



African Union

Interafrican Bureau of Animal Resources
Regional SPINAP-AHI Coordination for Eastern Africa

AU/IBAR-CHINA
ASSISTANCE PROTOCOL ON THE
PREVENTION AND CONTROL OF HPAI IN AFRICA
CHINA-AFRICA FRIENDSHIP



**Six-month Africa mission of China's experts
on HPAI control**

Final Report

Nairobi/Kenya, Bamako/Mali, November 2007

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1 Background

On January 12, 2006, the Chinese government officially issued China's African Policy. The document reviews the process of China-Africa friendship, expounds China's views on the status and role of Africa and comprehensively plans bilateral friendly cooperation in the political, economic, cultural and social areas in the new period. The document proposes that the Chinese government commits to establishing and developing a new type of China-Africa strategic partnership featuring political equality and mutual trust, economic win-win cooperation and cultural exchange by starting from the fundamental interest of the Chinese and African people.

The arrival of highly pathogenic H5N1 avian influenza on the African continent has been of great concern for human as well as animal health, though the densities of human and poultry populations are generally lower in Africa than in South-east Asia. The H5N1 avian influenza had broken out in China since the late of 2004. Chinese people have experienced the crisis that caused by avian influenza and gained plenty of helpful methods in HPAI control.

Against this background, the Chinese government decided to send China's experts team on HPAI control. This is an important action that evidently shows that the Chinese government and leaders have always attached great importance to Africa and always allocate developing bilateral traditional friendly cooperative relations special concern.

2 Objectives

1. Providing recommendations on the establishment of adequate surveillance and reporting system for highly pathogenic avian influenza (HPAI), diagnostic laboratory system, prevention and control system, and assisting AU/IBAR to set up HPAI surveillance network based on the investigations and assessment on the husbandry industry and animal epidemics in Africa;
2. Providing recommendations on rational allocation of HPAI diagnostic laboratory hardware and working staff at national and regional laboratories, assisting AU/IBAR to design and establish national HPAI diagnostic laboratory to improve the HPAI diagnostic capacity; and
3. Assisting training for senior African officers engaging in HPAI prevention and control to improve the HPAI prevention and control technology through special lectures and presentations on HPAI prevention and control knowledge, technology and measures.

3 Duration of the implementation

The duration of the implementation is six months, which is started from March 30th to September 29th, 2007.

4 Experts dispatched

4.1. Nairobi team

Dr. Hualei Liu, Epidemiologist, Chief of Mission (and Overall/general Chief)

Dr. Jianzhong Shi, Laboratory expert

4.2. Bamako team

Dr Wang Junwei, Avian Influenza Expert, Chief of Mission

Dr Yang Huanliang, Avian Influenza Expert

Mr Fan Huan, Interpreter

5 Work plan

The project is divided into three phases, namely: preparatory, implementation and summary phases.

5.1 Preparation phase

The purpose of this phase is to set up the detailed implementation scheme based on the discussion between AU/IBAR and the Chinese experts. The scheme included the following subjects and issues: main activities, budgets, staff involved in the mission, information collection, confirmation of visiting countries, the training programme and relevant presentations. The Chinese experts prepare the training course of HPAI in cooperation with AU/IBAR staff and give some presentations to share the experience on prevention and control of HPAI from China in relevant countries (Kenya, Djibouti, Sudan, Togo, Ghana, Benin and Mali).

5.2 Implementation phase

The main phase activity was to focus on monitoring and evaluating the effectiveness and efficiency of the National Emergency Response Action Plans (ERAP), so as to identify the existing gaps or weaknesses in the current plans, and give some suggestions or guidelines to update and upgrade the action plans. In order to share the experience on prevention and control of HPAI from China in relevant African countries, training, including presentations, was provided by the Chinese experts and AU/IBAR.

- Main activities have been performed on the countries which had been supported by African Development Bank (AfDB) to make the integrated national action plan on prevention and control of HPAI. Three countries, namely Djibouti and Sudan, and Kenya for Nairobi team and four countries namely Benin, Ghana, Togo and Mali for Bamako team, were involved in the missions for both team.
- The main objective of the mission was to assist AU/IBAR to monitor and assess their national action plan and emergency plan in ADB-supported countries, analyze

the existed gaps, and make suggestions to upgrade the action plans into an integrated action plans.

- Another sought objective was to help AU/IBAR to perform training courses on prevention and control of HPAI, and share the experience on prevention and control of HPAI from China in eligible countries. The Chinese experts give presentations that focused on prevention and control policies (based on OIE and FAO recommendations, and the specific policies adopted in China), surveillance strategies for HPAI, AI diagnostic technology (based on OIE criteria and the Chinese experience) and proper vaccination policy and its implementation in China.

5.3 Summary phase

In this phase, the Chinese experts with AU/IBAR staff summarize the whole project, and made the final report to AU/IBAR. The Chinese experts have discussed as well with Director of AU/IBAR the possibility of extending the cooperation plan upon consulting with the Chinese government.

6 Mission and activities

6.1 Activities and missions for the team in Nairobi, AU/IBAR head quarter:

6.1.1. Activities and Missions to Kenya, Annex 1.

6.1.2. Activities and Missions to Djibouti, Annex 2.

6.1.3. Activities and Missions to Sudan, Annex 3.

6.2 Activities and missions for the team in Bamako:

6.2.1. Activities and Missions to Ghana, Annex 4.

6.2.2. Activities and Missions to Togo, Annex 5.

6.2.3. Activities and Missions to Mali, Annex 6.

7 Assessment of special intervention

Recommendation on prevention and control strategies in African countries

7.1 Current situation of the livestock industry in Africa

In Africa (Sub Sahara Africa), the livestock industry, especially the poultry industry, is extremely underdeveloped. The poultry population in Africa was estimated at around 1.36 billion bird at the end of 2005 mounting to 8% of total poultry population in the world. Chicken meat is identified as the main source of protein in lifes of SSA population. SSA has secured its needs of poultry portion through intensive importation of poultry and poultry product, mainly from Europe and Asia at an annual growth rate of 20%. On the other hand, growth in the local poultry industry has been stagnant. Simultaneously, the development speed of local poultry industry has been modest growing at an annual rate of 3 percent as related to output of eggs. Variations in economic and natural conditions in Africa have significantly contributed to the divergence in advancement level of poultry industry. According to field investigations conducted in Kenya, Djibouti, Sudan, Togo, Ghana, Benin and Mali, poultry industries in these countries have been found to be substantially varied. In Kenya, par example, the total poultry population was estimated at almost 30 million birds as follows: chicken 29.7 million and about 0.3 million other species such as goose, duck, turkey etc. Of the 29.7 million chickens, around 80% of chickens was reared at the backyards, 20% of chickens was reared commercially or semi-commercially for meat and eggs. The total poultry population in Mali was estimated at 47 million, which was made up of chicken 45 million and almost 2 million other species such as ducks, turkeys, geese etc. Of the 45 million chickens, about 25% of them were exotic breeds reared commercially or semi-commercially for meat and eggs. Sudan poultry industry was comparatively lagging behind, particularly in level of bio-safety. About 75% of chickens were reared at backyards, other chickens were reared commercially with notably low bio-safety level. Djibouti's poultry industry is on the extreme end with a total poultry population of

merely 6000 bird as of 2007. The population of the largest plant scale was about 200 and mix breeding.

7.2 Diagnostic capacity of the laboratory

In general, the diagnostic capacity on HPAI has been vastly feeble and with almost no capability of performing rapid detection and conformation of HPAI in most African countries. Most of African countries have no capacity to confirm the disease of HPAI, can not test the subtypes of avian influenza virus which resulted in the outbreaks. In addition, current surveillance and case reporting systems can not afford the demands of prevention and eradication of HPAI.. According to field investigations and the information captured from East Africa, including Kenya, Djibouti, and Sudan, and from Western Africa, including Mali, Benin, Togo and Ghana, experts have concluded that all of these countries posses no capacity of HPAI confirmation and can not perform virus isolation and characteristics identification of the pathogen. Kenya, for example, A number of faults have been identified in the current surveillance system. The network of diagnosis and surveillance on HPAI was established based on the surveillance system of Rinderpest. The human resources in the central veterinary laboratories, for example, consists of five staffs only, including merely one veterinarian while others are technicians, engaged in the viriological detection and diagnosis in the Central Veterinary Laboratory. Furthermore, the pathogens involved in the daily detection included RVF, ND, PPRV, etc. The bio-security level in the current national laboratory was very limited, likely just BSL-2, and could not afford the demands of bio-security to make conformation for most trans-boundary diseases. In order to confirm the pathogen of HPAI, the BSL-3 lab is essential to provide essential protection for the staff engaged in the detection of HPAI in the laboratory. Although they had one real time PCR cycles machine in the lab, it was only used for the detection of RVF. With an intensive training program, laboratory staff can play an important role in the early detection of HPAI in the country, so the RT-PCR method for detecting the HPAI should be set up in the laboratory to improve the diagnostic capacities on early

detection. There are six regional veterinary investigation laboratories, and the facilities in the labs need to be upgraded to play a role in the surveillance system on HPAI. At present, the activities they can perform on HPAI are very limited. These laboratories can play an important role in early warning system through performing the serological surveillance for HPAI, just like HI test. As human resources concern, staff in the RVIL should be recruited associated with intensive investment being allocated for availing diagnostic reagents and vehicles so as to collect necessary information actively and timely. Most of information on animal disease was provided by the infrastructure of the local veterinary services, so they should accept the systemic training on HPAI, just like diagnostic, samples collected, etc.

In Sudan, the diagnostic capacity of veterinary laboratories are also extremely limited with the national veterinary laboratory being the only laboratory that is capable of performing rapid antigen test and serological test. At present, there is a fluorescence PCR machine and it should play an important role in the surveillance system. In order to enhance the capacity on early detection and rapid response, the government needs to intensively allocate financial supports to the veterinary diagnostic laboratory for the procurement of several essential equipment and instruments to enhance the bio-security level. The surveillance system on HPAI is only focused on the collection of the epidemiological information. The laboratory does not possess the capacity of early detection.

In Djibouti, the diagnostic capacity of veterinary laboratory was found to be the worst in the three countries. In fact, there is no diagnostic network. The national veterinary laboratory is severely short of equipment, instrument and staff. Moreover, capacity of early detection and confirmation on HPAI is lacking. There are only four veterinarians working in the whole country with two of them working in the national veterinary department. One of them was a soldier in French army, while the other was a private veterinary. There is only one veterinary laboratory in Djibouti

For Western and Central Africa, Bamako team has assisted African countries to construct and improve the diagnostic laboratory on avian influenza, which was one of the important content of the exchange letters. The expert team has focused on the national veterinary center lab of Mali, veterinary labs of Togo, Benin, and Ghana. The expert team visited the lab and gave valuable instructional advices. In April and September, 2007, the experts visited LCV several times and had talk with the principal on the construction of HPAI lab and lab bio-security, and brought forward improvement suggestions on the overall arrangement and adjustment of the lab. Thanks for experts advices, virology laboratories have readjusted their disposition which significantly enhanced perceived capability in HPAI diagnosis.

National surveillance system

The national surveillance system was established based on the laboratory diagnostic system with the efficiency of the surveillance is closely related to the capacity of the diagnostic network. In light of the current status of existing diagnostic systems in most African countries, laboratory facilities do not have enough capacity to make early warning and confirm the disease of HPAI. At present, the surveillance systems in most countries are only capable of searching or collecting the epidemiological information. In more detail, field investigations conducted in Kenya, Djibouti and Sudan, all of the laboratories can not perform confirmation, virus isolation, characteristic research and even RT-PCR. A limited number of these laboratories can perform rapid antigen and serological tests. Taking into account the current diagnostic capacity, these laboratories can not meet the demands of the surveillance (active surveillance and passive surveillance). Therefore, the premises to establish and improve the efficiency of the current surveillance system must be based on the establishment and enhancement of appropriate diagnostic capacity in the laboratory.

7.3 Analysis of current control and prevention strategies

7.3.1 Current situations of HPAI in Africa

The first outbreak of HPAI in domestic poultry in Africa was reported in Nigeria on February 8, 2006. Since then, eight other countries (Niger, Egypt, Cameroon, Burkina Faso, Sudan, Cote d'Ivoire, Djibouti and Ghana) have been affected (Fig1). Because of its production systems, socio-cultural and trade practices (background rearing, legal or illegal traditional marketing systems, live bird markets, mixing species etc), African countries are exceedingly vulnerable and susceptible to HPAI. Thus, the rest of Africa is also at high risk. Of these affected countries, Egypt, Nigeria and Djibouti have reported cases in humans. At least 15 cases of human fatalities have been recorded on the continent out of 36 confirmed cases (14 deaths out of 34 confirmed human cases in Egypt, one death in Nigeria and one case in Djibouti).

Whereas the outbreaks of HPAI in Niger, Burkina Faso, Cote d'Ivoire, Djibouti, Sudan and Cameroon were localized and would thus appear to be largely under control. The HPAI situation in Nigeria and Egypt is yet serious demanding more concern and consideration as these countries still experience non ceased outbreaks and seem to be losing any sort of control on HPAI that has turned into an endemic disease. Taking into account of the application of the stamping out policy in Nigeria and a combination of culling and vaccination in Egypt, suggesting that the policies currently used for the control and eradication of the disease in Nigeria and Egypt are neither efficient nor effective enough.

The circulation of HPAI virus in poultry populations in Nigeria and Egypt will pose a threat to neighboring countries and the rest of the continent because the disease could easily spread through such avenues as trade in poultry and poultry products or via infected migratory bird movements. It is therefore of critical importance that the HPAI foci in Nigeria and Egypt are brought under control and finally eradicated. Concurrently, appropriate integrated regional strategies for the prevention of further spread across Africa will be equally necessary.



Fig 1 Distributions of infected countries in Africa

In addition, there are other countries were infected by H5N2 cases: Zimbabwe (February 17) and South Africa (July 3).

7.3.2 Control and prevention strategies in Djibouti and Sudan

Two H5N1 cases outbreaks in Djibouti in 2006: one case happened at poultry in the place including 22 chickens and 1 turkey near to city of Djibouti, the other case happened in a prison. It was interesting that the two cases did not have evident relativity at epidemiology (away 200 km). Compulsive stamping out was used but no compensation.

In Sudan, the first case was observed on April first, 2006 in North Khartoum State in a commercial farm and later confirmed at the Central Veterinary Research Laboratory (CVRL) on 18th April 2006. The OIE was notified on 19th April 2006. All the outbreaks in North Sudan occurred in commercial enterprises (Sector 2 or 3), while the only one that occurred in Juba, South Sudan was in backyard poultry. The government had adopted a comprehensive control policy, namely stamping out, vaccination, control movement and disinfection, and had a compensation mechanism.

Since August, 2006, HPAI, H5N1 first outbreak in Sudan was confirmed, to date, there has not been any new case. The control measures have been evidently successful. But there have been some irrational factors; compensation, propaganda and communication. Currently, immune strategies have been unsuitable and have not scientific immune strategy, and have not quit mechanism and abused vaccines. In the prophase, the measures of stamping out and compensation have been adopted to control the case and yield reasonable effect. But later, these were adopted to immune all of them and not making sure of 100%, and lacked surveillance and efficiency assessment after immunization.

Recommendations on HPAI control and prevention

Substantial variation in economic social and natural condition in Africa, along with varied capacity of breeding, laboratory establishment, detection and diagnosis of diseases, control and prevention and attitudes of recognition in African country ruled out the appropriateness of establishing a uniform mode on control strategy and national action plan. African countries should establish suitable control strategy by themselves and can gain good impact according to national status currently.

7.4.1 Countries and compartments free from infection

- Establishment and improvement of surveillance system: early detection and rapid response have been one of the premise conditions on hand for avian influenza control and for avoiding more loss. In order to take early warning, the government should enhance establishment of cases reporting, heighten detective capacity of veterinary diagnostic laboratory, and take risk assessment on breeding distribution, administration level, epidemic situations around the country, the distributions of water networks, migratory and resident birds, and also strength surveillance on the live bird market, denseness areas on poultries, migrants and boundary of infected countries.
- Improvement of breeding mode, enhancement of bio-safety precautions and administration levels: farmers should avoid mixing at different breeds; lessen feeding in backyard and in miniature. Contrary, they should develop breeding cosmically and commercially to change lagging production mode currently and heighten bio-safety level.

- Establishment of scientific and suitable immune policies: the government should avoid using a great lot of vaccines due to intensive backyard breeding, distemperedness of surveillance capacity, limited capacity to process surveillance after taking a vaccination and assessment of immune effects.
- Laboratory establishment: At present, bio-safety level of veterinary laboratories in Africa does not fulfill the demands of early detection and conformation on HPAI. Facilities should be further upgraded to meet conformation or build reference laboratories to put up detection and diagnosis in African areas. This issue should first be recognized by African countries.
- Establishment of prefect surveillance plan: The frequency of surveillance could be at minimum as once every six months within a country, or could even be lower if selected 'pilot' areas are targeted for more frequent surveillance.
- Development of comprehensive national action plan: the government should effectuate practice control and prevention, stamping out, compensation and treatment of newly case points.

7.4.2 Infected countries and compartments

- The case information should be reported to correlative departments on national and international by the media.
- Infected countries should, with reason, process distribution (infected point, infected zones and threatened zones) according to case situations and policies recommended by OIE and FAO.
- Infected countries should strength movement control in infected zones and set up disinfected points at most traffic roads, strict limit movement on poultries, poultry products and feeds.
- Infected countries should be stamping out all of poultries, construct scientific and suitable compensation in infected zones, and disinfect and take a disposal of carcasses and potentially infective material in a bio-secure and environmentally sustainable manner.
- These countries should close all live bird markets in infected zones and threaded zones.
- They should unfold active surveillance on HPAI, especially detect suspect poultry farms, collect samples of poultry and wild birds to send them to correlative laboratories to confirm infected level and scope, and take a risk assessment.
- Epidemiological investigation should be carried out to analyze and research biological characteristics of prevailing strains and find out the infection sources by any possibility.

- Communication and harmonization should be enhanced between veterinary department and health department to avoid infecting human beings, and put into practice propaganda, epidemiological investigation and surveillance to the peoples who work at the high risk areas.
- Scientific and suitable using vaccines

Measures related to epidemiological surveillance depend on collective samples from poultry and wild birds, whereas, effective actualization of epidemiological surveillance lie on some factors as follows:

- According to OIE guidelines, infected countries should establish official warning system to put into practice investigation and taking reporting to corresponding international organization.
- Diagnostic capacity on HPAI in countries and compartments
- Administration system of comprehensive analysis on diagnosis and surveillance data.
- Take part in regional surveillance and diagnostic network.

7.4.3 Other suggestions

- Integrative national action plan should be implemented together with national leader, veterinary, health, transport, commerce and army, etc. In order to control and prevention HPAI, established committees (tasks forces) should be adjusted to suit the national position. The committee Chair/Head should be endowed with due authority to organize and harmonize different departments to deal with emergencies.
- African national veterinary departments should enhance technologic training on control and prevention strategies, emergency plan and vaccination, and should strength training on diagnostic technology, including sample collection, storage, transportation and rapid detection, etc.
- In order to perform early finding, early warning, early detection and early control, governments should reinforce diathesis of farmers and veterinary personnel.
- Propaganda and communication should be enhanced between farmers and veterinary staffs to define national control and prevention strategies on HPAI, especially on vaccination and compensations, and should detect antibody levels by utilizing HI test to assess the efficiencies of using vaccine and to use vaccine scientifically.
- States should reinforce storages of control and prevention materials, including

diagnostic reagents on avian influenza, vaccine, disinfection and protective uniform, and set up special action team to deal with the cases.

- Compensation measures with reason: compensation mechanism is recommended by OIE and FAO in light of market price of poultry, at least exceeding 50% of market price or at 75%-90% of market price ideally, but does not include compensating poultry products and contaminated feeds.

8 Recommendations

- AU/IBAR should seek additional fund and technical assistance through different avenues, namely from the continent and the world. More reasonable and persistent international cooperation mechanism could be set up to strengthen the role of AU/IBAR in the prevention and control of important trans-boundary diseases in the continent.
- The communications between AU/IBAR and African countries should be enhanced, especially when a specific country had an emergent outbreak of important trans-boundary disease like RVF, PPR, HPAI, etc. AU/IBAR should provide appropriate technical assistance on time and dispatched an expert team to help the Department of Veterinary Services to control and eradicate the disease with financial and technical support.
- AU/IBAR should print brochures and handbooks on HPAI, including guidelines to upgrade and update integrated national action plans on prevention and control of HPAI.
- AU/IBAR should employ more veterinary experts, especially animal health and epidemiological experts on HPAI. AU/IBAR also should set up an emergency committee on HPAI. The committee could be made up of programme coordinators, monitoring and evaluation experts, laboratory experts, risk analysis experts, finance managers, human health experts, animal health experts and wildlife experts, etc, so as to provide suggestions and guidance in case of an emergent outbreak occurred any where in African.
- Because the homology of the pathogen which resulted in the outbreaks of HPAI in most African countries is very high, and almost the same through gene sequencing, AU/IBAR should cooperate with countries which enjoy the capacity of manufacturing vaccines according to the specific H5N1 virus (reverse genetic technology) to design and develop specific vaccines in Africa, and to set up a mechanism for storing and distributing vaccines and other material.
- As the majority of African countries lack the capacity to confirm H5N1 avian influenza, AU/IBAR should mobilize intensive human and financial resources to establish several regional reference laboratories continent wide to speed up the delivery of samples in case of a suspicious outbreak of HPAI to confirm the disease facilitating making early detection and rapid response to avoid more losses. The minimum demands of a reference laboratory include:
 - System to accept samples from national laboratories in network.
 - Virus isolation with full H and N sub-typing capability.
 - RT-and RRT-PCR for H5 and N1.

- HI and C-ELISA for serology.
 - Capacity to produce HI reagents.
 - Access to gene sequence and analysis capability.
 - Training facility.
- AU/IBAR should develop some research on the character of the H5N1 virus and the epidemiological characteristic of disease in Africa through cooperation with relevant institutions and organizations, especially the comprehensive control and prevention strategies which are suited for African countries.

Recommendations on further AU/IBAR—Chinese cooperation

- Based on the current situations of HPAI in Africa, the cooperation between AU/IBAR and Chinese government could be performed on the development of specific vaccine according to the character of the virus strains that resulted in most outbreaks of HPAI in Africa, design the diagnostic reagents to evaluate the efficiency of the vaccine used in the emergent situations, and enhance the capacity and capability on early detection and early warning to prevent and control HPAI.
- In light of the current diagnostic capacity in most African countries, the cooperation may contribute to the development of relevant reference laboratory so as to meet with the demands of bio-security and rapid detection.
- The communication and cooperation on animal health could be performed more comprehensively, especially on important trans-boundary diseases, such as RVF, FMD, CBPP and ND etc.

Conclusion

In Summary and conclusion, the Chinese technical assistance team on avian influenza has been in place during the period March, 28 to September, 30. The expert team has acquired massive quantity of original data on avian influenza in areas were under focus. It has made several scientifically and logically sound suggestions on all aspects of avian influenza prevention and control. The activity has achieved the prospective goal. Furthermore, both sides accumulated valuable experience. Certainly, the experience and disease documents gained will turn extremely helpful and instructive at future collaboration between Africa and China.

Annex 1: Activities and mission to Kenya

1 Main activities

- Visit the Department of Veterinary Service (D.V.S.) in Kabete
- Visit the Department of Veterinary Services in Nairobi city and make the field investigation on live bird market (Kariokor Market).
- Visit the International Livestock Research Institute (ILRI).
- Meet with the representative of FAO in Kenya
- Visit the Department of Veterinary Services in Rift Valley Province
- Visit a commercial poultry farm (Minsor Farm)
- Visit the Regional Veterinary Investigations Laboratory (RVIL) in Nakuru
- Visit the District Veterinary Officer (DVO) in Nakuru
- Visit the live bird market in Nakuru town and made some investigation of migrate flyway in Nakuru Lake.

2 Assessment on the prevention and control system in Kenya

The information on capacity and capability on prevention and control of HPAI were captured through field investigation, although the time for investigation was limited and the region and scope we have visited in Kenya was restricted. So our assessment was only given based on the information obtained from the Department of Veterinary Services and that acquired from the field investigation. For example there are total eight province and six Regional Veterinary Investigations Laboratories (RVILs) in Kenya and we only visit one province (Rift Valley) and one RVIL in Nakuru. As for the farm with poor management and sanitation and some backyard in rural areas we have no time to visit.

2.1 Strengths

- The government had paid great attentions to the prevention and control of HPAI, and the organism was very reasonable.
- The government had implemented a National Action Plan for the Prevention, Control and Response to Avian Influenza in Kenya, and has an integrated surveillance (or search) system and report system on HPAI.
- The Department of Veterinary Services has had a diagnostic network with different veterinary laboratories, just like Central Veterinary Laboratory and some Regional Veterinary Investigations Laboratories, and the Central Veterinary Laboratory had the capacity to confirm the pathogen for HPAI.
- The Department of Veterinary Services in Kenya had acquired the training course on rapid detection

of avian influenza virus provided by AU/IBAR and ILRI.

- There is a system, namely Animal Resources Information System (ARIS), and the ARIS could be used to report and analysis case information for the commander in the country to take appropriate policies and methods to cope with the case.
- The department of veterinary services has made a risk analysis of avian influenza in Kenya according to the migratory flyway, the human population density, populations of commercial poultry, hygienic standards, the case of HPAI in neighboring countries, and local wild birds in different district. The risk assessment was reasonable and scientific.
- The department of veterinary services has print s series of manuals on HPAI to strengthen the public awareness.
- As for the live bird market, the department of veterinary had arranged special veterinarian in charge of the supervision in the market.

2.2 Weaknesses

- Until now there have not an integrated emergence response plan to cope with the possible case of HPAI in the country, including appropriate policies adopted by the government when an outbreak was confirmed. And the storage of resources used in prevention and control of HPAI was very shortage, just like protective clothing and disinfectant.
- The Department of Veterinary Services in Kenya had not acquired the training course on prevention and control policies, vaccination, emergence response plan, some information on stamping out, etc.
- There are some weaknesses in the surveillance system. The laboratories need more funds to strengthen the supplement for hardware, and improve the bio-security levels. The staff in the veterinary services, especially in the infrastructure of the veterinary system, should be supplemented, and the diagnostic capacities need to be strengthened. For example, in the central veterinary laboratory there is five staff in the department of virology, and only one was veterinarian, other four persons were technician workers. And now the pathogen they pursued in the daily diagnostic services including RVF, ND, PPRV, etc. So there is a serious staff shortage in the laboratory. The bio-security level in the laboratory was very limited, maybe only BSL-2. As we know the BSL-3 lab is essential to confirm the pathogen of HPAI, and only BSL-3 lab can provide essential protection to the detection staff, and meet to the need for bio-security. Now although there have a PCR cycles and real time PCR cycles in the lab, they were only used for the detection of RVF. They should play an important role in the early detection of HPAI, so the RT-PCR method should be set up in the lab to improve the diagnostic capacities.
- There are six regional veterinary investigations laboratories, and we only visit a RVL in Nakuru. The facility in the laboratory, was very dated. Until now they could do on HPAI was only limited to search or find the disease, and made some investigations about the epidemiological information. They could do nothing on the detection or surveillance about HPAI in the laboratory. At least it could do some serological surveillance for HPAI, just like HI test. And the staff in the RVL was shortage because the scope was very huge and no many vehicles from them to collect the information actively, most of the information was provided by the infrastructure of the local veterinary services, but they usually have not systemic training on HPAI, just like diagnostic, samples collected, etc.
- As for ARIS, the stand-alone version can work well, but at present it could not transfer information to

headquarter through Internet. On the one hand it may be the Internet and the computer, on the other hand, it maybe relevant to the design of ARIS. Furthermore, the department of veterinary services in the province has not the GPS to record the detailed position on every case, and in ARIS could describe the name of the village.

- There is a shortage for diagnostic reagents on HPAI in the department of veterinary services. Now only in the central veterinary laboratory there are some diagnostic reagents on HPAI, and in the regional veterinary laboratories there have nothing for HPAI. So the efficiency of surveillance system was low, in every province, they could do for HPAI was only to search the information, and absent in active surveillance plans. Obviously it could not meet the need for early detection and avoid an outbreak of HPAI.
- The management in the live bird market was confused, and the sanitary condition in the market was very bad, and no specially facilities to do with the polluted water. And the worker engaged in chicken slaughtering did not have any protective measures, and it have a high risk to infection.

So our assessment on the prevention and control system for HPAI was that the government of Kenya had **no sufficient capacities to cope with an outbreak of HPAI at present** based on the investigation

3 Suggestions

- The government should set up an integrated emergence response plan to cope with the possible outbreak of HPAI in Kenya. The policies adopted by the government to control the outbreak of HPAI should be clear, namely stamping out or vaccination combined with stamping out. Meanwhile, the government should increase the storage of resources, just like protective clothing, disinfectant, etc. And a special team should be set up and receive systemic training on HPAI to cope with any outbreaks in the country, and can afford guidance to control the disease.
- The government should strength the funding and staffing in the department of veterinary services and the laboratories should be changed to meet the need for surveillance and bio-security. Some essential facilities like biosafety cabinets, autoclaves, and the filter system for air and disposal system for polluted water should be equipped in the core lab. And the lab for virus isolation and identification should be rebuilt into a simple BSL-3 laboratory. Some equipment like GPS and basic vehicles should be added to the laboratory. Some important diagnostic reagents for HPAI should be stored not only in the national veterinary lab but also in the regional laboratories. The training on the staff engaged in the diagnosis of HPAI should be strengthened to improve their diagnostic capacities. The area responsible by a regional veterinary lab was too big according to the staffs and vehicles, so the department of veterinary should set up more RVLs to meet the demand for surveillance, and make the distribution of RVLs tend to reasonable.
- The department of veterinary services should provide the training course on prevention and control policies on HPAI, emergence response plan, vaccine, etc. Because it is essential for the government to ensure appropriate measures would be adopted promptly to avoid the diffusion of the disease.
- The department of veterinary services should set up and fulfill the surveillance plan. Because now the Kenya is free for HPAI, so the government should pay great importance on the early detection and early warning system. But the surveillance activity in every province was limited to search, no ample

active surveillance plan for HPAI. The government should strength the surveillance in some high risk areas like migratory flyways, high density populations, border, and live bird market, etc. Some serum could be collected to detect the antibodies, and some swabs could be colleted to perform virus isolation. For a regional veterinary laboratory it should have the capacity to detect the antibodies of HPAI, and some diagnostic antigens should be stored in the regional veterinary laboratory to perform HI test.

- Obviously the ARIS is good and essential for a country to set up prompt control policies. But now a lot of factors have inhibited the development and utilization of ARIS. So the ARIS need some improvement. And the government should invest more funds to explore the ARIS, and all the countries including AU/IBAR could share the information through the system, so as to the commander could make appropriate methods to control the HPAI.
- The government should strength the supervision on the management of live bird market, some protective measures would be essential for the workers engaged in slaughtering to reduce the infective risk by HPAI.

Annex 2: Activities and mission to Djibouti

1 Main activities

- Assess their National Emergency Preparedness Plan for the prevention and control of HPAI, to find the weaknesses and gaps in their plan, and give some suggestions to upgrade their action plan.
- Visit the Department of Veterinary Service in Djibouti.
- Meet with representatives from FAO in Djibouti.
- Visit the national diagnostic laboratory
- Visit the Ministry of Agriculture of Djibouti
- Train the staff in the national diagnostic lab
- Visit the regional quarantine center in Djibouti
- Visit some poultry farms and provincial veterinary service
- Visit some areas at high risk for HPAI, namely live poultry markets, flyways of African migration birds.

2 Assessment on the prevention and control system

According to several visits paid to the national veterinary laboratory, traditional poultry farms with different scales and main migratory birds' destination, capture the information on rearing conditions, bio-security levels, and possible vaccination programs to be instituted in the country, we can decide the capacity and capability on prevention and control of HPAI in Djibouti was very limited, the government should invest more financial support to acquire the necessary laboratory equipment and reagents in order to improve the capability for the surveillance and detection of HPAI. It is also suggested specific training of the laboratory and the national epidemio-surveillance network staff as well as the established national committee members, for the prevention and control of HPAI in the country. These trainings should be undertaken in the framework of the ADB emergency assistance for the prevention and control of avian influenza in Djibouti.

- The National Emergency Preparedness Plan for the prevention and control of HPAI need to be updated and upgraded, the distributions of poultry populations, risk analysis according to different regions should be added into the action plan. The budget in the action plan needs to be revised and make it more suitable for the reality in Djibouti. The materials for prevention and control of HPAI, such as PPE, disinfectants, need to make more stock in case of emergency needs. Compensation system should be established for all poultry destroyed because of HPAI.
- The national surveillance system could not meet with the demand for early warning and rapid response, it needs to be improved and upgraded. Some equipments and instruments should be equipped in the central veterinary laboratory to enhance the bio-security level and capacity of detection. Some diagnostic reagents should be prepared for surveillance activities. The country doesn't have the capacity to confirm the disease of HPAI, even the capacity to perform primary diagnosis. The staff in the regional veterinary services could not afford the demands of case reporting

and rapid response. They need more training on how to prevent and control HPAI.

3 Suggestions

- The national preparedness and emergency plan should be complemented and upgraded. An emergency committee should be set up to cope with the emergent cases. The control policy should be definite, a reasonable compensation mechanism was essential to control the disease coupled with stamping out policy. The stock of materials for prevention and control of HPAI should be increased, such as PPE and disinfectant. Furthermore, some special response teams with experts from different specialties with different levels, such as national level and regional level. The response team could be composed by epidemiologist, diagnostic experts, risk assessment experts, etc. If a case was confirmed, the response team could be dispatched to the field to help the local government to supervise the disease control.
- Given the poultry population and the rearing conditions in Djibouti, any meaningful operation for the control of avian flu in the country should be complemented by the control of other poultry diseases, such as Newcastle disease.
- The directorate of veterinary services should come up with some innovative and incentive measures to capture the attention of poultry owners and their participation to these control programmes.
- A national compensation scheme should be established to compensate the poultry owners whose poultry were stamped out during the first confirmed HPAI outbreak.
- The government should invest more financial support into the department of veterinary services. The country has no capacity for confirmatory diagnosis, and even the national laboratory could not afford ordinary serological diagnosis, they only can perform rapid antigen detection test. The basic and most important requirement for confirmation of HPAI is to set up the BSL-3 laboratory so as to meet with the demand of bio-security to perform virus isolation.
- The country should establish and upgrade the surveillance plan, especially the active surveillance. In the current situation, the government should pay great attention to the early detection and early warning so that could perform rapid response to deal with an endemic threat.

Annex 3: Activities and Mission to Sudan

1 Main activities

- Meet with the Undersecretary of Federal Ministry of Animal Resources and Fisheries (FMARF)
- Visit the Rinderpest laboratory at the Ministry Headquarter.
- Visit the Director of Animal Health and Disease Control
- Visit the Central Veterinary Research Laboratories
- Visit FAO and have a meeting together with the FAO chaired task force.
- Visit Ministry of Health
- Visit two previously infected farms in North Khartoum
- Participate the workshop programme, and share the experience on prevention and control of HPAI.

2 Assessment on the capacity for prevention and control HPAI

There are 3 action plans in Sudan, that means each department (department of health and department of veterinary services) and each region (south and north) have their own action plan for control and eradication of avian influenza. They don't have an integrated action plan combined with animal health and human health. The communication and coordination between different departments and different regions should be enhanced to make a national integrated action plan. The country has no capacity for confirmatory diagnosis, and the national laboratory is only capable of carrying out serological diagnosis (haemagglutination inhibition (HI), Agar gel immune diffusion (AGID) and ELISA) and rapid antigen detection. The surveillance system in the country is not in place. The active surveillance and passive surveillance need to be improved so as to make early detection and rapid response.

2.1 Strengths

- The government had paid great attention to the prevention and control for HPAI. The committee has been established, and different departments were involved, just like ministry of health, etc.
- The government had implemented a National Action Plan for the Prevention, Control and Response to HPAI.
- The government had a surveillance system on HPAI, base on the Rinderpest.
- The government had adopted a comprehensive control policy, namely stamping out and vaccination, and has a compensation mechanism.
- The Department of Veterinary Services had a diagnostic network on HPAI, just like Central Veterinary Laboratory and some private laboratories.
- The department of veterinary services has made a risk analysis of HPAI according to the recent outbreaks, migratory flyway, populations of commercial poultry, etc. The risk assessment was reasonable and scientific.

2.2 Weakness

- They don't have an integrated national action plan on HPAI in Sudan. The National action plan should be updated and improved.
 - The different national action plan in two parts of Sudan (south and north) should be harmonized into one final action plan.
 - The national action plan should be incorporated with animal health and human health.
 - The government should store more diagnostic reagents, disinfectant, PPE, vaccine, some material for samples collection, etc.
- The capacity on early detection: The laboratory has limited capacity to detect the disease.
 - The bio-security level of the lab could not meet with the conformation.
 - The surveillance activities, especially active surveillance need to complement according to the real situation in Sudan.
 - The samples collected from high risk area should be tested through **serological and virological methods**.
- The policy about vaccination: need improvement
 - Need surveillance and evaluation post-vaccination
 - According to the financial and resource support, the vaccination **should be adjusted with ring vaccination**.
- The Department of Veterinary Services had not acquired enough training on prevention and control policies, diagnostic and confirm technologies, vaccination,, etc.
- The emergency strategy: the compensation mechanism need to be updated.
 - The ratio of compensation should between 75-90% according to the value.
 - The government should keep or find more financial support for compensation, just like insurance company.
- There are some weaknesses in the surveillance system.
 - The laboratories need more funds to strengthen the supplement for hardware, and improve the bio-security levels.
 - The staff in the veterinary services, especially in the infrastructure of the veterinary system, should be supplemented, and the diagnostic capacities need to be strengthened. Now although there have a real time PCR cycles in the lab, they didn't use it. They should play an important role in the early detection of HPAI.
 - The surveillance system on HPAI was only limited to search or the epidemiological information. They could do nothing on the detection or surveillance about HPAI in the laboratory. At least it could do some serological surveillance for HPAI, just like HI test. The local veterinary laboratory should play an important role in early detection and early warning on HPAI, because most of important information was provided by the infrastructure of the local veterinary services.
 - There is a shortage for diagnostic reagents on HPAI in the department of veterinary services.

So the efficiency of surveillance system was low, in every province, they could do for HPAI was only to search the information, and absent in active surveillance plans. Obviously it could not meet the need for early detection and avoid an outbreak of HPAI.

- The poultry production system had some problems.
 - The populations of backyard have large proportion in the total country.
 - The bio-security level in commercial poultry farms was low, the system maybe only sector 3 according to the FAO standard.
 - The vaccination programme should be adjusted to meet with the fact. Don't immune some vaccines like live ND too much times.

3 Suggestions:

- Integrated National Action Plan: The country should urgently speed up the process of integrating the sector specific action plans into an Integrated National Action Plan (INAP). The communication between different parts (north and south) and different departments (animal health and human health) in Sudan should be enhanced. The first step in the process is to convene a national forum for all key national stakeholders, including private sector and international organizations represented in the country. The Higher Committee chaired by the Undersecretary, FMARF is best placed to steer this process
- Diagnostic capacity: In order to enhance the capacity on early detection and rapid response on HPAI, the government should invest more financial support to the veterinary diagnostic laboratory to buy some equipment, and heighten the bio-security levels to meet with the requirement for early detection using rapid detection technology There is urgent need for the establishment of capacity and capability for confirmatory diagnosis (Real time PCR, virus isolation and characterisation). The staff in the lab should get more training on diagnostic technology, including collect and keep samples, rapid diagnostic test, etc. The basic and most important requirement for this is the setting up of BSL-3 laboratory which will require the following:
 - Consultancy to design BL3 level for virus isolation and characterization.
 - Provision of all necessary equipment and consumable
 - Training man power
- Surveillance system: The overall surveillance approach needs to be re-focused, and could consist of the following key axes:
 - Define practical approaches to determine whether HPAI (H5N1) is still present in the country or not.
 - Define steps that are needed for early and rapid detection of HPAI in birds and other animals
 - Create a plan of action for surveillance of HPAI (H5N1) in humans
 - Determine means for early and rapid detection of person to person HPAI (H5N1) transmission
 - Develop mechanisms for data storage and analysis and rapid communication of

information with other national sub-committees on HPAI

- Establish mechanisms to communicate updated information on HPAI regionally and internationally
- Prevention and Control policy: On the basis that stamping out without vaccination as employed in the intensive and semi-intensive production systems (Sectors 2 and 3 according to FAO classification) was able to contain the disease within 5 months and since then (August 2006) there have been no new outbreaks in the country; continued use of vaccine at re-stocking is not justified if adequate bio-security measures can be enforced at all levels and surveillance intensified. In order to eradicate HPAI in Sudan, they should revise the control policy, especially about the vaccination. The ring vaccination policy could be used when an outbreak of HPAI had been confirmed, and in other regions the vaccination should be banned, because the situation of HPAI in Sudan was not endemic. The most important for the country to eradicate HPAI was not vaccine, but how to reduce the population of backyard, and enhance the bio-security management levels in commercial farms. They should have an evaluation mechanism to assess the efficiency of the vaccine used in emergency activities, especially the antibody levels, namely HI titers. They should have an exit strategy on vaccination. The OIE, FAO, World Bank and others have conducted studies on compensation mechanisms whose recommendations would be useful for the Government of Sudan in reviewing its compensation scheme.
- Emergency preparedness: The government should increase the storage of resources, just like protective clothing, disinfectant, etc. And a special team should be set up and receive systemic training on HPAI to cope with any outbreaks in the country, and can afford guidance to control the disease. The government should strengthen the supervision on the management of live bird market, movement control of poultry and poultry products, disinfection in infected areas, strict limited using vaccine only around infected zones. Some protective measures would be essential for the workers engaged in slaughtering to reduce the infective risk by HPAI.
- Public awareness: Public awareness is crucial in order to get the understanding and cooperation of all concerned persons and therefore a lot remains to be done in creating awareness on HPAI in the country. Special efforts should be directed at enhancing farmer awareness on bio-security.

Annex 4: Activities and mission to Ghana

1 Introduction

According to the plan of AU/IBAR, Chinese expert team for HPAI visited Ghana VSD at July 3-5, 2007 to investigate the prevention and containment measures, the laboratory construction for HPAI in Ghana. The situation of national poultry developing, the measures taken when outbreaks occurred during April and June this year in Ghana were introduced to us during this visit to Ghana. After the introduction, the director of VSD showed us along with the AVL which situated in the veterinary service. We communicated fully with the leaders of VSD and AVL on HPAI surveillance, laboratory construction, and the experience in epidemic prevention and control in China, etc. The detail is reported as follows.

2 Objective

There are four main objectives this visit as follow:

- To help the government ameliorate its prevention and containment systems for HPAI after our investigation.
- Technique support to veterinary diagnostic laboratory.
- Experience communication with VSD in the area of avian influenza prevention and controlling in China.
- To pursuit the execution of the emergency aid project from AU/IBAR.

3 Outbreaks and Management for HPAI in Ghana

Up to July 2007, there were 3 waves of HPAI outbreaks since the first case reported on May 2, 2007 in Ghana. The first and second outbreaks were reported in May 2007 in Tema and Sunyani, respectively. The third outbreak was reported on a poultry farm in Aflao in the Volta Region on June 21. 34706 birds were destroyed at the three outbreaks, with 12884 birds died of HPAI, and 21612 birds were culled in effort to contain epidemic spread in the three outbreaks of HPAI.

On April 24, the AVL diagnosed suspect HPAI samples taken from a small poultry farm in Tema Metropolitan Area. HPAI H5N1 infection was later confirmed by the method of RT-PCR in NMIMR, which is Ghana National Center for Influenza diagnosis. Samples were also sent to OIE/FAO Avian Influenza Reference Laboratory in Italy for further confirmation and sequencing. The result of sequence analysis of the H5N1 strain isolated from the outbreak occurring in Ghana clearly indicated that it was closely related to other African isolates from the Ivory Coast, though the source of infection is still unknown.

On May 2, 2007, GOG announced the country's first confirmed case of HPAI H5N1 at Kakasunanka, Tema municipality. The disease was then confirmed in two other 3 farms in Tema, and later at Sunyanka in the Brong-ahafo Region at about 130km northwest Kumasi on May 26.

Quarantine and containment measures were taken by the GOG rapidly and effectively after the epidemic occurred according to the GPRP(2005-2007).

1. Infected point, infected zone (3km around the infected point) and threatened zone (10km around the edge of infected zone) was defined rapidly after epidemic occurred so as to taken further controlling measures.
2. All infected and in-contact birds in the epidemic spot were culled that took account of animal welfare concerns and safety of operations. Birds slaughtered by two methods. One was to let the birds drink the water containing tobacco, the other was to inject high concentrated virkon into the trachea.
3. Birds in infected zone were not stamped out, but only quarantined strictly and immediately, and executed active surveillance.
4. Cleaning and disinfection. Disinfected all the premises and materials that might be contaminated. All the waste and dead birds were incinerated and deeply buried. Water troughs and feed basins were dip in specificated disinfectant solution in order to disinfected thoroughly.
5. All live birds and birds product markets in infected zone and threatened zone were closed. Restricted poultry and poultry products movement, and reinforced inspection to the poultry in infected zone and threatened zone.
6. In spite of the poorly financial, the GOG allocated funds so far total some 340,327,700 million cedis as compensation to farmers whose poultry and poultry products were destroyed two weeks after epidemic disposal.
7. Blockage was relieved if no new case occurred in the infected zone under strictly surveillanced for 21 days.

Within two months after the first outbreak, there were other two outbreaks in Sunyani and Brong-Ahafo. All epidemics were well managed in line with prevention and containment measures. There was no human case of H5N1 HPAI infection occurred in Ghana during the three outbreaks, either. By far, there is no new H5N1 case occurring.

The GOG did not take the action of vaccination to the birds in infected zone and threatened zone, though they have had H5N2 subtype inactivated vaccine stocked.

4 The situation of HPAI prevention and containment in Ghana

The GOG are fully aware of the threats posed by HPAI to animal and human health. In the face of HPAI pandemic threats, the GOG took the first step in combating HPAI, a preparedness and response plan developed in October 2005. The key technical ministries (MOH/GHS,MFA, and MLFM) along with key international partners (FAO, WHO and USAID) created an inter-agency AIWG to coordinate activities to address the threat of an AI pandemic. In December 2005, the GOG, together with the development partners, put forth the GPRP 2005-2007. The GPRP was revised in 2006, and mainly included following themes:

- A) Planning and coordination
- B) Surveillance, situation monitoring and assessment
- C) Prevention and containment

- D) Health system response
- E) Communications

The emergency plan is believed to be a comprehensive and detailed crisis management plan in Ghana. It is this Plan that played key effective role in these HPAI outbreaks in Ghana during the April and June.

Active surveillance, veterinary monitor and vaccine stock were carried out, which was in line with implementation of the Plan on Avian Influenza.

1. In reaction to HPAI threat to Ghana evidenced by the incursions of the disease to some neighboring countries, the VSD of MOFA in collaboration with other Ministries, MDAs and Partners undertook active surveillance of selected domestic and wild birds in July 2006. This exercise was to detect the presence or absence of bird flu disease in the country through clinical and laboratory investigations of domestic and wild birds.
2. Strengthening the control of imports&exports of poultry and poultry products. The government has promulgated a series of laws on animal diseases. Importation has been banned on poultry and poultry products from countries reporting outbreaks of HPAI. Border check points have also been set up to monitor the poultry and poultry products entering in the country.
3. Preservation of the avian influenza vaccine. There is about 1 million doses vaccine stored in the refrigerator of ALV.
4. Compensation policy have been made out and put into practice. The GOG made clearly the scope of poultry for culling. The poultry in the infected point and in-contact are all killed.

The MFA has made a compensation policy that farmers would be paid 50-90 percent of the market value for their destroyed birds and bird products. The compensation for the culled poultry is as follow :Parent broiler, layer and day-old-chicken are 90%, layer, broiler and turkey are 85%, duck and guinea fowl are 70%, table eggs are 50%, and fertile eggs are 60%.

1. The Health Promotion Unit of the GHS/MOH coordinated the communication actions of the lead technical Ministries (GHS/MOH, MOFA, MLFM) and their public relations units and other MDAs (especially the Ministry of Information) on behalf of the AWWG. Multiple channels of communication shall be adopted, including press briefings and releases. The objective is to ensure that the general populace receives correct, specific and relevant information regarding the pandemic and steps/actions to be taken.

Both the electronic and print media have made programmes to sensitize the public about the threat of human and animal AI. Some of these programmes are press releases, radio talks, radio interviews, presentations and TV spots.

2. The GHS /MOH shall be responsible for establishing systems for surveillance, situation monitoring and assessment activities of the pandemic in humans. The MFA and MLFM shall be responsible for establishing systems for surveillance, situation monitoring and assessment activities of the pandemic in animals. Veterinary Services and the Wildlife Division shall be the principal agencies.

5 The construction of avian influenza laboratory

The diagnosis and surveillance work is mainly developed by the AVL and NMIMR. The diagnostic laboratory for HPAI in AVL was refurbished in April 2006 under provided financial assistance from USAID. As the only national centre for influenza diagnostic, NMIMR was well equipped with an advanced facility - Polymerase Chain Reaction (PCR) device, which can be used to furtherly confirm the suspect samples and detect genre of the virus.

AVL is composed of several laboratories, such as virology, bacteriology, serology and pathology. There are elementary equipments and facilities, such as Biological Safety Cabinets, centrifuge, ELISA machine, autoclave and cinerator that can be used in diagnostic work in the lab. The work develops in AVL include: diagnosis for animal diseases(for instance, avian, dog, and livestock diseases), research on rinderpest, Peste des Petits Ruminants, Infectious Bursal Disease, and Newcastle disease, and so on.

Avian Influenza rapid detection kits were usually used in diagnosis of samples collected from dead birds. HA/HI test for H5 and H7 subtypes is also used in serological test. Once positive or suspect result detected in this lab, the sample should be sent to NMIMR immediately to confirm by RT-PCR. The sample would be sent to OIE/FAO international Reference Laboratory for further confirmation and identification if the result of RT-PCR is still positive.

6 Findings and suggestions

Enlarge the scope of stamping out

Area within 3 km radius at infected point is considered to be infected zone, and 10 km around the infected zones is considered as threatened zone in Ghana when HPAI outbreak occurred. In responds to the outbreak, the stamping out poultry just limit in the infected point and in-contact birds. Active surveillance involving sample collection is done by Veterinary Service in the infected zone and threatened zone. We all know that the avian influenza has a latent period about 2-14 days. After the farm confirmed a outbreak of avian influenza, domestic birds around may have become infected with AIV through direct or indirect contacting with infected poultry or contaminated materials. Personnel, vehicles, and other inanimate objects such as cages can also be vectors for the spread of AV from one farm to another.

Backyard, smallholder and commercial farms in Africa are usually lacking in sound bio-security measures. Vaccination for HPAI is not advocated in the country, either. Therefore, the scope of stamping out is recommended to be enlarged to the entire infected zone in order to minimize the threat from HPAI spread before AI vaccination was carried out.

Improve and strengthen epidemiology investigation and epidemio-surveillance

Before the presence of HPAI in Ghana, in reaction to the HPAI threat to Ghana from neighboring countries, VSD in collaboration with other MDAs and Partners undertook active epidemio-surveillance of selected domestic and wild birds in July 2006. Clinical observation and laboratory investigations of domestic and wild birds were mainly used to surveillance whether the epidemic occurred or not. Surveillance in the infected zone and threatened zone was also strengthened when epidemic occurred. The main methods used was

clinical observation , meanwhile, serology and pathogen tests were also taken as accessorial work.

It is suggested that active and passive surveillance based on etiology and serology detection in laboratory and clinical observation be conducted in the infected zone and threatened zone intensively and broadly until there is no new case occurred 21 days after destruction of the last affected premise. Active epidemio-surveillance based on laboratory detection and clinical observation is recommended to be executed in whole country after HPAI epidemic under controlled, which should involve much more veterinary technicians. Emergency surveillance should be developed when HPAI occurred in neighboring countries. Detailed surveillance guideline should be made out according to the poultry raising construction, distribution, species, wetland, regularity of migratory birds and border trade. Methods combining active surveillance with passive surveillance, routine surveillance with emergency surveillance for HPAI are suggested to use in order to obtain exactly epidemiological information for prevention and control when surveillance work launched. Take focus on target region such as dense poultry areas, staging / landing sites of migratory birds and the poultry near the borders of the AI infected countries. Furthermore, surveillance of porcine population for HPAI is also strengthened.

Vaccination was recommended to be considered in prevention and containment plan

Vaccination plan was not executed by the GOG now, though three outbreaks occurred in the country and H5N2 vaccine stocked in AVL.

Poultry production systems in developed countries have a strong ability to control the animal diseases due to their high biosecurity levels. A stamping out policy had usually been implemented when HPAI occurred in some developed countries in the past , which could be more helpful to eradicate the diseases completely.

In 1994, vaccine was also used as a powerful tool to control the HPAI outbreak in Mexico. Prophylactic vaccination had also been used in limited areas in Italy to aid the control of H5 and H7 LPNAI viruses. One of the successful measures to control HPAI in some southeast Asian countries and in China were also vaccination. It is a common idea now that vaccinating poultry is an important tool in the worldwide battle against H5N1 virus combined with several other control means, according to an international scientific conference that ended in Verona in March, 2007.

Poultry production systems in developing countries are complicated, which they have some common problems such as more backyard style, mixture of chicken and waterfowls, and low biosecurity level. It has much more difficulty in the control of HPAI once the epidemic occurred.

It is suggested that associative measures be taken in the control of HPAI epidemic. Vaccination as a support strategy in threatened zone may be considered. Vaccination may also be considered when the disease has spread to such an extent that it has overwhelmed the resources of disease control authorities, or the economic cost of a widespread slaughter campaign cannot be borne by the government. It can also be considered at an earlier stage when veterinary service infrastructures and capacities prove to be very weak and insufficient to curb the spread of HPAI. Vaccination of poultry also reduces the viral loading in the environment, thus decreasing the risk of transmission from poultry to human.

Reinforce establishment of the Avian Influenza diagnostic laboratory, and to raise the protection level of the laboratory biosafety.

The laboratory engaging in AIV detection should consistent with the requirements of laboratory biosafety, firstly. Then, it should meet the need of test quality so as to give test report correctly. The following recommendation had better be considered for the national veterinary laboratory to resolve these needs further.

a. Re-arrange the laboratory disposition, and to improve facilities according to WHO Laboratory Biosafety Manual.

There are basic experiment facilities in the Accra national veterinary laboratory, but the condition could not satisfy the requirement for HPAI testing perfectly, especially in the laboratory biosafety controlling. Recommendation is given to re-improve lab facilities according to the requirements for biosafety level 2 laboratory of WHO Laboratory Biosafety Manual, so as to finish the pre-detection and identification of AI suspect samples treatment, serology test, and etiology test (rapid antigen test and RT-PCR) safely.

b. To strengthen the equipment and training of laboratory technicians, especially biosafety knowledge training.

There are about 37,000,000 birds in Ghana. A large amount of poultry samples should be collected and analysed if the country want to finish the epidemio-surveillance and investigation for HPAI. Laboratory technicians should be further equipped and trained. Biosafety training for the staff and new personnel should be strengthened in sample collection, transportation, treatment, detection and waste disposal. Biosafety level of consciousness of laboratory staff should also be reinforced in order to forbid the disease transmission from animal to human.

c. To strengthen the protection for the laboratory staff.

PPE, for example, protection coats, gloves, masks and eye shield should be prepared sufficiently according to the requirements of biosafety laboratory to ensure biosafety during samples detected.

d. To establish laboratory management systems for quality and biosafety, and to make out Good Laboratory Practice.

Good Laboratory Practice plays key role in ensuring laboratory biosafety and giving correct report. Several animal diseases include HPAI have been detected in this laboratory. Laboratory management systems for quality and biosafety are proposed to be established to ensure safety of the staff and environment and to give correct results. The test result from LABORATORY with good quality system can also be well admitted by international organization and/or related countries.

e. To reinforce diagnostic capability of laboratory.

Clinical observation and pathogen detection have already executed in surveillance of infected zones in Ghana. Surveillance of HPAI was recommended to combine pathogen detection with several serology methods, for instance, AGID, HA/HI and ELISA. The laboratory has the preliminary condition to carry out serology detection and other diagnostic methods after aptitude improved and staff trained.

Increase financial investment

In order to prevent new outbreak or eradication completely and rapidly while epidemic occurred, simultaneously, support development of national poultry raising, much more money using for HPAI controlling is recommended to provided by the national government. At the same time, striving for the support from international organization in funds and supplies does also need. The funds are mainly used for the following issues:

- a. Improvement of early alerting system .
- b. To reinforce surveillance of HPAI in the whole country.
- c. Training laboratory technicians and veterinaries of different level to aim directly at the capability in epidemio-surveillance and laboratory diagnosis.
- d. Raising biosafety consciousness of farmers at various levels by publishment of the biosafety measures and their importance.
- e. Compensation for farmers suffered economic loss from HPAI epidemic outbreak.
- f. Other items that should be strengthened in HPAI prevention and controlling.

7 Conclusion

Since the first HPAI outbreak in Asia in 2003, most African countries, include Ghana began to take coping measures. Feb., 2006, HPAI was first outbreak in Nigeria. Then it occurred in Egypt, Niger, Cameroon, Burkina Faso, Sudan and Côte d'Ivoire respectively. In the face of menace from ferocious and serious HPAI, the GOG took a series of such precautionary measures as close-up border trade, strengthening surveillance and market inspection according to the GPRP. Unfortunately, HPAI epidemic occurred in TEMA in April, 2007. Several outbreaks occurred once again within succedent two months. The preventive measures taken by GOG seem not enough to control the disease according to the epidemic outbreak and development. Confronting the menace from HPAI, the GOG made out strategy plan of HPAI control and prevention, and formulated laws and regulations, and reinforced supervision. But not all the measures were well executed because of insufficient fund. Although there was such weakness, epidemics were controlled after outbreak. There is no new case occurring since June, 2007. It is recommended that the GOG strive all the more to strengthen supervision and management of poultry and poultry products, and reinforce surveillance and epidemic pursuit, and enhance capability of rapidly response, and perfect prevention and control measures furtherly.

The mission regrets that they have not communicated with veterinary diagnostic laboratory in HPAI analyzing and surveillance, have not communicated with other sectors also in charging of HPAI control, so that help the country perfect the system of HPAI prevention and control.

Annex 5: Activities and mission to Togo

1 Introduction

Une mission de la Coordination Régionale de l'UA-IBAR pour l'Afrique de l'ouest et du Centre a séjourné au Togo en vue de porter un appui technique à la Direction de l'Elevage et de la Pêche dans le cadre de la gestion d'un foyer d'Influenza Aviaire Hautement Pathogène (IAHP) apparu dans le village de Sigbehoue. La mission était composée du Dr Compaore Zacharie Assistant Technique à la coordination Régionale, des experts chinois mis à la disposition de l'UA-IBAR pour appuyer les pays Africain dans la prévention et la lutte contre l'Influenza Aviaire Hautement Pathogène : Dr Wang Junwei et Dr Yang Huanliang accompagnés de leur interprète Mr Fan Huan.

La mission a travaillé avec le service en charge de la santé animale à la Direction de l'Elevage et de la Pêche, le responsable du laboratoire vétérinaire, le consultant national recruté par la FAO pour appuyer la Direction de l'Elevage. Elle a rendu une visite de courtoisie au Secrétaire Général du Ministère de l'Agriculture de l'Elevage et de la Pêche et au Directeur de Cabinet du Ministre. A la fin de son séjour la mission a fait une restitution des principaux constats et propositions d'amélioration au Directeur de l'Elevage en présence de certains de ces collaborateurs.

Le présent rapport de mission résume les principales activités réalisées au cours de la mission au Togo.

2 Contexte de la mission

Depuis l'apparition de l'Influenza Aviaire Hautement Pathogène au Nigeria en février 2006 et l'infection de certains pays voisins comme le Burkina Faso, le Togo est considéré comme un pays à risque élevé. La menace de l'infection s'est accentuée avec l'apparition des foyers d'Influenza Aviaire Hautement Pathogène au Ghana dont le tout dernier se situe à la frontière avec le Togo. Pour faire face à cette menace, le pays a pris des dispositions suivantes pour se prémunir de l'infection :

- mesures d'interdictions d'importer des volailles et des produits avicoles en provenance des pays infectés ;
- renforcement de la surveillance épidémiologique ;
- élaboration d'un plan stratégique national de prévention et de lutte contre la grippe aviaire ;
- information, sensibilisation et formation des consommateurs et des acteurs de la filière avicole

L'insuffisance des moyens financier n'a cependant pas permis au Togo de mettre en oeuvre la plupart des actions inscrites dans son plan stratégique nationale de prévention et de lutte contre la Grippe Aviaire, rendant le pays vulnérable à une probable infection. C'est ainsi que Le mercredi 13 Juin 2007 la Direction de l'Elevage et de la Pêche a été saisie sur des mortalités suspectes de volailles dans le village de Sigbehoue (N 06° 15' E 001° 37') banlieue nord-est de la ville d'Aného dans la préfecture des Lacs. Les mortalités avaient débuté depuis le 06/06/07 et à la date du 13/06/07 on dénombrait 2207 volailles mortes dans la ferme infectée sur un effectif de 5574. Les premières analyses de laboratoire basées sur l'utilisation des test rapides ont révélé des cas positifs d'influenza Aviaire hautement Pathogène de type A. la confirmation du diagnostic du H5N1 s'est faite plutard au laboratoire de nouechi Memorial Institute for medical Reserch au Ghana et à l'Institutio zoo profilattico Sperimentale Delle Venezia, laboratoire de référence de l'OIE/FAO à

padova en Italie.

Une opération d'abattage des volailles de l'exploitation infectée suivie de la désinfection des poulaillers ont été réalisées le 15 et 16/06/07. Au total 3069 volailles ont été abattues dans le foyer et une surveillance épidémiologique active a été instaurée dans la zone d'infection.

3 Objectifs de la mission

La présente mission avait pour objectifs : (i) d'appuyer la Direction de l'Elevage et de la Pêche pour la mise en œuvre des mesures de lutte et de prévention contre l'Influenza Aviaire Hautement Pathogène, (ii) d'apporter un appui technique au laboratoire de diagnostic vétérinaire, (iii) de partager avec les techniciens de la Direction de l'Elevage, l'expérience de la Chine en matière de lutte contre l'Influenza Aviaire Hautement Pathogène, (iiii) le suivi de l'exécution du projet d'aide d'urgence UA-IBAR/BAD.

4 Déroulement de la mission.

La mission a fait deux séjours au Togo ; le premier a eu lieu du 29/06/07 au 03/07/07 avec la mission chinoise qui a eu participé aux premiers abattages dans la zone d'infection. Elle a également partagé avec la Direction de l'Elevage à travers une communication les principales activités entreprises par la Chine pour le contrôle des foyers de l'Influenza Aviaire Hautement Pathogène. Le second séjour a eu lieu du 05/07/07 au 07/07/07 au cours duquel la mission chinoise a été rejointe par l'Assistant Technique Dr Compaore Zacharie. Pendant ce deuxième séjour la mission a participé à la seconde opération d'abattage des volailles dans la zone d'infection et travaillé avec le responsable du laboratoire vétérinaire sur le renforcement des capacités des diagnostics. L'assistant Technique a eu une séance de travail avec le Directeur de l'Elevage sur l'état d'exécution du projet d'aide d'urgence financé par l'UA-IBAR/BAD.

5 Principales activités menées par la mission

Etat des lieux des mesures préventives prises contre l'Influenza Aviaire Hautement pathogène

Plan stratégique de prévention et de lutte Contre la Grippe Aviaire.

Avec la crise survenue en Asie en 2005 et l'apparition des foyers au Nigeria en février 2006 le Togo a élaboré un Plan Stratégique National de prévention et de lutte contre la Grippe Aviaire qui a été adopté en Avril 2006. Le plan stratégique est intégré et prend en compte les volets santé animale, santé humaine et communication. La stratégie d'intervention du plan est axée sur les points suivants: la surveillance épidémiologique de la Grippe Aviaire, la mise en œuvre des mesures de prévention et de riposte contre la maladie, la formation du personnel technique et des acteurs de la filière avicole, la communication sur la maladie à destination du public, des professionnels et des techniciens.

Mesures réglementaires et organes de gestion de la Grippe Aviaire

Des mesures réglementaires ont été prises pour prévenir l'introduction du virus dans le pays: arrêté interministériel portant interdiction d'importation de volailles et des produits avicoles en provenance des pays infectés, la création par arrêté ministériel d'un comité interministériel de prévention et lutte contre la

Grippe Aviaire chargé de la mise en oeuvre du plan stratégique

national de prévention et de lutte contre la Grippe Aviaire, la création d'un comité technique national de prévention et de lutte contre la Grippe Aviaire chargé de la mise en oeuvre des

Plans d'action adoptés par le comité interministériel. Le comité technique est présidé par le Directeur de l'Elevage et de la Pêche.

Surveillance épidémiologique

La prise en compte de l'Influenza Aviaire Hautement Pathogène comme une maladie prioritaire dans le réseau de surveillance épidémiologique des maladies animales du Togo (REMATO) qui compte cinquante (50) postes d'observation pour les animaux domestiques et quarante huit pour la faune sauvage.

Pré positionnement des moyens de lutte contre la Grippe Aviaire

L'acquisition des réactifs et des consommables de laboratoire pour le diagnostic rapide de la Grippe Aviaire (FAO), du matériel de protection et de désinfection fournis par l'USAID.

Plan d'urgence de lutte contre la Grippe Aviaire

Un plan d'action d'urgence de six (06) mois a été élaboré par la Direction de l'Elevage et de la Pêche et soumis à l'UA-IBAR pour financement sur les fonds BAD. Une première tranche du financement a été reçue par le Togo en Juin 2007

Formation des acteurs

Des formations ont été organisées au profit des du personnel technique et des aviculteurs. Les techniciens Togolais ont participé à des formations organisées par la FAO, APHIS, L'UA-IBAR et d'autres partenaires dans les domaines de laboratoire, de l'épidémiologie et de la riposte contre la maladie.

Laboratoire de diagnostic vétérinaire

Le Togo dispose d'un seul laboratoire de diagnostic vétérinaire basé à Lomé. Le nombre d'agents affectés au laboratoire est de quatre (04) parmi lesquels 02 stagiaires. En matière de Grippe Aviaire le spectre de diagnostic est très limité. La seule méthode utilisée pour le diagnostic de la Grippe Aviaire est le test de détection rapide de l'antigène.

Constats sur l'état de préparation du Togo contre la Grippe Aviaire

Plan national de prévention et de lutte contre la Grippe Aviaire

A l'instar des autres pays menacés par l'Influenza Aviaire Hautement pathogène le Togo a élaboré un plan stratégique national de prévention et de lutte contre la grippe Aviaire en 2006. Ce plan qui trace les grandes lignes des actions de prévention, de lutte et de communication doit être traduit en un plan opérationnel.

Application des dispositions réglementaires

Les mesures règlementaires prises pour prévenir la maladie connaissent une faible application : irrégularité des tenues des réunions des différents comités mis en place pour le suivi et la coordination de la lutte contre Grippe Aviaire, les contrôles sanitaires aux frontières sont insuffisants.

Capacité de diagnostic du laboratoire

Le laboratoire vétérinaire dispose d'une certaine quantité de réactifs de diagnostic rapide mais insuffisante pour conduire des enquêtes sérologiques et faire face aux différentes alertes sur les mortalités des volailles. La capacité du laboratoire en infrastructure, en personnel et en équipement est très faible.

Acquisition du matériel et des équipements de lutte contre la maladie

Au niveau de la Direction de l'Elevage il existe un stock important d'équipement et de matériel de protection et de désinfection.

Surveillance épidémiologique

Le réseau de surveillance épidémiologique des maladies animales du Togo qui est composé de cinquante (50) postes d'observation connaît des difficultés de fonctionnement après l'arrêt des financements PACE intervenu à la fin du projet. Certains postes sont vacants et ceux qui sont occupés par des agents techniques ne reçoivent plus des frais de fonctionnement;

Mesures de lutte prises pour la gestion du foyer

Diagnostic de la maladie dans le Foyer

La Direction de l'Elevage et de la Pêche a été saisie le 13 juin 2007 sur des mortalités suspectes de volailles depuis le 06/06/07 dans le village de Sigbehoue, localité située à environ 35 km de Lomé. Le même jour une équipe d'intervention s'est rendu sur le terrain pour des investigations. Des analyses réalisées les 13 et 14/07/07 sur des échantillons prélevés dans le foyer ont donnés des résultats positifs au test de diagnostic rapide. Le 16/06/07 des prélèvements ont été envoyés à Accra et à Padou pour des diagnostics de confirmation.

Abattage des volailles dans le foyer

L'opération d'abattage des volailles de l'exploitation infectée s'est déroulée le 16/07/07 par une équipe de la Direction de l'Elevage appuyée par les agents de la Direction Régionale et en présence du Directeur de Cabinet du Ministre de l'Agriculture, de l'Elevage et de la pêche. Au total 3069 volailles ont été abattues, incinérées et enfouies dans des fosses. Les poulaillers et les équipements se trouvant dans les lieux ont été désinfectés.

Abattage des volailles dans la zone d'infection

Avant le démarrage des opérations d'abattage dans la zone d'infection, des séances de sensibilisation ont été conduites dans la zone avec les populations pour expliquer les raisons et l'organisation des abattages des volailles ainsi que le processus d'indemnisation. Pour les besoins de l'opération, huit (08) équipes ont été formées. Chaque équipe est composée des agents chargés d'abattre les volailles, d'un agent chargé de la désinfection, d'un agent des forces de sécurités et d'un agent chargé d'indemniser les aviculteurs. Les abattages se sont faits en deux temps, le premier s'est déroulé le 03/07/07 et le second le 06/07/07. Au total environ 12000 volailles ont été abattues dans la zone d'infection.

Indemnisation des aviculteurs

La compensation des aviculteurs s'est faite sur la base d'un barème de paiement établi par le Ministère en charge de l'Elevage et les associations des aviculteurs (Cf. Annexe N°1). Les aviculteurs ont été indemnisés sur place après l'abattage de leurs volailles. Les fonds UA-IBAR/BAD ont servi à l'indemnisation et à la prise en charge des opérations d'abattage.

Contrôles sanitaires

Un renforcement des contrôles sanitaires a été appliqué aux frontières terrestres à l'aéroport, aux marchés intérieurs de volailles et dans les zones d'élevage. Les marchés de volailles de la zone de foyer et des villages environnants ont été fermés temporairement.

Communication sur la Grippe Aviaire

Des séances d'information et de sensibilisation sur la Grippe Aviaire ont lieu dans la zone d'infection et dans la zone de surveillance. Des messages sont également diffusés par les médias à l'attention du public.

Constats sur la gestion du foyer

Intervention des services de santé animale

Les services en charge de la santé animale (division de la santé animale et le laboratoire vétérinaire) se sont rendus le même jour au foyer quand ils ont été saisis le 13/06/07. Le diagnostic a été immédiatement fait avec le test de détection rapide de l'antigène. La volaille du foyer a été abattue le 16/06/07 soit trois (03) après la saisine. Pour ce qui concerne le temps de réaction de la ferme aux services vétérinaires il a été assez long. En effet les services vétérinaires ont été informés de la suspicion neuf (09) après le début des mortalités.

Diagnostic de laboratoire

Le premier diagnostic réalisé avec les tests de détection rapide de l'antigène a été fait à temps ; les salles réservées aux analyses sont insuffisantes (elles sont au nombre de deux). Le diagnostic de la Grippe Aviaire ne se fait que par la seule méthode de détection de l'antigène.

Abattage sanitaire des volailles dans la zone d'infection

Le temps mis entre le diagnostic de la maladie et les abattages de la volaille dans la zone d'infection a été relativement long. En effet la fin des opérations d'abattage est intervenue trente (30) jours après le début des mortalités dans le foyer.

Les niveaux techniques des équipes constituées pour les opérations d'abattage étaient disparates et insuffisants. Dans certaines équipes le port des combinaisons était correct tandis dans d'autres équipes ce n'est pas le cas. Certains membres des équipes comme les forces de sécurité qui étaient souvent dans les poulaillers ne portaient pas des combinaisons.

La méthode d'abattage préconisée était la torsion du cou mais on surprenait souvent des agents entraînés à abattre la volaille avec des bâtons.

Au cours des opérations d'abattage on a observé des grands attroupements aux lieux d'abattages et d'incinération avec la présence des enfants et des vendeuses de nourriture.

Dans la zone d'abattage les volailles ont été regroupées en un point fixe du village pour être abattues alors qu'elles devraient être abattues dans les poulaillers. Les poulaillers n'ont pas subi de désinfection.

Mesures de Biosécurité

Les mesures de biosécurité ont connu des insuffisances dans leur application : l'exploitation infectée n'était pas délimitée et matérialisée par un panneau de signalisation, aucune pédiuve n'existait à la rentrée de la ferme infectée, il n'y avait aucune signalisation à la rentrée du village indiquant que la zone était infectée, aucune rotule à l'entrée et à la sortie du village. Les fosses d'incinération sont souvent peu profondes,

situées à proximité des habitations et non matérialisées.

La gestion du foyer a été transparente et appuyée par une bonne volonté politique. Le Directeur de Cabinet du ministre a coordonné les opérations d'abattage sur le terrain. En plus de l'appui de l'UA-IBAR/BAD le Togo a reçu des appuis de la FAO, de l'OIE et de l'USAID.

Etat d'exécution du projet d'aide d'urgence pour la prévention et la lutte contre la Grippe Aviaire UA-IBAR/BAD

Le Togo fait partie des pays du premier groupe bénéficiaires des fonds UA-IBAR/BAD. A ce titre le Togo a soumis à l'UA-IBAR pour financement un programme d'urgence de prévention et de lutte contre la Grippe Aviaire hautement Pathogène. Le démarrage du projet a connu un retard dû à la non satisfaction des conditionnalités du projet par le Togo. C'est ainsi que le projet qui devrait démarrer au troisième trimestre de l'année 2006 n'a pu commencer ses activités qu'en juin 2007. Les fonds du projet ont largement contribué au financement des opérations d'abattage et à l'indemnisation des aviculteurs.

Compte tenu de son statut de pays nouvellement infecté par la Grippe Aviaire et de la faible mobilisation des ressources financières, le Directeur de l'Elevage et de la Pêche a souhaité un réaménagement de son programme d'urgence pour prendre en compte les préoccupations liées au nouveau contexte du pays. La relecture du programme d'urgence permettra de renforcer la surveillance épidémiologique par l'implication des vétérinaires privés dans le réseau de surveillance, la prise en charge du fonctionnement des postes d'observation qui étaient jadis financés par le PACE. Il est également envisagé de renforcer le volet communication par la tenue des ateliers régionaux en direction des politiques, de l'administration, de la sécurité, des coutumiers et des religieux.

Il a été convenu que le Togo fasse parvenir dans les meilleurs délais le programme d'urgence révisé à la coordination régionale de l'UA-IBAR à Bamako pour appréciation.

6 Propositions d'amélioration

Des mesures ont été prises par les services vétérinaires du Togo pour gérer le foyer de grippe Aviaire de Sigbehoue et prévenir une éventuelle dissimulation du virus dans d'autres localités du pays. Certaines actions entreprises dans la gestion du foyer méritent d'être améliorées ou renforcées. Les propositions d'amélioration techniques suivantes sont faites par la mission :

- la relecture du plan Stratégique national de prévention et lutte contre la Grippe Aviaire pour le rendre plus opérationnel.
- La reprise et la tenue régulière des rencontres de suivi et de coordination de la lutte contre la Grippe Aviaire du comité technique national
- La prise en charge du fonctionnement des postes d'observation du réseau de surveillance épidémiologique. Une relecture du programme d'urgence de prévention et de lutte contre la grippe aviaire pourrait dégager des lignes budgétaires pour financer la surveillance des volailles domestiques et sauvages.
- La conduite d'une étude pour une recherche active du virus de la Grippe Aviaire de H5N1 sur le territoire national

- L'amélioration de la circulation de l'information sanitaire entre les aviculteurs et les services de santé animale. Un agent communautaire pourrait servir de trait d'union entre le village et le poste d'élevage de la localité
- Le renforcement des capacités de diagnostic du laboratoire vétérinaire de Lomé. A cet effet une extension des locaux pourrait se faire en lui affectant toutes les salles du bâtiment qui abrite actuellement le laboratoire. Cela permettrait d'améliorer la biosécurité et augmenter les capacités de diagnostic du laboratoire. Une proposition de réaménagement et d'équipement du laboratoire sera faite par les experts Chinois.
- Une importante quantité d'équipements de protection et de matériel de désinfection est présentement stockée à La Direction de l'Elevage et de la Pêche à Lomé. Le déstockage d'une partie de ces équipements et matériel devrait se faire au profit des Directions Régionales
- Les équipes constituées pour les opérations d'abattage étaient insuffisamment préparées et présentaient des lacunes dans leur manière de faire (méthode d'abattage, port des combinaisons, désinfection, incinération, planification des besoins et organisation pratique des opérations). Pour ce faire une formation préalable des membres de l'équipe devrait se faire avant de se rendre sur le terrain. Les épidémiologistes formés par l'UA-IBAR pourraient éventuellement être utilisés pour cette formation.
- L'amélioration de la Biosécurité en évitant les ruptures des stocks de matériel sur le terrain (sacs en plastique, tailles des combinaisons), en délimitant les zones d'abattage pour éviter les attroupements, en effectuant les abattage dans les poulaillers à l'intérieur des concessions, en incinérant les volailles abattues hors du village, en matérialisant le foyer, la zone d'infection, les fosses d'incinération par des panneaux de signalisation. Les véhicules et autres engins devraient subir des contrôles à la rentrée et à la sortie de la zone d'infection.

7 Conclusion

Longtemps considéré comme un pays potentiellement menacé par l'Influenza Aviaire Hautement Pathogène le Togo a connu son premier foyer le 13/06/07 à Sigbehoue dans la banlieue nord-est d'Aného, ville située à la frontière Béninoise. Les mesures de prévention prises pour empêcher l'introduction du virus dans le pays se sont avérées insuffisantes. Face à la menace de la maladie le Togo a élaboré un plan stratégique national de prévention et de lutte contre la grippe Aviaire, pris des mesures réglementaires et renforcé les contrôles sanitaires. Toutes ces mesures n'ont pas connu une exécution satisfaisante à cause de l'insuffisance des moyens financiers dont est confrontée la Direction en charge de l'élevage. Le seul moyen financier mobilisable au moment de la déclaration du foyer était les fonds UA-IBAR qui ont servi à l'indemnisation des aviculteurs et à financer les opérations d'abattage. Malgré quelques insuffisances constatées dans l'application des mesures prises pour contrôler le foyer la situation semblait être maîtrisée. Aucun autre foyer n'a été signalé jusqu'au départ de la mission. La Direction de l'Elevage devra redoubler des efforts pour le suivi du foyer et améliorer la mise en œuvre des mesures de prévention tant à l'intérieur qu'aux frontières du pays.

8 Remerciements

La mission remercie tous ceux qui ont permis la réalisation et le bon déroulement de la présente mission au

Togo. Elle remercie particulièrement le Directeur de l'Elevage et de la Pêche, et ses collaborateurs, le Dr Houmkanli Yaovi consultant national FAO, le Dr AKlel Yahoo Pataname Chef division législation et santé publique vétérinaire, Le Dr M S Karim coordonnateur du TCP 3016/E FAO. Nos remerciements vont également au Secrétaire Général du Ministère de l'Agriculture de l'Elevage et de la Pêche et au Directeur de Cabinet du ministre.

Annex 6: Activities and mission to Mali

According to the plan of AU/IBAR, Chinese expert team, together with Dr. COMPAORE, Technical Assistant in AU/IBAR regional coordination, visited LCV on April, 24, 2007. Dr. SANGARE, Head of virology laboratory, showed us around the LCV. The superintendent of various laboratories introduced their work done at present to us. At the afternoon, we communicated in detail with Dr. SANGARE at HPAI diagnosis, laboratory construction, AIV transmission of transnational boundary, and other information concerned. At the afternoon of April 26, we communicated the investigation situation with Dr. TEMBELY, director General of the LCV, and Dr.SANGARE, Head of virology laboratory. The detail is reported as follows.

1 Main person in charge to interview

- Dr. TEMBELY, Director General
- Dr. NIANG, Veterinary Microbiology Head of Diagnostic and Research Department
- Dr.SANGARE, Head of virology laboratory

2 Brief introduction to LCV

LCV was set up in 1972, and attached directly to MINISTERE DE L'ELEVAGE ET DE LA PECHE REPUBLIQUE DU MALI. It is the only veterinary diagnostic laboratory in Mali up to now. There are about 150 personnel in LCV.

The LCV is composed of five departments , which is department of vaccine producing, diagnostic centre for animal diseases, quality management, administrative management and financial affairs. Among the total, diagnostic centre for animal diseases comprises eight laboratories and one experiment animal house, say Anatomie Pathologique et Controle de qualite des semences animale, Bacteriologie Medicale, Entomologie, Helminthologie, Mycoplasmes et mycoplasmoses, Protozoologie, Tiques et maladies transmises par les tiques, Virologie, Animalerie. The main task of LCV is research on situation of animal health, diagnosis for animal diseases, technique support to veterinary public health, and training. Main research work developing now is surveillance for RVF (ELISA) ,Lumpy Skin Disease, and PPCB. Furthermore, they also study on parasite, metabolic diseases, insecticide, and other animal infectious diseases. In addition, animal using vaccines are also produced in LCV.

3 Situation of the HPAI diagnosis

Current situation of the Lab

LCV is the only veterinary diagnostic laboratory in Mali till now. Some provinces have the trend to establish VET lab, but no one has started to develop at present. Samples should be sent to LCV for preliminary test whether it AI positive or not while suspicious case is found in a province. Further confirmation will be finished at OIE/FAO specified laboratories. Some universities in Mali also have laboratories, but they are only offered to the students for teaching. Most of them are not as well as LCV, but some has such advanced equipment

as sequence instrument which LCV has not.

Available groundwork in HPAI diagnosis

The main work on HPAI diagnosis in LCV now as follows:

- 1) Etiology diagnosis: RT-PCR (one step or two steps) , and
- 2) Serology test: AGID, ELISA, and HA/HI.

Furthermore, virus isolation can also be performed in this lab. But it has not been developed because of their poor biosafety condition. Diagnosis for Newcastle Disease has been operating in this laboratory. The method used is not only serology test, but also virus isolation. In addition, the laboratory also participated in HPAI surveillance of migratory birds in western and central Africa organized by FAO during 2005 and 2006. The work involved in all the procedures from samples collection, packaging transportation and preliminary detection. They have also attended the investigation for poultry HPAI in Mali organized by an technical agency funded from FAO this year. Up to now, of all the routine methods used for HPAI diagnosis, only real-time RT-PCR is not used in this lab for they have no fluorescent PCR instrument.

Refer to the treatment of test result, the laboratory will send the samples to OIE/FAO reference laboratory to confirmation while they test H5 or H7 positive.

Facilities

There are necessary facilities and equipments used for HPAI routine test, for example, relatively independent laboratory condition, centrifuge, PCR instrument, low temperature refrigerator and double-door autoclave.

Personnel

There are high-tech level personnel in the lab. Especially the chief of virology laboratory Dr.SANGARE, have done a lot of research work on such viral diseases as HPAI, Foot and Mouth Disease, and have made perfect achievements in these diseases studying. Moreover, there are three other technique staff in this laboratory.

Collaboration and communication

Not only has the laboratory been keeping collaboration with university of BAMAKO, departments of national public health and PDMA, but also has broadly cooperated with such international organization as OIE, FAO, ILRI, CIRDES and CE. They have soundly enhanced their technical level by collaboration and communication with international organization. The hardware facilities in this laboratory are also well improved by the cooperation. For example, the whole technique level of the laboratory have raised greatly when the FAO, USAID and CE gave their money to build up experiment animal house or buy equipments and training personnel. Many technicians have been trained in the area of laboratory technology and laboratory biosafety through cooperation with South Africa these years.

4 Overall evaluation

Infrastructure and equipments can meet the need of veterinary services on the whole. There are advanced researchers and technician that can engage in HPAI studying and detection. Most detection and research work on HPAI have been developed in the lab, with relatively good research groundwork.

The lab also has smoothly information communication, with broadly collaboration with such an international organization as OIE and FAO.

However, there is only one veterinary laboratory in Mali, which is LCV. Departments at various levels should send samples to LCV for detected furtherly when they suspect it of HPAI. Although there is personnel with high-tech and equipped with necessary facilities and instruments, equipments and staff are also short of in the face of weighty tasks. Furthermore, there is no quality assuring system fitted international standard, their results are difficult to be admitted by other countries or organizations. In addition, safety facilities are also worried about, imminent needing normative and improvement furtherly. Only one laboratory that can execute HPAI detection is far from meeting the need of a country with 27,000,000 birds. Therefore, it is necessary to give much more equipments and personnel in HPAI research, surveillance and detection in order to satisfy the need of HPAI precaution in Mali.

5 Recommendation on laboratory construction

To locate the laboratory

It is recommended to make full use of the priority of Mali situating in the centre of the western and central Africa, striving for establishing the laboratory as reference laboratory of FAO or OIE, or establishing reference laboratory of AU/IBAR in the western and central Africa.

The role of the LCV in provincial level planning veterinary laboratory

It is suggested that LCV play key role in laboratories construction at all levels in Mali, and give directive advice to the provinces at laboratory design, construction, and management control during their preparation of construction, so that the provincial level laboratories bring into full play in epidemic supervision, report, and disposal while outbreak occurs. Meanwhile, it can also establish good foundation for monitoring network construction of national animal infectious diseases in the future.

Suggestions that the lab needs to improve if developing HPAIV pre-diagnosis at present

To ameliorate facilities condition so as to ensure laboratory biosafety while detecting samples

The mission recommends to readjust the proposition of laboratory on the basis of whether experiment operation is convenient or not, and whether it can assure of biosafety. At the same time, to ameliorate the lab condition according to the requirements for biosafety level 2 laboratory.

To add equipments according to detection intension and task requirement.

Facilities and equipments in the laboratory can basically meet the requirement of HPAI detection and surveillance at this time. However, equipments should be equipped with if the lab wants to satisfy the plan of national HPAI prevention and containment. It is suggested that the laboratory equip with much more instruments combining with their tasks according to national entire plan of HPAI precaution.

To increase and equip with technician to meet the need of HPAI research, detection, investigation and surveillance.

It would be recommendable to increase the quantity of technician in order to make fundamental stocking of the techniques in HPAI epidemio-surveillance, diagnosis, and vaccine advanced development. Meanwhile, this technician can also assume the responsibility of treating suspicion cases and training local

veterinaries when the outbreak occurs.

To establish quality and biosafety management systems in order to guarantee reporting the result scientifically and normatively, and biosafety to environment and personnel working in the lab.

Specifically, following work is recommended to organized:

- 1) To establish quality and biosafety management systems that to be in line with the lab so as to ensure standardization, normalization and biosafety at sample collection, transportation, reception, registration, treatment, detection, result reporting, and safe disposal of waste.
- 2) To formulate a series of standard operation practices and programmes. It mainly includes:
 - Programme for sample collection, transportation, and reception.
 - Programme for selection and standardization of detection methods.
 - Quality assurance of detection result
 - Controlling of the detection procedure
 - Waste disposal safely in detection
 - Purchase for experiment articles and equipments
 - Management of samples, reagents, and facilities.
 - Disinfection of facilities and equipments
 - Programme for report of test result
 - Management of documents
 - Personnel management, training, and so on.
- 3) To make out regulatory regimes for laboratory safety management, for example, management of in and out of the laboratory, personnel management, and articles management, to guarantee normative AIV detection and laboratory biosafety.

These programmes and practices aim directly to HPAI detection. However, the mission suggests that the LCV establish its management system according to international standard ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories" and WHO "laboratory biosafety manual". Not only can warrant AIV detected scientifically and normally, but also guarantee other detection and research laboratories work scientifically and normally, enhancing work efficiency and result reliability greatly. It can also upgrade LCV rank in such international organizations as OIE, FAO or AU/IBAR, and settle good foundation for conformity certification of related organization.

Personnel training

When the lab establishes its own management system, all the personnel should be trained, especially those who have never participated in training in biosafety, including logistics staff. Training content comprises not only detection techniques, but also all the parts of system, for instance, Manual, Programme Files, and Standard Operation Practices. According to the requirements of HPAI detection, training veterinaries at provincial level should also be arranged so as to keep biosafe and normative operation in sample collection, packaging and shipping.

Investigation report of HPAI prevention and containment in

Mali

1 Brief introduction

According to the plan of AU/IBAR, Chinese expert team for HPAI visited the DNSV and departments relevant to HPAI containment in Mali from late April to late May 2007, so as to investigate if there is any weakness in HPAI prevention & control and help them improve it preferably. The team is composed of those who are in charge of HPAI prevention and containment assisting AU/IBAR in western and central African countries, Dr.WANG Junwei and Dr.YANG Huanliang, accompanying with their French translator Mr.FAN Huan. In addition, Dr.COMPAORE, Technical Assistant in AU/IBAR regional coordination, also participated in part of investigation work during our visits. We communicated fully with the director and personnel of DNSV, the director and personnel of LCV, the director or vice director of DNCN, DNS, and PDAM in the area of HPAI prevention and poultry production. After communications, the staff of DNSV showed us around two modern poultry raising enterprises, and four live poultry markets, respectively. The detail is reported as follows.

2 Context

Since HPAI outbreak occurred in Asian and European countries, the African continent had been encountering great threat of the epidemic outbreak. Unfortunately, HPAI took place firstly in Nigeria on February 8, 2006, which was epidemic for the first time in this continent. Since then the outbreaks happened subsequently in Egypt, Niger, Burkina Faso, etc. The national authorities of Mali are fully aware of the threats to animals and human health posed by avian influenza. In the face of the menace from HPAI, the Government of Mali has taken a series of precaution measures to combat it, such as developing preparedness and response plan, setting up Committee of Technique and Coordination (CTC), banning importation of poultry and poultry products from the countries which have HPAI outbreaks, and strengthening HPAI surveillance. However, action prescribed in the strategies of HPAI prevention and control is not well executed for lacking of financial support and technicians. The risk of HPAI epidemic in Mali is becoming higher and higher, and the situation of HPAI prevention & containment is still rigorous with continually spread of the epidemic among the African countries. Consequently, the AU/IBAR regional coordination assigned the expert team to DNSV of Mali to help them look for the weakness in HPAI precaution in order to perfect their preparedness system.

3 Objective of the mission

There are four main objectives to investigate DNSV and relevant departments.

- To offer technique support and to help the government ameliorate its systems of HPAI prevention & containment after our investigation.
- Technique support to veterinary diagnostic laboratory for HPAI.
- Experience communication with relevant personnel in the area of HPAI prevention and control in China.

Schedule of investigation

- April 24th to 26th, to visit LCV so as to understand laboratory construction for AI;
- May 2nd to 9th, May 15th, to pay a visit to DNSV in order to understand their construction systems of veterinary service and their work on HPAI prevention and control;
- May 10th, pay a visit to DNCN and DNS to get the message of HPAI surveillance in migratory birds and work on HPAI in department of human health;
- May 21st, to communicate with PDAM to understand the poultry industry in Mali;
- May 11th, and 14th, to visit modern and large poultry farms at the suburbs of the capital, Bamako, in order to understand current situation of diseases and biosafety control in raising farms;
- May 18th, and 22nd, to pay a visit to live poultry markets in Bamako and its outskirts;
- May 16th, to attend the weekly routine meeting organized by CTC

Current situation of HPAI prevention and control in Mali— the precautionary measures taken prevention and containment of in HPAI

i. Construction of management systems on HPAI prevention & control

Conference on ministry level was held on October 18, 2005 in Mali in face of global and serious situation of avian influenza. All the following ministries and international partners attended this meeting. They were MEP, MDS, MEA, MATCL, DNCN, MDA, MEF, MIC, MSIPC and MAECI, as well as FAO, OIE, MOS, EU, PNUD and USAID. A resolution to set up CTC that would be in charge of organization and coordination of HPAI prevention & control was passed at this conference. At the same time, general secretariat of CTC was established at DNSV.

Regular meeting hosted by the minister of MEP or secretary-general of the CTC has been holding every Wednesday since its foundation. At the regular meeting, participators report and/or communicate their work assigned with the members of CTC in order to understand situation of the epidemic development and progress of HPAI work. Moreover, caution committees were founded in each district and Bamako specific district. Caution offices were also set up in cities and towns in Mali, which were in charged by the relevant procurator, with Veterinary Services and the Natural protection Division as the principal agencies.

ii. Strategic plan on avian influenza

The Government of Mali thinks highly of HPAI prevention and control, and urged MEP to draft off emergency plan, five-month plan and long-term preparedness and Response Plan for HPAI control,

collaborating with other related partners. All the plans are implemented orderly since December 2005. The plan contains the organization forms, communication, epidemic report systems, confirmation of epidemic situation and how to dispose the epidemic, etc. A detailed epidemic situation management manual was also made out so as to carry out these plans perfectly and effectively.

iii. A series of Legislations relating to avian influenza were enacted.

A series of Legislations which can be used to prevent and manage the virus were enacted or revised by the Government of Mali , especially after the outbreaks in surrounding countries such as Burkina faso , Cote d'Ivoire, and Niger. These Legislations include regulation of punishment on disobey the public sanitation (revised, 31st, May, 2001, NO01 - 022.), regulation on banning import of poultry meat (18th, March, 2004, NO. 04-0596/MIC/MEF/MAEP-SG), temporary regulation on banning the import of poultry and poultry products(10th, February , 2006, NO. 06-0239 /MIC-MEF-MEP-MSIPC), etc, involving in public health, trade of poultry and poultry produces, import, epidemic report, and disposal of epidemic. A detailed poultry market regulation is being drafted by relevant division of veterinary service.

iv. Supervision and quarantine of veterinary public health

Supervision of veterinary public health is implemented by health protection and surveillance division of DNSV. Official veterinary provides the statutory poultry inspection service and licenses the eligible live poultry when live poultry are sold. There are checkpoints on the main traffic routes to cities when the poultry are transported to markets. No quarantine will be taken again once the poultry enters into the markets.

v. Function of the health departments on HPAI prevention and containment

The trained personnel arranged by The Health department that cooperate with DNSV are responsible for avian influenza management on provincial level. They should report the local epidemic situation to the National sanitation department in Bamako once a week. All the reports submitted from different provinces or regions will be organized and declared at the routine workshop held by CTC. In addition, essential equipments such as drug stocks were done in provinces in case of epidemic outbreaks.

vi. Epidemiology surveillance

HPAI epidemio-surveillance on migratory birds is carried out by the DNCN DNVS. About 49 caution stations at different levels were founded by DNCN in Bamako and the other 8 districts. DNCN carries out the function of avian influenza surveillance work on wild birds with the financial and technical support provided by the international organizations such as USAID, FAO, UNDP. One of the main tasks of DNCN is to make statistic survey. Furthermore, they will take samples from the migratory birds and then send them to LCV to test when the seasons comes. The surveillance plan has already been implemented before HPAI visited the African continent. Some 690 samples have been detected since the work started.

HPAI epidemio-surveillance on domestic poultry has been developed by DNSV through the person qualified observing if there any dead poultry at feeding, transportation, and trade. Once the dead birds are founded, they will be sent to LCV for further detection.

Active surveillance on domestic birds is not yet undertake up to now.

vii. Training and communication

Information communication on HPAI prevention and control among ministries was executed via routine

conference of the CTC. Moreover, the information trace and evaluation division of DNSV is also in charge of the communication, propagation and popularization of avian influenza information.

Multiple channels of public education have been adopted, including TV programmes, radio, picture poster and press briefings and releases. Besides, they trained veterinarians, personnel of public health, and poultry farmers on HPAI. The PDAM, as an institute of poultry development and member of CTC, also participated in training farmers. The objective is to ensure that the general populace receive correct, specific and relevant information regarding on the pandemic and steps/actions to be taken.

Furthermore, a few of technical staff attended the training workshop organized by FAO, APHIS, AU/IBAR on epidemiological techniques, disease surveillance in domestic poultry, etc. In addition, they have attended lots of international conferences on HPAI control, and have acquired plenty of experience and information on HPAI precaution from other countries.

viii. Construction of diagnostic laboratory

LCV is the only laboratory that can take function of HPAI diagnosis in Mali by now. There are elementary equipments and facilities such as biological safety cabinets, centrifuge, ELISA machine, autoclave and cinerator that can be used in diagnostic work in the lab. There are also researchers possessing perfect experience on animal diseases investigation in LCV. At present, about 4 staffs engage in the detection of avian influenza. All the samples collected by DNSV, DNCN or DNS were sent here for primary diagnosis. Further confirmation should be done in the international reference laboratory that appointed by OIE or FAO.

Some regional veterinary laboratories are being planned to build up presently.

Evaluation on current situation in HPAI prevention and containment

Evaluation on the system of HPAI precaution

CTC is the highest class institute of organization, coordination and command on HPAI prevention and control in Mali. A regular conference hosted by the minister of MEP or secretary-general of the CTC is held once a week to know the global pandemic situation and the progress of the work done in management of HPAI since its foundation, October, 2005. At the meeting, the progress on HPAI work at different division will be reported to CTC and communicated with all the members of CTC. Furthermore, new policies, new regulations or proposals on HPAI prevention will also be talked about at this convention.

From the point of view of attending CTC routine conference and visiting DNSV, DNS, DNCN, PDAM, all the institutes set up and run soundly. There are administrative and technical staffs responsible for HPAI or other serious animal diseases in these departments. Each department has its responsibility for HPAI precaution and every function was implemented by an appointed person.

The CTC has been playing key role in the HPAI prevention and control since its foundation.

About the contingency plan for HPAI precaution

High and potential risk from HPAI is becoming greater and greater in face of frequent outbreaks in neighboring countries around Mali. A National emergency plan, a five-month plan and a long-term plan on prevention and containment of avian influenza have been made out since 2005. HPAI epidemic disposal manual was drafted out at this stage of supporting the Governments' national emergency plan.

Although there are relatively comprehensive plan and comparatively concrete disposal manual, there are still some problems that need to be improved furtherly such as the link up of items of the plans and the content of manual. The compensation policy and the diagnostic methods should also be furtherly supplemented and explicit.

Implementation of the regulations on HPAI prevention and control

There are still some problems existing in implementation of the regulations on avian influenza prevention and control. The nation has made out a series of regulations, including importation of feeding eggs and day-old chicken from countries free from HPAI with the permission of DNSV. However, measures of epidemic supervision and control such as isolation and tracing quarantine were not well taken according to the regulations after importation of poultry or poultry products. In addition, there also exist shortages in animal health supervision at borders.

Capability of the diagnostic laboratory on HPAI test

The capability in HPAI detection and surveillance in Mali is weak in avian influenza prevention and containment. Clinical observation and experimentalism judgment are usually the key method used in avian disease diagnosis in most of the quarantine divisions because of lacking of essential equipments. With insufficient veterinary technician and lack of detection equipments at all levels, all the HPAI suspect samples including collected from border areas must be sent to LCV for preliminary detection. Therefore, high requirement is proposed to LCV. It needs to be equipped with much more facilities and personnel so as to meet the need of HPAI prevention and control.

LCV is the only veterinary diagnostic laboratory in Mali attached directly to the MEP. There are advanced technical level staffs in this laboratory, as well as basic experiment facilities. However, the personnel is insufficient compare to their task, and the laboratory biosafety controlling also needs to be ameliorated.

Early surveillance, early diagnosis and early warning are crucial to HPAI epidemic control. Only by early discover early report and early confirmation can we take effective measures timely, and decrease loss of economic and heavy threat to public health produced by epidemic maximately. The premise of above effective measures is laboratory satisfying surveillance on HPAI at the right moment.

Emergency stock of materials for avian influenza

Beside stock of HPAI vaccine for emergency need, materials such as personal protection equipments, disinfectants and sample collection equipments were also needed to be well prepared and deposited.

Epidemiology surveillance

Although there are active and passive surveillance systems on the information of public health, situation of animal health and migratory birds activity provided periodically in Mali, active surveillance and epidemiology investigation are still not developed in domestic poultry, especially at the border areas, poultry raising concentration areas, and migratory birds active zones except that the DNCN implemented HPAI surveillance in wild birds supported by such international organization as USAID,FAO and UNDP because of the perplex of lack of resources (manpower, material and financial). Therefore, they can not predict and report the epidemic early and timely, can not publish early warning information to the public timely, and also can not discover emergency epidemic and hidden danger timely.

Veterinary sanitary supervision

There is great difference in veterinary supervision work between the introduction and the facts we have received from the communication with the staff, the markets, and the poultry farms. For example, the veterinary supervision division introduced that they would supervise the poultry markets regularly. Once they find diseased poultry, they will send it to LCV for further detection. However, nobody confirms what they said during our investigation in the markets. Furthermore, it is not enough in quarantine and supervision, especially the quarantine at the circulating aspect and poultry markets.

Biosafety control in farms and markets

The biosafety situation in farms and markets worries the mission. There is no harmless treatment and clearness to live poultry markets, sewage, underlay, feces and material that maybe contagious to environment. All the wastes were thrown away before safely disposed. There is no related regulation or law on how to deal with these wastes, either. Related institutes do not supervise and urge the markets management units or seller to disinfect the business sites periodically. Although there are regulations on banning importation of poultry or poultry products from infected countries, there is no disinfection measures to traffic, container from infected countries. To date, there are still not enough disinfectors and devices to use disinfection.

4 Amelioration suggestions

HPAI epidemics have occurred in the past in such neighbor countries of Mali as Niger, Bukina Faso. Since the early of this year, the epidemic occurred again and again in the African continent. HPAI precaution in Mali should not be relaxed in the face of seriously outbreak situation. Above-motioned observation lead to the following recommendations in order to perfect HPAI prevention work furtherly.

1. To improve emergency preparedness for HPAI and perfect technical regulations of epidemic treatment furtherly, so as to ensure epidemic disposed normatively and safely while HPAI outbreak occurring.
2. To keep communication mechanism among members of the CTC on HPAI containment continuously, and to pursuit, communicate and coordinate their work of different departments in HPAI prevention. The frequency of the meeting may be various according to the result of HPAI risk assessment, for example, once a month when the country being low threatened.
3. To reinforce supervision, and to check out responsibility departments for their progress in HPAI precaution work periodically.
4. To maintain HPAI surveillance in migratory birds continuously that has been developing. To keep on epidemio-surveying border areas near infected countries, birds concentrating areas (poultry markets, raising areas) by the means of observation of dead birds.
5. To strenthem HPAI active epidemio-surveillance. It is recommended that the country make the best of laboratory facilities, equipments and technique advantages in LCV, and make out surveillance plan aiming directly at concrete situation of national poultry raising construction, distribution, rule of migratory birds, home range, and trade activity at frontier. To Execute active epidemio-surveillance within the whole country, and make investigation and surveillance for HPAI at all the districts periodically. Methods combining active surveillance with passive surveillance, routine surveillance with emergency

surveillance for HPAI are suggested to use in order to obtain exactly epidemiological information for prevention and control when surveillance work launched. Meanwhile, emergency surveillance should also be developed according to epidemic situation of surrounding countries. Taking focus on target regions such as dense poultry areas, staging / landing sites of migratory birds and the poultry near the borders of the AI infected countries. Furthermore, surveillance of porcine population for HPAI is also strengthened.

6. To strengthen construction of veterinary personnel and investment of fundamental facilities & equipments, to enhance the capabilities of HPAI epidemic prevention and control at provincial or regional levels.
7. To enhance the capabilities of emergency treatment while HPAI outbreak occurred by reinforcing training staff and simulative exercises.
8. To reinforce supervision of poultry transportation, trade and abatement processing. Supervision and quarantine of animal health still need to be ameliorated.
9. To strengthen construction of the laws & regulations in animal health and public health.
10. To reinforce publicizing in laws and regulations, and HPAI knowledge by many kind of measures such as printing technique manuals, laws®ulations propaganda handbooks, maps, television and broadcasting, moving activity thoroughly of public participation in animal diseases precaution, enhancing the consciousness of public epidemic prevention. The mission recommends that DNSV collaborate with LCV in publicizing materials in order to raise interest and readability by adding pictures of showing HPAI clinical signs or pathological changes.
11. To reinforce the stocking of emergency epidemic. It would be recommendable that the facilities & equipments such as protection clothes, disinfectants, disinfect equipments and blockage facilities used for controlling the epidemic are stocked in DNSV and all the provincial directions of veterinary service, respectively.
12. To reinforce establishment of the Avian Influenza diagnostic laboratory, and to raise the protection level of the laboratory biosafety. The improvement suggestions on diagnostic laboratory construction were raised in "investigation report of the mission to LCV"
13. Collaboration and communication with international organizations, such as OIE, FAO, AU/IBAR is recommended to reinforce continuously so as to strive for financial aid. At the same time, the mission also suggests that the Mali government bring the serious animal diseases prevention such as HPAI into national financial budget and invest proper funds to enhance the capabilities of veterinary departments in animal disease control and emergency response.
14. To strengthen biosafety control of raising farm and live poultry markets. To enhance the biosafety consciousness of farmers, personnel working in live poultry markets by such a series of ways as training them and propaganda.

5 Conclusion

Since the first HPAI outbreak in Asia in 2003, most African countries, including Mali began to take coping measures. On Feb. 8th, 2006, HPAI was first outbreak in Nigeria. Then it occurred in Egypt, Niger, Cameroon,

Burkina Faso, Sudan and Côte d'Ivoire, respectively. In the face of menace from ferocious and serious HPAI, the government of Mali took a series of such precautionary measures as close-up border trade, strengthening surveillance and market inspection according to the emergency preparedness plan. Up to now, there isn't any HPAI epidemic occurring in this country.

Confronting the threat from HPAI, not all the precaution measures are well executed persistently and effectively because of insufficient fund, though the government has made out such series of measures as "PLAN DE CONTINGENCE POUR LA PREVENTION ET LA LUTTE CONTRE LA GRIPPE AVAIRE AU MALI". The personnel also revealed that they had no choice at work for no money while communication with the mission. They also want to execute their programs according to the plan, but they can't carry out work normally sometime with few personnel and equipments, and short of financial support. Therefore, they can only develop the work related to serious diseases first. The difficulty in HPAI prevention is increasing for these problems. Furthermore, with the special geographic location (both the central delta of Niger river and fleuve sénégal are habitat of migratory birds) , with the frequent migration of wild birds, plus the relative weakness of epidemic prevention and too limited fund, the HPAI situation of prevention and containment in Mali are still rigorous. It is recommended that the DNSV strive all the more to strengthen supervision and management of poultry and poultry products, and reinforce surveillance and epidemic pursuit, and enhance capability of rapidly response, and perfect prevention and control measures furtherly even though existing so many problems as short of money.

The mission regrets that they have not visited the provincial level agencies of veterinary service, and have not communicated with local veterinary in HPAI analyzing and surveillance because of lack of money, so that help the country perfect the system of HPAI prevention and control furtherly.

To establish quality and biosafety management systems in order to guarantee reporting the result scientifically and normatively, and biosafety to environment and personnel working in the lab.

Specifically, following work is recommended to organized:

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