cocks), and sometimes other birds are housed in the family home.

3.3 A diversity of regulations are currently used to control avian influenza in Asia

To address such high risk practices there is a need to develop, review, and strengthen the existing regulatory controls in Asia, as appropriate to the differing country situations. In so doing, it is essential to recognize that there is a diversity of production systems and regulatory environments across the Region.

Currently, the most comprehensive regulatory control has been implemented in Hong Kong (China). In direct response to the avian influenza outbreak it had experienced in 1997, Hong Kong (China) has introduced an extensive range of regulatory measures on the production, importation and sale of live birds to Hong Kong (China). The measures that Hong Kong (China) put in place have included requiring vaccination of all Hong Kong farmed chicken and all chickens imported from mainland China (the main source of live poultry for Hong Kong [China]); farm structural changes including installation of bird-proof facilities to prevent possible avian influenza transmission from wild and migratory birds; the use of sentinel chickens (i.e., unvaccinated chickens) that are to be placed in each batch of vaccinated chickens; the registration of all farms; requiring quarantine, inspection, sampling and testing as well as health certificates for each consignment of imported chickens; requiring that all birds are held in a single wholesale market before being sold by retailers; monitoring of the bird population for dead and sick birds and the surrender of any such birds for analysis; prohibiting the mixing of different types of poultry in order to reduce the interspecies transmission of avian viruses and to minimize the opportunity for re-assortment of the viral genes; requiring that waterfowl are centrally slaughtered; ensuring that waterfowls are slaughtered in central facilities and the carcasses and offal of waterfowls are packed individually and separately respectively to prevent cross-contamination; prohibiting the sale of live quail in poultry retail outlets; introducing mandatory rest days when retailers must slaughter all remaining live poultry on the premises before designated hours of the days and suspend their business thereafter to allow thorough cleaning and disinfection of the premises; and inspecting compliance of rest day requirements and removing the tenancies/licences of those contravening the requirements.

Other countries have legislation addressing containment of avian influenza which can provide the framework for effectively containing outbreaks once they occur. Malaysia is noted to have a strong piece of legislation capable of providing authorities the capacity to effectively respond to animal disease outbreaks.

Viet Nam has also responded to the current avian influenza outbreak and other animal disease outbreaks by establishing a number of regulatory controls related to breeding, slaughtering, transporting and trading in animals for food. However, a number of gaps remain between legislation and enforcement.

In some other countries of the region the focus is on early detection and stamping out of avian influenza, and legislation does not permit vaccination of birds in order to give greater emphasis to these strategies.

Finally, some countries have general regulations related to the registration and licensing of livestock, poultry and poultry by-products handlers and distributors. In Indonesia, Cambodia and the Lao People's Democratic Republic such general legislation exists.

3.4 Short-term risk reduction-measures to protect human health from avian influenza

If countries are to focus on situations where humans appear at greatest risk, priority must be given to sectors 3 and 4 farms and associated communities where humans live in very close proximity to the animals they or other community members are raising.

If there is existing active infection, the situation is one where sector 4 biosecurity cannot be improved and there is significant challenge from highly pathogenic avian influenza (HPAI) viruses, including infection in neighbouring villages, wild birds, domestic ducks or bordering countries, then veterinary authorities should consider vaccination strategies (as part of a multi-element response) to minimize propagation by this sector, to protect susceptible birds from infection and to manage human health risks.

In sector 4 production systems, where chickens are fully susceptible to infection with HPAI and there is a high risk of infection, it may be appropriate to vaccinate all chickens. In the case of outbreaks, stamping out remains the primary method.

The use of vaccination must be coupled to surveillance in accordance with OIE guidelines to promptly detect any virus circulation or change in properties. Vaccination must also be carried out with appropriate products, manufactured and quality-controlled to ensure compliance with international standards referred to in the *OIE Manual for Diagnostic Tests and Vaccines for Terrestrial Animals*.

The 'differentiation of infected from vaccinated animal' (DIVA) approach is recommended either through the use of an appropriate diagnostic test or the use of sentinel birds. Furthermore, vaccination teams should be trained in biosecurity measures, in vaccination procedures and in public health measures, including the correct use of personal protective equipment.

The methods and tools to be used to prevent and control avian influenza have been fully described in the FAO document "FAO Recommendations on the Prevention, Control and Eradication of HPAI in Asia", which was prepared in collaboration with OIE, in September 2004.

There is also an urgent need to know more about the virus and how it circulates. Thus, one of the first areas for joint action for animal and human health authorities should be to enhance the intelligence available to international organizations by providing more human and animal viruses for sharing with animal and human laboratory networks. Efforts should also be made to share data from seroprevalence studies, studies of infections transmitted among humans and studies of infections transmitted from animal to humans.

The Consultation recognized the importance of improving disease notification to health and veterinary authorities and recommends that incentives which include a combination of financial, competition (perception of doing better than others), and peer pressure, if appropriate, should be applied to increase the willingness of farmers in disease reporting.

Other regulatory controls that were seen as of importance in the short term for countries where avian influenza is reported were regulatory controls addressing: outbreak management, including the stamping out of defined infected flocks; the protection of farmers and workers; appropriate carcass disposal; cleaning and disinfection; movement control; surveillance in high risk populations; import control and quarantine; and registration and licensing of sectors 1 and 2 farms.

3.5 Short- to medium-term risk reduction measures to protect human health from avian influenza

Governments, industry associations, and farmers in sectors 1-3, all need to support and/or implement good farming practices, including enhanced biosecurity, at poultry farms and associated premises. The barriers between farms and their outside environments need to be more effectively managed, including closer control over the movement of the many people, animals and inanimate objects entering and leaving farms.

The exclusion of wild birds from farms merits particular mention because of the potential for wild birds (especially waterfowl) to harbour HPAI viruses. Wild birds may come into contact with farmed poultry directly (especially if the farmed birds are free-ranging) or indirectly (via contamination of feed and water). The latter pathway is especially important for farmed ducks reared on ponds and for farmed chickens whose drinking-water is obtained from ponds. The use of nets to exclude wild birds should therefore be promoted in sector 3 farms. In sector 3 farms, interspecies segregation by fencing is achievable in the short to medium terms.

Where exclusion of wild waterfowl from ponds cannot be done, drinking-water for poultry that is obtained from these sources should be treated or taken from uncontaminated sources such as wells. In addition, possible contaminated water from ponds where waterfowl are kept should be used only for cleaning operations.

It is possible to reduce the risk of a HPAI outbreak and to improve control over a disease situation by limiting or modifying farming practices that would otherwise facilitate viral spread. For example: (1) restrict the practice of farming multiple species; (2) limit or eliminate the practice of raising and transporting waterfowl and quail with other poultry as well as pigs; (3) provide incentives to duck farmers to reduce the high-risk practice of moving duck flocks from harvested paddy fields over what can prove great distances; (4) use chicken faeces only as fertilizers or livestock feed after appropriate treatment; (5) restrict multi-age poultry farms; and (6) wherever possible (especially in sectors 1-3), operate on an 'all-in, all-out' basis.

The Consultation also recognized that the implementation of improved hygiene and animal management and handling practices in the wet markets of Asia would contribute to limiting the spread of the HPAI virus (and other pathogens). For example:

- The implementation of measures during transport to reduce the risk of faecal contamination of roads and the area around markets when cages and poultry are brought to the market and off-loaded.
- When introducing poultry to the market, the separation of species along the length of the production and marketing chain. A very simple means of achieving this is to keep separate species in different cages.
- The monitoring of birds in the market to continually assess their health or disease status is important as is regular surveillance, sampling and analysis (inclusion of

sick and dead birds in any surveillance, appropriate disposal, and necessary action taken for other birds in the market).

- The separation of the poultry selling area from other areas of the market. This is considered useful as it will reduce the opportunity for poultry to contaminate the environment, other products and consumers not involved in the purchase of poultry.
- The regular emptying of a market of all animals for a defined period while the market is cleaned and disinfected. This is considered good hygienic practice as such action plays an important role in preventing the build-up of pathogens (even in avian influenza-free countries and areas);
- The establishment of facilities for cleaning and disinfection of transport cages before they are taken back to farms. Cages can be modified for ease of cleaning and disinfection (e.g. wooden cages could be replaced by metal, plastic or other appropriate materials).
- The addressing of the arrangement of cages and their structure so as to reduce cross contamination of chickens with faecal matter and pathogens from other poultry or birds. For example, if cages need to be stacked on top of each other, chickens should not be placed below other poultry or birds. Also, a waste tray could be used underneath the cage.
- The modification of the structure of cages to reduce the risk of faecal contamination of the environment and humans (e.g. acrylic partitions can be used to reduce the contact between humans and poultry). In addition, the cages and trays may be collected and washed in a special room and appropriate waste treatment systems may be considered appropriate. Where humans and birds come into contact, it is useful to also provide adequate hand-cleaning facilities.
- The traceability of birds back along the production and marketing chain. This is an important aspect of avian influenza control.
- The establishment of a biosecure and hygienic slaughtering process. This is essential for avian influenza (and other pathogen) control. Those involved in the slaughter of poultry in the market should also take the necessary precautions to avoid carrying any contamination outside the market.

A number of other regulatory controls that need to be considered on a medium-term basis include the enhancement of biosecurity and management for poultry slaughterhouses and processing plants and movement control for poultry/birds raised for recreational activities.

Attention needs to be given to the social and economic costs that will be incurred as a result of HPAI risk reduction measures in marketplaces, slaughterhouses and processing plants. These costs need to be adequately foreseen and considered before planning and taking action. Costs may be incurred by governments and the private sector. For example, public funding may contribute to investment in infrastructure, publicizing activities, carrying out inspections, or compensating farmers for loss. Private market managers may contribute to reorganizing market layout, provision of equipment, or additional cleaning. Market traders may lose income from rest days or other forced interruption of trading, which may not be made up by extra sales at other times. Publicly funded activities may draw from general taxes, or from levies on the

livestock sector or joint public-private trust funds. In addition to financial costs, some risk reduction may require changes to well established habits, such as feeling (by touching and handling) the condition of a bird before purchase.

3.6 Short- to long-term risk reduction measures to protect human health from avian influenza

The application of control measures, some of which may result in or require the restructuring of the poultry sector, will have significant social and economic consequences as producers and traders in sectors 3 and 4 find themselves unable to meet new requirements. These impacts must be specifically addressed and mitigation measures must be foreseen and included in policy planning and implementation.

In addition to the often considerable economic costs, change of practice can be inconvenient and difficult and tends to be resisted. None of the countries included in the consultation has seen the spontaneous adoption of risk reduction practices, except by small groups of consumers switching to supermarket purchases. It has always been necessary to combine general awareness raising, regulation and long-term community action.

Education is an essential component of any avian influenza prevention, control or eradication strategy. Establishing an education strategy is particularly important to reduce the public health risk, especially in sectors 3 and 4. This programme of education should include the provision of information on what influenza is, how it is transmitted as well as the identification and elimination of risk behaviours. The target audience for such education and awareness programmes on poultry diseases (including HPAI) should target farmers, at-risk rural and urban communities; nongovernmental organizations; and other national and international organizations that are involved in promoting livestock for poverty alleviation.

In order to reduce the risk of avian influenza infection in people living with animals and handling of food in Asia, priority attention again needs to be given to those at highest risk. These would include: (1) women and children in resource-poor communities; (2) low-income households who may share their living space with their animals; (3) ethnic minorities who often live in remote areas; (4) those involved in high risk food handling and consumption (e.g. those preparing chicken intestines or eating coagulated duck blood); (5) those who have high-risk companion and prized birds; (6) and village-to-village traders. In addition, attention should be also given to medical personnel, laboratory personnel and animal cullers.

Education strategies could include:

- (1) community awareness activities, school-based education programmes, and mass media (radio, television, print media, etc.) programmes;
- (2) community-based outreach and training activities where the community takes a participatory role; and
- (3) the use of (a) community champions or focal points who can also be active in community surveillance (it may be useful to provide such persons an incentive to implement surveillance and reporting); (b) village volunteer workers; (c) village veterinary workers; (d) local authorities; (e) teachers; (f) youth associations; and (g) women's associations.

Before initiating such education strategies, it would always be essential to have identified and initiated a programme of evaluation of education effectiveness in relation to its ability to bring about behaviour change.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

If countries are to focus on situations where humans appear at greatest risk, priority must be given to sectors 3 and 4 farms and associated communities where humans live in very close proximity to the animals they or other community members are raising. However, there is still a need to reinforce biosecurity measures in sectors 1 and 2 also.

In the situation where there is a significant challenge from HPAI and biosecurity cannot be improved in a particular country or area, veterinary authorities should consider vaccination strategies in animals (as a part of a multi-element response to avian influenza) to better protect human health. In some countries or parts of countries massive vaccination could be the only way to first reduce the infection in poultry so as to further reduce human exposure and infection. In others, where stamping out without vaccination can be achieved, the authority of countries to prohibit the use of vaccination needs to be respected. The use of vaccination must be coupled to appropriate surveillance and must be carried out with appropriate products, manufactured and quality-controlled to ensure compliance with international standards referred to in the OIE *Manual for Diagnostic Tests and Vaccines for Terrestrial Animals*. Stamping out, in case of outbreaks, remains a primary measure to be implemented. The methods and tools to be used to prevent and control avian influenza have been fully described in the FAO document “FAO Recommendations on the Prevention, Control and Eradication of HPAI in Asia”, which was prepared in collaboration with OIE in September 2004.

There is an urgent need to strengthen disease notification to human health and veterinary authorities, especially in association with sectors 3 and 4 farms, including considering all appropriate options to increase the willingness to report.

There is also an urgent need to know more about the virus and how it circulates. Thus, one of the first areas for joint action for animal and health authorities should be to enhance the intelligence available to international organizations by providing more human and animal viruses for sharing with animal and human laboratory networks. Collaboration between the joint FAO/OIE network of avian influenza (OFFLU) and the WHO influenza networks should be encouraged. Efforts should also be made to share data from seroprevalence studies, studies of infections transmitted among humans and studies of infections transmitted from animal to humans.

In the short to medium term, there is a need to implement good farming practices, including enhanced biosecurity, at poultry farms and associated premises; interspecies segregation by fencing on sector 3 farms (segregation should apply to chickens, ducks and pigs as well as quails and other relevant species); and by limiting or modifying farming practices that would otherwise facilitate viral spread.

In relation to legislation, although deficiencies in regulatory control were identifiable in a number of countries of the Region, the regulatory situations in these countries seem to be adjusting relatively quickly in response to the occurrence of outbreaks. Thus, while regulations could be further enhanced in the Region, the efficacy of regulatory enforcement remains an issue of greater concern. There remains, in many countries, a significant gap between legislation and enforcement, particularly in the least developed countries where there are limited human resources, infrastructure and financial resources. Such deficiencies result in less than optimal

enforcement and an inability to effectively control HPAI. Major efforts need to be committed to enhancing governance and increasing effective enforcement of existing legislation.

Wherever possible, legislation should aim to be risk-based. This allows regulators to focus on laws and regulations that when implemented will have an impact on the risk. In some areas, information on the epidemiology of the virus is limited. Hence, it is crucial to better understand the role of certain animal species such as wildlife and pigs in the epidemiology of avian influenza before authorities implement regulatory controls, in particular those relating to the culling of these animals.

To enhance regulatory controls, a number of supporting elements must also be in place, including improved disease awareness and communication at all levels from policy makers to grass root levels; resource mobilization to effectively enforce the regulations; information system and mapping of poultry distribution and movement flow to support decision-making; incentives such as adequate compensation to support the notification and stamping out measures; international support to facilitate the development of legislation; the active involvement of stakeholders in formulating new regulations; and research related to implementation of legislation (e.g. economic as well as social impacts of prevention and control measures).

The consequences of control measures, as well as the restructuring of the poultry sector, will have significant social and economic consequences. These must be specifically addressed and mitigation measures must be foreseen and included in policy planning and implementation.

There is a need also for an enormous effort to bring about behavioural change through education, awareness and health promotion. As in any effort to bring about change a diversity of approaches should be considered with an emphasis on community-based participatory action and mass media community awareness campaigns.

National, provincial and local authorities should also consider the appropriateness of the healthy settings approach and of other approaches in efforts to reduce the risks to human health associated with the wet markets of Asia. In so doing, consideration should be given to describing the marketplace, identifying high-risk areas and practices in the marketplace; identifying the members of the market community; engaging champions and drawing up a prioritized list of possible changes to fit the local situation; identifying changes that may be relatively simple and likely to show positive impact and start with these; exploring various possible sources of finance; engaging the interest of politicians and local government. To address all the steps necessary, including those that relate to pre-market action, a medium- to long-term approach needs to be taken. The healthy markets approach uses a participatory process and inter-sectoral collaboration in a way that will allow effective control of avian influenza.

Recognition that developing a comprehensive approach to preventing and controlling avian influenza will have social and economic consequences which may impact greatest on sector 3 and 4 is essential. Therefore, close attention must be given to ensuring that impacts are assessed in advance of implementing any strategy to reduce the risk of avian influenza to human health, and mitigation measures are built into the strategy.

Any comprehensive approach to avian influenza prevention and control will require significant technical and financial resources to be provided by the governments. However, as many low income countries are involved they are unlikely, on their own, to have sufficient resources to meet all requirements. The support of the international community is therefore crucial.

4.2 Recommendations

In order to reduce the risk of avian influenza to human health, it is essential to consider the countries according to their current situation. For those countries in which sectors 3 and 4 farms are a dominant feature of the production systems, or where humans live in very close proximity to the animals, and where the majority of human cases are occurring, the Consultation made the following recommendations:

4.2.1 Vaccination

- (1) Vaccination programmes should be implemented (as part of a multi-element response) in particular in sector 4 farms.
- (2) Vaccination programmes should be coordinated with surveillance and monitoring activities for virus circulation and evaluation of programme efficacy.
- (3) Vaccination should be carried out with appropriate products manufactured and quality controlled to ensure compliance with international standards referred to in the OIE *Manual for Diagnostic Tests and Vaccines for Terrestrial Animals*.
- (4) Sector 4 farmers in areas where HPAI is endemic, should identify sources of suitable expertise and funds. In such circumstances, and given that vaccination of backyard chickens will benefit the wider poultry sector and reduce risks to human health, there is justification for financial support from governments.

In this context it is reiterated that stamping out defined infected flocks remains the primary measure to control HPAI in case of outbreaks.

4.2.2 Improving biosecurity

- (1) Sector 3 farms should be through improved biosecurity (e.g. by fencing, netting, species segregation), increased surveillance and banning certain high risk farming practices (e.g. use of contaminated water, recycling of poultry faeces).

However, while the above priority actions are necessary in the less biosecure farms and communities, in all sectors there still remains a need for the following activities:

4.2.3 HPAI epidemiology, diagnosis and vaccination measures

- (1) Joint medical/veterinary epidemiological analysis should be strengthened to better understand risk contamination pathways between infected animals and humans.
- (2) Veterinary services should be strengthened to improve capacity to implement services including surveillance sampling and analysis.
- (3) Additional research should be undertaken in areas such as epidemiology, vaccines and rapid diagnostic tests.

4.2.4 Legislation

- (1) Legislation should be strengthened in key areas of outbreak management as a short-term priority concern.
- (2) The significant gap between legislation and enforcement, particularly in the less developed countries should be overcome by strengthening veterinary services, human resources and infrastructure and by ensuring adequate financial resources are available to authorities to address this important public health function.
- (3) A number of supporting elements should be in place to enable legislation to be effectively enforced. One very important supporting element in the short term is the implementation of incentives such as adequate compensation to support notification and stamping out measures.

4.2.5 Education

- (1) An education strategy should be established to reduce the public health risk, especially in sectors 3 and 4. Implementing effective education as a particularly important means of reducing the risk to those producing, marketing and living with poultry, especially in sectors 3 and 4 farms.

4.2.6 Taking action in the wet markets of Asia

- (1) Action should be at an appropriate level (national, provincial, local authority or market level) to enhance the biosecurity of the wet markets in Asia in order to reduce their role in the emergence and persistence of avian influenza.

4.2.7 Call to action by countries of the region and support from the international community

Countries are urged to take guidance from the findings of the Consultation in developing, modifying and implementing their national avian influenza prevention and control programmes.

As a consequence of the significant public health concern associated with the avian influenza situation in animals there is also an urgent need for more investment in preventing, controlling and eradicating avian influenza disease in Asia. There is an urgent need for assistance from the international community to enable infected countries to put into place vaccination programmes and initiate improved biosecurity in sector 3 and 4 farms. At the same time, there is a need for the long-term sustainability of such programmes from national funds to be addressed.

Without substantial national and international financial and technical support, avian influenza will continue to be a significant public health and animal production issue in many countries in Asia and the risk of a human influenza pandemic occurring will remain.

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CONSULTATION AGENDA

1. Opening Session
2. Adoption of Agenda
3. Session Ia: Identifying current high-risk practices and regulation gaps in Asia
4. Session Ib: Group discussion to capture broad range of high risk practices and broad regulatory environment in Asia
5. Session IIa: Regulatory control and risk reduction measures
6. Session IIb: Regulatory controls and risk reduction measures (group discussions)
7. Plenary discussion to identify risk reduction strategies and to draft clear guidance, conclusions and recommendations
8. Presentation and adoption of guidance, conclusions and recommendations by the meeting
9. Closing

SESSION 1 GROUP DISCUSSION FINDINGS

Group discussions to (i) identify current practices employed in the production and marketing of live animals in Asia which can have potential human health implications; and to (ii) assess the scope and effectiveness of current regulatory control measures applied to the production, distribution and marketing of live animals for food in Asia were conducted.

Identifying current practices employed in the production and marketing of live animals in Asia which can have potential human health implications

Four species of poultry (chicken, duck, pigeon and quail) and pigs were identified as the major food animals raised in animal production systems in Asia.

In considering which of the current practices employed in the production and marketing of live animals in Asia might have the potential human health implications, the groups attention was drawn first to the identification of high-risk poultry farming practices. In this respect, sectors 1 and 2 farms were not considered high-risk provided they employed proper biosecurity measures. However some practices that might lead to the spread of avian influenza were identified as being relevant to all sectors. These included:

- Farms of all sectors sometimes being located near roads making them susceptible to becoming contaminated via aerosols being created by passing transport vehicles contaminated with the virus;
- Farms of all sectors commonly having ponds situated on them and the water could become contaminated by waterfowl;
- In all sectors, disposal of dead birds may not always be satisfactory and burning or burying of dead birds may be incomplete in several situations; and
- The common practice of farm workers keeping birds at home and introducing infection into commercial or semi-commercial farms.

In all sectors, other than sector 1 farms, it was considered common to:

- Use untreated chicken faeces as fertilizers or livestock feed;
- Not use an all in all out system of animal husbandry;
- Move unsold market birds back to farms – a practice that could lead to the virus being introduced to the farm from the marketplace;
- Use unclean egg collecting equipment; and
- Employ high risk practices with fighting cocks – one such practice was considered to be the sucking of nasal discharges from a fighting cock after a fight.

Many poultry farming practices were identified as being more common in sectors 3 and 4 farms. These included:

- Multi-species farming including ducks, chickens and pigs all in one epidemiological unit (In this regard it was noted that one study had shown that, in Viet Nam, the relative risk of a chicken being infected with avian influenza is eight times higher for those chickens kept together with ducks than for those not kept with ducks);
- Keeping of chickens above fish ponds which could lead to an increased chance of chickens coming in contact with wild waterfowl; and
- Unattended birds frequently entering domestic premises, particularly in sector 4 farms.

The group also noted high risk practices associated with food preparation and consumption in Asia. These included: (i) the prevalence of rudimentary kitchens, food preparation and food waste disposal systems in Asia; (ii) the scavenging of offal that has been improperly disposed of; (iii) the consumption of food comprising raw chicken or duck blood; and (iv) the tendency for farmers to prepare, cook and eat sick or dead birds.

In relation to the marketing of birds and the wet markets of Asia, the group recognised several high-risk practices including:

- A lack of regulatory control over the movement of birds to markets and therefore a lack of any traceback system;
- The possible role that the movement of small traders played in spreading disease from farm to farm and from village to village;
- A lack of pre-market health checks;
- The quick slaughter and marketing of birds when clinical sickness becomes evident in a flock, thus spreading disease into markets;
- The carrying of live birds on public transport – it was felt that this could increase the risk of human exposure to infected birds;
- Regional preference for ‘warm’ meat leads to existence of live bird markets;
- Poor sanitation and disinfection in marketplaces;
- Multi-species kept in confined spaces in markets;
- Poor ventilation was prevalent in markets;
- The limited training provided to stall owners; and
- Stall owners not having access to any personal protective equipment.

It was thought that even with the large number of high risk practices identified, the limited number of reported human cases and epidemiological studies made it difficult at this stage to

assign a cause and effect relationship between the identified practices and the occurrence of avian influenza in humans with any certainty. Future research, with an emphasis on systematic surveys of human cases, might lead to further clarification of the role of these high risk practices in the transmission of avian influenza to humans.

Assessing the scope and effectiveness of current regulatory control measures applied to the production, distribution and marketing of live animals for food in Asia to minimise human health risk

The group discussing the current status of regulatory control concluded that in any assessment of the scope and effectiveness of current regulatory control measures applied to the production, distribution and marketing of live animals for food in Asia, there is first a need to recognize the diversity of production systems, regulatory environments and regulations across the Region. The following information reflects the observations of the group.

The most comprehensive regulatory control has been implemented in the People's Republic of China's Special Administrative Region of Hong Kong (Hong Kong, China). In direct response to the avian influenza outbreak it had experienced in 1997, Hong Kong, China, has introduced an extensive range of regulatory measures on the production, importation and sale of live birds to Hong Kong, China. The measures that Hong Kong, China, put in place have included requiring vaccination of all Hong Kong farmed chicken and all chickens imported from mainland China (the main source of live poultry for Hong Kong); farm structural changes including installation of bird-proof facilities to prevent possible avian influenza transmission from wild and migratory birds; the use of sentinel chickens (i.e. unvaccinated chickens) that are to be placed in each batch of vaccinated chickens; the registration of all farms; and requiring quarantine, inspection and sampling and testing as well as health certificates for each consignment of imported chickens. Only lots of chickens certified to be H5 antibody negative are permitted to be imported.

Hong Kong also requires that all birds are held in a single wholesale market before being sold by retailers, that the bird population is monitored for dead and sick birds during marketing and that any such birds will be surrendered for analysis and should HPAI be detected all live poultry must be surrendered for disposal.

In Hong Kong, China, regulations prohibit the mixing of different types of poultry in order to reduce the interspecies transmission of avian viruses and to minimize the opportunity for reassortment of the viral genes. Waterfowl must be centrally slaughtered and no live waterfowl may be sold in retail outlets. Also the offal of waterfowl slaughtered in central facilities are to be packed separately from any other animal slaughtered in the facility and to be packed in individual packages to prevent cross-contamination. Segregation of quail from chickens is also required and live quail cannot be sold in retail markets. This latter limitation was introduced in response to H9 and H6 influenza viruses carried by quail having mixed with H5N1 virus. In Hong Kong, China, the prohibition of the marketing of live aquatic birds is believed to have reduced the number of subtypes of influenza viruses found there.

Rest days in markets have been introduced as a mandatory measure in Hong Kong China to reduce the potential for avian influenza to develop and spread among birds and humans. In Hong Kong SAR, on the rest days the owners and operators of market poultry stalls and fresh provision shops must slaughter all remaining live poultry on the premises before noon and suspend their business in the afternoon and evening to allow cleaning and disinfection of the premises. All poultry retailers must strictly observe these conditions. Each poultry outlet is inspected on the rest day and failure to comply with the conditions of the rest day leads to the immediate cancellation of what is called a "Fresh Provision Shop" license or market stall

tenancy. The introduction of 'rest days' in the markets has been shown to reduce the 'viral load' in live poultry kept in the markets. These 'rest days', were initially required once monthly and then increased to twice monthly.

Mainland China also has much legislation addressing production, transportation, processing and marketing of live animals for food. The central legislation is a national epidemic law. This is currently under review. Banning the sale and slaughter of particular species in live markets is a widespread practice. In China regulations limit the sale and slaughter of pigs in marketplaces and, in response to the SARS crisis, civet cats were banned from live animal markets. However, it also needs to be recognized that production systems are quite different across the country (eg the production of broiler chickens is a major feature of east and north-east China while in the middle of China the focus is on layers and in the west and north-west the focus is on sheep and goats). National level has contingency plan for AI. Deputy Prime Minister is the head of control at the national level, and local. Different standards are existing. Compensation differs in areas. Central government pays 80% payment, provincial level very different - e.g. Shanghai 2 days close per month. Main problem is that governors are responsible due to different rules/high level of autonomy. National regulations are not always affect provinces.

Other countries have legislation addressing containment of avian influenza which can effectively control outbreaks once they occur. Malaysia, for example, uses the Animal (Health) Ordinance of 1953 which it is felt remains a strong piece of legislation capable of providing authorities the capacity to effectively respond to animal disease outbreaks. In the HPAI outbreak of 2003 it was this legislation that enabled Kelantan to implement border controls in the border areas with Thailand; and to control the movement of animals from the affected area, including implementing 24 hour road blocks. The implementation of these controls requires cooperative action of the police. Other regulations in place in most states of Malaysia require the licensing of new commercial farms. Before issuing of licenses, the location is inspected for suitability. More recently all states have initiated poultry legislation that addresses where poultry farms may be located and which establish poultry production zones. Where relocation of an existing business is required, basic infrastructure is provided by government. Regulatory control is also applied in the quarantining of imported animals; in slaughtering; and in the processing of animals for export.

In addition to national and state legislation, local authorities can establish by-laws. In this respect local authorities commonly establish by-laws which address wholesale and smaller retail markets; the use of veterinary drugs; and slaughtering requirements. In Kuala Lumpur, for example, there is no slaughter house for poultry.

In Malaysia it should also be noted that there are different laws in Sabah and Sarawak. In the latter state a Veterinary Public Health Ordinance was established in 1999. This legislation addresses the import and export of animals and animal products; allows for measures to address animal movement management; enforces licensing of livestock farms; regulates management of slaughterhouses; and addresses transportation of meat and meat products and animal meal.

The legislative environment in Thailand reflects the fact that it is a major exporter of poultry. As a consequence, the government responded very quickly to the outbreak of avian influenza in 2004. However it could be noted that most regulatory attention was paid to sector 1 and 2 farms involved in export while less attention was focused on sectors 3 and 4 farms. Of course sector 1 and 2 businesses are often capable of implementing control measures themselves, especially where they are exporting to overseas markets such as the European Union and the USA.

In Japan, regulatory control both regulatory control and enforcement are quite strong. The focus for Japan is on early detection and stamping out of an avian influenza at the earliest opportunity. As a consequence, Japan does not permit vaccination. In addition, legislation prohibits slaughter of poultry outside a slaughterhouse in Japan.

Viet Nam has also responded to the current avian influenza outbreak and other animal disease outbreaks by establishing a number of regulatory controls related to breeding, slaughtering, transporting and trading in animals for food. However, like many countries in the region, Viet Nam has diverse systems of animal production and different approaches to regulatory control across the country. Each province has its own regulations and capacity to enforce these. For example, Ho Chi Minh City has recently prohibited slaughtering of poultry in its wet markets, however, there are many settings in Viet Nam where such regulatory control would be more difficult to implement effectively. Thus, in rural or village settings, the community itself is very important in establishing control procedures. In such situations, the awareness and education of all stakeholders is as important, if not more important, than regulatory control.

Other countries have general regulations related to the registration and licensing of livestock, poultry and poultry by-products handlers and distributors. In Indonesia, Cambodia and Lao PDR such general legislation exists. However, an issue of concern for the Region is the gap between legislation and enforcement. In Indonesia for example, recent changes at a national level have resulted in the relocation of veterinary services and a shortage of officers in the field. This has led to difficulty in disease reporting and response. Cambodia has recently established a sub-decree on the sanitary inspection of animals and animal products in compliance with the WTO-SPS agreement requirements. However, for Cambodia too the limited human resources, logistics capacity, infrastructure and financial resources result in less than optimal enforcement and an inability to effectively control animal movement. Another aspect that needs to be considered in addressing regulatory controls in Cambodia is the structure of farming in that country as sector 1 farms do not exist and most poultry are raised in the sector 4 situation. Thus while some sector 2 and 3 businesses are registered, most poultry farms are not. In fact current legislation does not even entitle sector 4 farms to register. In Lao People's Democratic Republic (Lao PDR), sector 4 farms are also the most frequent structures involved in the raising of poultry. Again this limits the effectiveness of any regulatory control. Still legislation has been introduced to ban import of poultry from affected countries. It is unclear how effective these bans are however to date no case of avian influenza has been reported in Lao PDR. In relation to other regulatory controls it can be noted that only a very general regulation on hygiene exists which briefly mentions market hygiene. Again there is a gap between the requirement for market hygiene and the reality of the situation in many locations.

In any assessment of the scope and effectiveness of current regulatory control measures applied to the production, distribution and marketing of live animals for food in Asia, there is also a need to recognize the movement of some countries to decentralize their regulatory control. For example Cambodia, Indonesia and the Philippines are currently implementing programmes aimed at decentralization. In Cambodia, provincial declarations are given preference over national laws. In Indonesia however there is now draft legislation before Parliament that aims at greater control of districts to better address outbreaks of avian influenza.

Although regulatory control deficiencies are notable in several countries of the Region, the regulatory situations in these countries seem to be fast adapting to the more disease control-demanding state posed by the endemicity of avian influenza in the Region. While regulations could be further enhanced in the Region, the efficacy of regulatory enforcement remains a major issue of concern.

SESSION 2 GROUP DISCUSSION FINDINGS

Regulatory controls to address avian influenza in Asia

The group given the task of identifying regulatory controls to address avian influenza in Asia were provided the findings of the previous group that looked at the current status of regulations addressing avian influenza and zoonoses control and their enforcement in Asia. The group noted the great diversity of regulatory controls and how they are applied in Asia. The group further recognized the differences that exist in enforcement capacity across the region. With this in mind the group determined that some regulations were essential to have in place in the short-term, while others might be brought into being in the medium term and still others should be considered in the long term. Each country should consider such regulations according to their individual needs and according to feasibility of implementation within a country. The group identified the need for countries to consider introducing regulatory controls that address: (i) transparent and timely notification of suspected avian influenza cases; (ii) outbreak management; (iii) movement control; (iv) surveillance in high-risk populations; (v) import control and quarantine; and (vi) registration and licensing of sector 1 and 2 farms. These were seen as being regulatory controls that should be considered in the short term.

The group proposed that in the medium term countries should consider introducing regulatory controls that require: (i) single species farming systems; (ii) enhancement of biosecurity and management for sector 3 farms; (iii) enhancement of live bird markets and slaughter management, in densely populated areas; (iv) enhancement of biosecurity and management for poultry slaughterhouses and processing plants; and (v) movement control for birds raised for recreational activities.

In considering regulatory controls that countries should introduce once other regulations are in place, the group concluded that there might be a need to introduce registration and licensing of sectors 3 and 4 farms. Also it was noted that if additional measures such as vaccination are implemented, regulations would be needed: (i) to ensure vaccination must be implemented under supervision of veterinary services; (ii) for post-vaccination monitoring to assess the efficacy of the vaccination process; (iii) to put in place surveillance that can differentiate whether detected antibodies were produced against vaccination or against infection; and (iv) to ensure the quality of vaccines used and the administration processes must meet OIE standards. It was further noted that non-infected countries, or zones in a country with limited disease incursion, must have the power to prohibit the use of vaccines.

To enhance the above regulatory controls, the group considered that the certain supporting elements must be in place. These supporting elements included: (i) improved disease awareness and communication at all levels from policy makers to the grass root level; (ii) resource mobilization to effectively enforce all regulations; (iii) information systems and mapping that could support risk management by providing information on poultry distribution and movement; (iv) incentives, such as compensation, to support notification processes and stamping out measures; (v) international advice on regulatory developments; (vi) adequate research to address problems in implementation; and (vii) the completion of cost effectiveness and social impact studies to determine the appropriateness of regulations.

Risk reduction measures on sector 1-4 farms in Asia

The group that addressed risk reduction measures on sector 1-4 farms noted that a number of international and regional meetings have already been held on the subject of control of HPAI in Asia, including risk reduction strategies at farm level. The outcomes of those meetings and the FAO document “FAO Recommendations on the Prevention, Control and Eradication of HPAI in Asia”, which was prepared in collaboration with OIE, in September 2004, were used as a general framework to discuss risk reduction measures at farm 1 to 4 level in this Consultation. The group focused on sector 3 and sector 4 farms as they represent both a higher level of risk for public health and a greater challenge to achieve reduction of the risk for humans. In relation to farming systems, it was concluded that infection is less likely to occur in sector 1 and 2 farms, providing that biosecurity is maintained. By definition, production sectors 3 and 4 are not biosecure and include pond-based rearing systems and free ranging ducks associated with rice production.

The group noted the importance of improving disease notification to health authorities, especially in sectors 3 and 4 and recommended that incentives should be provided to farmers to increase their participation in reporting schemes. It was also stressed that joint epidemiological and risk analysis should be conducted by the veterinary and medical sectors in order to understand the epidemiology of HPAI in humans.

The group also recognized that effective biosecurity depends on the formation of a barrier between farms and the outside environment. This sounds simple but can be difficult to implement successfully in practice. Many items and people routinely enter poultry farms, including replacement birds, feed, water, farm workers, veterinarians, poultry buyers and catchers, and vaccination crews. It was noted that farm workers should not be allowed to keep poultry at home. The exclusion of wild birds from farms merits particular mention because of the potential for wild birds (especially waterfowl) to harbour AI viruses. It was observed that wild birds may come into contact with farmed poultry directly (especially if the farmed birds are free-ranging) or indirectly (via contamination of feed and water). The latter pathway was considered especially important for farmed ducks reared on ponds and for farmed chickens that drink from the same ponds. The use of nets to exclude wild birds should be promoted in sector 3, it was suggested. Wild waterfowl should thus be excluded from ponds or, if this cannot be done, drinking water for poultry that is obtained from these sources should be treated or taken from uncontaminated sources such as wells. In addition, possible contaminated water from ponds where waterfowl are kept should only be used for cleaning operations.

It is possible to reduce the risk of an HPAI outbreak and to improve control over a disease situation by changing farming practices that facilitate viral spread. Domestic waterfowl are known carriers of avian influenza viruses and the practice of farming multiple species presents a risk of transmission between waterfowl reservoirs of infection and terrestrial poultry. As a consequence, the group recommended that the practice of raising and transporting waterfowl and quail with other poultry, as well as pigs, be limited or prohibited. Duck farmers, who are moving duck flocks from harvested paddy fields (sometime in trucks) on long distances from province to province, are employing a very high-risk practice that should be banned since they are likely to be maintaining and spreading infection. Incentives should be provided to these farmers in order to generate alternative sources of income. Other risk reduction measures considered by the group include: (i) chicken faeces as fertilizers or livestock feed should only be used after appropriate treatment; (ii) commercial farms belonging to sectors 1, 2 and, if possible, 3 should operate on an ‘all-in all-out’ basis; (iii) catchers and other workers coming into direct contact with poultry, should strictly practice biosecurity measures, such as cleaning and disinfecting protective clothing, equipment and footwear, before entering and leaving farms; and (iv) licensing or registration of commercial farms.

The group further noted that during transport, measures should be implemented to reduce the risk of faecal contamination of the area around markets when cages and poultry are off-loaded. Facilities for cleaning and disinfection of transport cages before they are taken back to farms should be implemented. Cages used for carriage of birds from farms to markets should be constructed of material that can be easily cleaned and disinfected. The group therefore preferred the use of plastic or metal compared with the use of wood for cages.

The use of vaccination was considered as an import risk reduction measure. The group considered that such a measure must be coupled to surveillance to promptly detect any change in properties (antigenic change) of the circulating virus. It was also stated that vaccination must be carried out with appropriate products manufactured and quality controlled to ensure compliance with international standards referred to in the OIE Manual for Diagnostic Tests and Vaccines for Terrestrial Animals. The differentiation of infected and vaccinated animals (DIVA) approach is recommended either through the use of an appropriate diagnostic test or the use of sentinel birds. The group also concluded that vaccination should be employed in sectors 3 and 4 poultry farms where there is evidence of a high prevalence of infection in wild birds as well as in free-ranging duck rearing systems to minimize the risk of human infections. In the situation where farm/village/backyard biosecurity cannot be improved and there is significant challenge from HPAI viruses, including infection in neighbouring villages, wild birds, domestic ducks or bordering countries, veterinary authorities should consider vaccination strategies to minimize propagation by this sector, to protect susceptible birds from infection and to manage human health risks. In backyard production systems where the chickens are fully susceptible to infection with HPAI and there is a high risk of infection, it may be appropriate to vaccinate all chickens. Vaccination teams should be trained in biosecurity measures, in vaccination procedures and in public health measures, including the correct use of personal protective equipment (PPE).

The group also considered that education is an essential component of any avian influenza prevention, control or eradication strategy

Risk reduction measures in living with animals and handling food in Asia

The group addressing risk reduction measures in living with animals and handling food in Asia focused their attention on:

- Women and children in resource-poor communities as they may often have frequent contact with animals and be involved in care and raising;
- Many low-income households share living space with animals;
- Ethnic minorities who often live in remote areas;
- Those involved in high risk behaviours such as eating duck blood; and
- Village to village traders.

The group also noted that legislation is not an appropriate strategy to achieve risk reduction among those living with animals and handling food in Asia. In reducing the risk to the above key groups it was considered essential to encourage behaviour modification through community awareness programmes. It was recognized that the content of any such awareness programmes needed to be evidence-based and appropriate to the community; it should contain clear messages; and should not cause excess reaction or panic within the community. These

community awareness programmes should also have an effective and regular system of monitoring and evaluation.

Risk reduction measures in the wet markets of Asia

The group addressing risk reduction measures in the wet markets of Asia began by getting consensus on what constituted a "wet market". They concluded that it is easy to "see" a wet market but it is not easy to define. The term is used to describe a wide variety of facilities; some are covered and modern; others are in open spaces; and yet others may be considered as farmers' markets, where anyone can come and sell anything. The group considered that the term could be applied to those that sell live poultry, those that hold live poultry and slaughter as required by the customer, those that sell "warm" meat and the poultry have been slaughtered near-by and those that sell chilled or frozen meat. It was also recognized that in addition to poultry, fish and other meat, there may be live animals such as civet cats, snakes, frogs, and pigs, for sale in a wet market.

In essence, a wet market is a place either fixed or temporary, where members of the public go to buy small animals and birds, either: (a) live and slaughtered there, (b) live and brought home to be slaughtered, or (c) already slaughtered.

In discussing the need for market community involvement in the identification and implementation of risk reduction measures the group noted that there is a diversity of stakeholders who need to be engaged. These stakeholders were considered to include:

1. Planning, finance and regulatory authorities:
 - a. Various levels of government – Central, state or provincial, district and local authorities;
 - b. Various Governments Ministries and Departments– Economic Planning Units, Finance Ministry;
 - c. Regulatory bodies and agencies responsible for human and animal health – licensing, enforcement from Local authorities, veterinary authorities and health authorities;
2. Vendors and those involved in the slaughter of poultry;
3. Customers, visitors and passers-by;
4. Suppliers and transporters;
5. Cleaners and sewage and drainage staff;
6. Market owners and market managers;
7. Trade associations – Poultry Traders Association;
8. Local politicians; and
9. Surrounding communities.

The group concluded that there is a need to increase any market community's awareness of high risk practices because in most cases, they are unaware that the age-old practices that they have been doing are risky, and it may be expensive or inconvenient to change them. In addition to raising awareness, it was considered important to engage key champions who will promote new ideas within the market community and to ensure political commitment was present as this was necessary to secure finance and facilitate regulatory changes. The key champions may be diverse. For instance in Marikina City, in the Philippines the mayor has been an important champion for healthy marketplaces. In Hai Phong, Viet Nam, the Ministry of Health initiated the process and the mayor and local authorities continued to drive it. In all countries, the process needs the highest level of political commitment backed by adequate resources, to ensure that they get started, to weather opposition to the changes, and to ensure that change is sustainable. It was also considered that it may be easier to "seize the moment" to do something in an emergency than to try to make changes when the risks seem remote. The animal and human health authorities have to take the leadership in increasing this awareness and in facilitating the necessary changes. Changes will occur slowly and need to be implemented step by step. "Pull" and "push" strategies may both be necessary.

In considering examples of approaches from countries in the region, attention was first drawn to Hong Kong, China. In Hong Kong, China, the government used the mass media to increase the awareness and support of the general public first, before approaching the market and trade leaders to discuss the implementation of the proposed measures. A series of steps had been introduced since the 1997 outbreak, beginning with basic hygiene measures, and progressing to two rest days a month when wholesale and retail markets are shut down. After initial resistance from vendors because of loss of income during rest days, they have found that now more customers go to the market to buy chicken because they think the market is cleaner. By contrast, in Malaysia, where most people think that the threat of avian influenza is not serious or practically non-existent, the challenge is how to create the demand for change. In Laos, it was difficult to raise awareness because the community was scattered. In Vietnam, in spite of the severity of the outbreak and the government's efforts to raise awareness using posters, leaflets, and loudspeakers at the markets, it has taken a long time for people to change their practices. In Marikina, which has adopted the healthy market approach and made customers aware of the public health risks, customers are willing to pay slightly higher prices if they know that the goods are clean and safe. It was also important to train the food inspectors and other regulatory authority staff, and to inform the mayors and councilors about food risks.

Although it was considered important to raise the awareness of suppliers of chicken to the markets, different countries have very different situations. Hong Kong, with its short supply chain was able to register farms that supply the market. In countries where many different traders bring poultry, it is impossible to register all of them and difficult even to mount an effective awareness campaign.

A series of measures were discussed. Some of them were relatively simple and cheap to implement while others require considerable financial resources and time. Changes are best considered step-by-step, beginning with the simplest ones.

- Safer transport of birds to the markets - Birds should be transported in a manner that prevents the pollution of the environment. In developed countries and areas of the region this could include the use of enclosed transport vehicles, while in the less developed areas, the mechanism might be more rudimentary such as a closed basket on the back of a motor cycle.
- Separation of species - A very simple change is to keep separate species in different cages.

- Segregation of poultry from other sections of the market - The general principle is to prevent people from carrying birds around the market and poultry from polluting other commodities. Many markets already separate poultry sections.
- Rest days - It is a good practice to empty and disinfect the market on a regular basis. This improves hygiene and prevents the build-up of pathogens, and should be done even in AI-free countries. However, it will result in costs to the government to publicise the activity and carry out inspection. In addition there will be loss of income for the market traders on rest days that may not be made up by extra sales on other days. It may be necessary to impose strict sanctions against traders who break the rules. Hong Kong currently has two rest days a month.
- Moving chickens out of the market at night - In Vietnam, some poultry markets are emptied at night so that they can be cleaned and disinfected. The market management pays for cleaning.
- Improve cage design - If wooden cages are changed to metal, it would be easier to clean them well. If cages need to be stacked on top of each other, a waste tray prevents droppings from passing through to the birds below. In Hong Kong, the trays are collected and washed in a special room. Other countries would need appropriate waste treatment systems. Acrylic partitions can be used to reduce the contact between humans and poultry. The cost of the cages would be borne by the owner; the waste treatment systems might be difficult to implement in some markets.
- Hand wash basins in markets - This encourages people to wash their hands after touching the chicken. The market management should pay the costs.
- Surveillance for sick birds - This includes monitors walking around the market, and laboratory tests of sick or dead birds. The costs would be borne by the government.
- Chillers - These are used for storing dressed poultry while waiting for customers to come back to collect them. The traders have to pay the investment and electricity cost.
- Traceability - For a first requirement, chicken sellers need to keep records of sources of birds. This has been implemented in Hong Kong, but may difficult to apply in other countries.
- Slaughtering process - A biosecure slaughtering process would include recognizing and destroying sick birds, safely handle chicken and meat, and changing clothes before going home or before entering the house.
- Upgrade or restructure an existing market - This might be done when the market needs considerable changes but cannot be moved, due to lack of space for a new one or very strong public resistance to moving. This is usually cheaper than building a new market. Like a new market, there is a temporary loss of income as well as the infrastructure costs. The infrastructure might be financed by the public or private sector.

- Rebuild the market or move market - This should be done only when absolutely necessary, when all other alternatives fail or when it is necessary as part of city planning. For example, in Malaysia there were complaints about the environmental pollution from markets and so some of them were relocated. But in some cases there were considerable resistance from the market community. The cost of building a market depends on the location, but it is always expensive. In addition to the cost of the building, there will be temporary loss of income and social costs of moving. Not all cities have land easily available. The infrastructure might be financed by the public or private sector.

In introducing change to any market community there is a diversity of stakeholders who need to be engaged. One effective means of doing this is through the healthy marketplaces approach. The healthy marketplaces approach uses a participatory process and inter-sectoral collaboration in a way that will allow effective control of avian influenza.