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FINAL REPORT ON APEC FORUM ON RISK COMMUNICATION ON CROSS-BORDER SPREAD OF ANIMAL INFLUENZA IN TRADE AREAS OF BORDERS

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Table of Contents

BACKGROUND

The risk that HPAI spread from one country to other countries through passengers and goods passed through borders is increased, with the continuously enlarging range of epidemic situation of avian influenza and pandemic influenza A/H1N1. Some scientists found that influenza viruses mutated, but its virulence did not enhance and its lethality was not higher than the seasonal influenza either. It is worried that a new virus with stronger pathogenicity and transmissibility would appear if AIV H5N1 and pandemic (H1N1) 2009 virus infected animals at the same time, and its virulence would enhance after the transmission between species and cross-border. Therefore, we should carry out risk analysis on cross-border spread of animal influenza in trade areas of borders and communication for information.

We are seeking APEC funding for the epidemiology survey of animal influenza in the trade areas of border and hosting an international forum about risk analysis on cross-border spread of animal influenza in trade areas of borders and communication for information in Beijing. Based on the implement of the project, we will propose a new way of risk analysis on cross-border spread of animal influenza in the trade areas of border. The mathematical model of cross-border transmission of disease, the evaluation model of losses and the management of the animal influenza threat will directly contribute to the prevention and control of animal influenza. We will share and discuss the risk analysis report and experiences with the management of the animal influenza threat with other APEC economies during the forum. The project will be carried out under the guidance of APEC Secretariat, and the risk analysis report on cross-border spread of animal influenza and the management of the animal influenza threat will be submitted and evaluated by APEC Secretariat and research organizations.

Longer-term control and mitigation measures, and cooperation between economies, will be required to both minimize the effects on agriculture and to reduce the potential for the avian virus to become easily transmitted between humans.

OBJECTIVES

The main objective is strengthening mutual understanding among inspection and quarantine agencies in APEC economies, promoting the technology cooperation and information communication on the prevention and control of animal influenza, upgrading the efficiency and quality of law enhancement cooperation and optimizing the cooperation mechanism to cut-off the transmission of avian influenza cross-border. After communication of technology and experience exchange, developing economies and their specific circumstances will not be reflected in the project. The project will provide APEC economies the opportunity to identify and discuss the key factors of the various approaches of member economies and consider the relevance of these factors to their own situations. There is considerable experience within APEC economies, especially developing economy members, in dealing with animal influenza that can be usefully shared.

In addition, the project will strengthen community risk identification and detection ability through series of training and capacity-building for developing economics particularly.

This project is designed in response to the 2009 Singapore Leaders' Declaration in the 17th APEC economic leaders' meeting. The Leaders agreed on "to build regional capacity for avian and other potential human influenza pandemics" and "to strengthen our health systems and cooperate". The project is also in response to the suggestion, "Ensuring Health", which is proposed in the 21st APEC Ministerial Meeting, Singapore, 2009. In addition, this project also responds to the appeal of the priorities, "Multi-sector cooperation and coordination on avian and pandemic influenza" and "Mitigating negative effects of avian influenza on agriculture and trade", proposed by APEC Action Plan on the Prevention and Response to Avian and Influenza Pandemics. It is very helpful for China and surrounding countries to play their full effects on regional AI prevention and control, and would also strengthen coordination to the cooperation mechanism developed by the inspection and quarantine agencies of different economies. For a long run, it must play important role on preventing transnational spread of animal influenza effectively.

Forum on Risk Communication on Cross–Border Spread of Animal Influenza in Trade Areas of Borders

(Beijing, 26– 28 October 2011)

AGENDA

Host: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ)

Organizer: Chinese Academy of Inspection and Quarantine (CAIQ)

Wednesday--26 October 2011--Day 1

08.30 – 09.00	**Registration**		
Opening Session			
09.00– 09.20	**Opening Speech** *Mr. Shi Zongwei* *Deputy Director General* *Department of animal and plant quarantine and supervision* *General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ)*		*Chair:* *Peng Zhisheng* *Director* *Department of animal and plant quarantine and supervision* *AQSIQ*
09.20– 09.40	**Opening Speech** *Dr. Feng Dongxin* *Deputy Director General* *Department of International Cooperation* *Chinese Acadamy of Agricultural Sciences*		
09.40 – 10.00	**Welcoming Remarks** *Mr. Zhang Li* *Vice president* *Chinese Academy of Inspection and Quarantine(CAIQ)*		
10.00 – 10.40	**Group photo& Coffee break**		
Session I: Overview of Animal Influenza Situation, Monitoring and Surveillance, Risk Analysis and Control in APEC ***Chair: China***			
10.40 – 11.40	Animal H5N1 Highly Pathogenic Avian Influenza (HPAI) Disease Situation Review with a special focus on Asia	*Dr. Vincent Martine* *FAO*	*Chair: China*
11.40 – 12.00	**Discussion**		
12.00 – 14.00	**Lunch break**		
14.00 – 14.40	Monitoring and Surveillance of Animal Influenza and Strategies to prevent and control cross-border spread of animal influenza	*Dr. Alvaro González Rubio* *Chile*	*Chair: China*
14.40 – 15.20	Avian Influenza Surveillance of Wild Birds in Chinese Taipei	*Dr. Chwei Jang Chiou* *Chinese Taipei*	
15.20 – 15.40	**Coffee break**		
15.40 – 16.20	Surveillance of highly pathogenic avian influenza (HPAI) in wild birds in China	*Dr.He Hongxuan* *China*	
16.20 – 17.00	**Discussion**		
Expected outcomes: 1. Reviewing of prevention and control measures of animal influenza within APEC			

economies. 2. Sharing experences among member economies, including monitoring, surveillance and risk analysis of wild animal, especially wild birds.	
18.00 – 21.00	**Welcoming Dinner**

Thursday--27 October 2011--Day 2

Session II: Exchange of experience in risk management measures **Chair: *Chile***			
09.00 – 09.40	SITUATION OF CONTROL AVIAN INFLUENZA WITH VACCINE IN VIET NAM	*Dr. Van Dang Ky* *Viet Nam*	*Chair: Chile*
09.40 – 10.20	Quarantine Policy for Import and Export and Avian Influenza Protection Program (AIPP)	*Dr. Karen Beatris Rose C. Dazo* *Republic of the Philippines*	
10.20 – 10.40	**Coffee break**		
10.40 – 11.20	A transboundary risk analysis framework on animal influenza	*Dr.Qin Zhifeng* *China*	
11.20 – 12.00	**Discussion**		
Expected outcomes: 1. Reviewing risk management measures on animal influenza within APEC economies 2. Share experiences in risk management on animal influenza among member economies.			
12.00 – 14.00	**Lunch break**		
SessionIII Exchange of experience in risk management measures and risk analysis technology **Chair: Viet Nam**			
14.00 – 14.40	Current situation and strategy to prevent and control Avian Influenza in poultry in Indonesia	*Dr. Drh. RM. Abdul Adjid* *Indonesia*	*Chair: Viet Nam*
14.40 – 15.20	The analysis and assessment of the influence of Highly Pathogenic Avian Influenza to economy	*Dr.XieZhonglun* *China*	
15.20 – 15.40	**Coffee break**		
15.40 – 16.20	Risk analysis and Prevention- Control System for the Spread of Animal Flu on borders	*Dr.Xu Zizhong* *China*	
16.20 – 17.00	**Discussion**		
Expected outcomes:			

1. Reviewing risk management measures on animal influenza within APEC economies. 2. Reviewing advanced methods of risk analysis on animal influenza in the world. 3. Sharing experience among member economies of risk analysis, especially quantitative risk analysis.	
17.30 – 20.00	**Dinner Break**

Friday--28 October 2011--Day 3

SessionⅣ Monitoring, surveillance and risk analysis of animal influenza in wild animals **Chair: China**			
09.00 – 09.40	Study and Application of the Genechip Technology for Diagnosis and Rapid Subtype Identification of Influenza A Virus	*Dr.Han Xueqing* *China*	*Chair: China*
09.40 – 10.20	Sialic acid receptor detection in pigeon and some animal respiratory tract	*Dr.Liu Yuehuan* *China*	
10.20 – 10.40	**Coffee break**		
10.40 – 12.00	**Discussion**		
Expected outcomes: 1. Sharing experiences among member economies, including monitoring, surveillance and risk analysis on animal influenza in member economies, especially the import risk analysis 2. Exploring the possibilities of strengthening APEC cooperation 3. Putting forward recommendations to enhance communication and cooperation in risk analysis of animal influenza. 4. Suggestions in future activities within APEC			
12.00 – 14.00	**Lunch Break**		
14:00 - 17:30	**Closing Speech**		

Session i

Overview of Animal Influenza Situation, Monitoring and Surveillance, Risk Analysis and Control in APEC

Animal H5N1 Highly Pathogenic Avian Influenza (HPAI) Disease Situation Review with a Special Focus on Asia

Vincent Martin, FAO ECTAD China

Pawin Padungtod, ECTAD Regional Office, Bangkok

WHERE HAVE WE COME FROM?

2004: 10 countries affected, more than 120 million dead or culled birds.

Huge social and economical impacts.

Global Disease Trend (October 2010 – September 2011) **:**

- Seasonal trend with peak during January – March

- Increasing trend of annual reported outbreaks from 2008

- No newly infected country

- 12 countries/territories reported outbreaks (11 in Asia)

- More outbreaks in Africa (477) than Asia (434 ; Indonesia not included)

- Increasing outbreaks in both Africa and Asia (Indonesia not included)

Regional Context – 2011

Poultry:

- 80% of poultry outbreaks since 2003 in East/SE Asia

- 3/5 endemic countries (China, Indonesia, Viet Nam) in East/SE Asia

- Conditions (free ranging ducks, poultry density, market chain dynamics) conducive to endemicity

Human:

- 68% of human cases since 2003 in East/SE Asia (WHO reports)

- 80% CFR in GMS countries during Nov 2010 – March 2011 period (WHO reports)

Achievements

H5N1 resources have:

- Contributed to improvements in veterinary sector

- Forged new multi-disciplinary collaborations

- Improved diagnostic capacity, sequencing, data sharing

- Strengthened epidemiology capacity & stood up RRTs

- Improved HPAI awareness & promotion of best practices/behaviour change

- Expanded understanding and utilization of multi-sectoral PPR

Disease Situation in Asia (October 2010 – September 2011)

- 1,616 outbreaks reported in 11 countries

Bangladesh*, Cambodia*, Egypt*, India, Indonesia*, Israel, Japan, Myanmar, RO Korea, Viet Nam and West bank of Gaza

- 78 outbreaks in wild animals (~5%)

Japan (61), Hong Kong, China (7), RO Korea (6), West Bank (1), Bangladesh* (1), Cambodia* (1) and Mongolia (1)

Disease Situation in Cambodia (January – September 2011)

- Human 8 cases (CFR 100%)

- All human cases exposed to sick poultry

- Anecdotal report of poultry mortality in the vicinity

Pathogenicity of clade 2-3-2 viruses 2011 in chicken and duck:

Chicken:

- **Highly pathogenic**

Duck:

- Pathogenic for ducks, but lower virulence compared with clade 1 / 2-3-4 viruses that would kill more than 50% of 4wk-old ducks

- High level of virus excretion detected in oropharyngeal swabs of sub-clinically infected birds

Where Are We Going?

Challenges and Opportunities:

- Behavior change communication message saturation? Beyond knowledge to practice; incentives

- Strengthening surveillance and diagnostic lab capacity

• Linking labs with epidemiology and sample collection

• Targeted active surveillance

• Open and transparent data sharing and reporting

- Limiting transmission opportunities and improving response times to events

• Promoting joint human/animal health outbreak investigations

• Promoting a Ecosystem Health approach

- Promoting early care seeking and treatment for ILI

Summary

• Virus is still circulating, evolving and entrenched in some countries

• Monitoring is Key

• Wide spread of H5N1 clade 2.3.2 in wild and domestic species in 2011

• No significant change related to virulence characteristic

- Virulence gene, receptor binding and antiviral resistance

- Needs to revisit control strategy and move towards targeted vaccination control program

Monitoring and Surveillance of Animal Influenza and Strategies to Prevent and Control Cross-border Spread of Animal Influenza

Dr. Alvaro González Rubio

Epidemiological Surveillance Subdepartmentt, Chile

Outside the Border

Regulations and procedures

- Procedure manuals and technical instructions for imports .

- Compliance with sanitary requirements in the framework of the OIE and WTO.

- Enabling farms, laboratories and other facilities.

- Authorization of products by monographs.

- Regulations for the registration and import of veterinary drugs and vaccines.

- Regulations for the import of sensitive materials for college.

- Health examination importing countries.

Border

- In Chile there are 82 border posts, with the presence of SAG officials.

- In case of necessity can impose a fine upon the offender

- 100% of passengers, goods and vehicles are inspected in the border post in Chile

- The inspection includes checking manually or by X-ray 100% of the luggage. In the main controls are trained dogs.

- In all control are incinerators
- All contraband is destroyed

Regulations and procedures

- Procedure manuals and technical instructions for use in borders.
- Authorization to enter the country only on border control enabled
- Regulating the transit of goods to other countries.

Inside the Border

- It is the responsibility of the private sector.
- There are manuals produced for poultry and pigs In birds, there are manuals for grandmothers, breeders, broilers, turkeys, hatcheries and backyard poultry.
- It is conducting training for rural poultry owners whose poultry population of 150.000, reaches a total of 10.000.000 birds.
- Every year, all poultry and pig workers are vaccinated against influenza

Results of Surveillance

Porcine Influenza

- All genetic imported for Chile is PIC, from Canada or USA
- In Chile, porcine influenza virus is a problem in piglets, between 14 to 21 days of age, sometimes.
- Chile does not have a official program of surveillance of porcine influenza because no is in list of OIE Code but the country have a Case Definition and te farmas applied control measures.
- Studies have shown positive serology swine influenza A H1N1,pH1N1, H1N2, H3N2
- In Chile we are testing three commercial inactivated vaccines against

influenza porcine virus:

- Maxivac 5 (Intervet, H1N1, pH1N1; H3N2, H2N2)

- PneumoStar SIV (Novartis Animal Health; H1N1; PH1N1; H3N2)

- FluSure XP (Pfizer, H1N1 and H3N2)

Diagnosis

• The serological diagnosis of influenza virus is made in private labs, by ELISA, and confirmed in the Official Lab.

• The virus isolation and molecular technical are in the Official Lab. The finally confirmation for all AI viruses is realized in the National Veterinary Service Laboratory, in Ames, Iowa, USA.

• Actually, our lab is working in a twin project with the National Veterinary Service Laboratory for to obtain the condition of the reference lab for the OIE in AI.

• The lab can diagnosis all subtypes of influenza virus.

Conclusions

1. Chile has a epidemiological model for to prevent, detected and to control an outbreak of influenza animal.

2. Chile is free for AI notifiable.

3. Swine flu virus is so common in the rest of the world and controlstrategies include the use of vaccines.

Chile will continue with its model of risk communication in the framework of the rules established by the OIE and the WTO, which means keeping a surveillance on animal influenza viruses in poultry and pigs, communicating risk situations according to the statement the rules of international agencies and maintaining trade with them accordingly.

Avian Influenza Surveillance of Wild Birds in Chinese Taipei

Dr. Chwei Jang Chiou

Animal Health Inspection Division Director

Bureau of Animal and Plant Health Inspection and Quarantine, Council of Agriculture

(BAPHIQ), Chinese Taipei

Chinese Taipei is situated at the crossroads to east Asia-Australasian flyway and west pacific flyway. Species of birds mostly found in Chinese Taipei include ducks, egrets, waders and gulls. Chinese Taipei has been aware of the threat from any diseases introduced by migratory birds since the location of Chinese Taipei overlaps the flyways of known migratory birds. The Avian Influenza Surveillance of Wild Birds Plan launched in 1998 was developed by BAPHIQ. River backwater and wetland habitats of Taipei, Ilan, Chanhua, Chiayi, Tainan, Kaohsiung, and Kinmen were chosen as the concentration points of surveillance because these locations represented major stops for several migratory flyways used by migratory birds, providing early warning, reporting, and disease surveillance analysis to curb the spread of AI in fields. Migratory flyways were also investigated as important efforts for assessment of the surveillance plan. Between 2007 and 2010, large birds such as ducks and egrets were captured and fastened with satellite transmitters to identify their possible home range during migratory season. Through the tracking system with efforts of banding and recovery, potential areas threatened by AI can be targeted. In addition, chicken, ducks, and geese, pigs, as well as pet birds have been subjected to AI surveillance since 1998 to prevent possible disease outbreak and establish early warning system in accordance with the guidelines of the World Organisation for Animal Health (OIE) and epidemiological principles,

In the wild birds surveillance, 41,953 samples were collected that 336 AI virus strains with 46 subtypes were identified (315 strains in ducks, 14 strains in waders). 9 H5/H7 subtypes including H5N2, H5N2, H5N6, H7N1, H7N2, H7N3, H7N5, H7N6 and H7N7 covered 38 strains of H5 and H7 subtypes (H5: 3 strains and H7: 35 strains). All were classified as low pathogenic avian influenza (LPAI). The surveillance results showed that the highest detection rate of AI virus was obtained in the peak season between September and December. The AI prevalence among ducks was significantly higher than that of other species, suggesting that anatidae is the AI high risk group worth continuous monitoring. Waterfowl infected with subtype H7 was relatively more than those with subtype H5, among which H7N3 and H7N1 were the main subtypes. H4N6, H3N8 and H10N3 were the most common subtypes found in non-H5/H7 subtypes. H5N1 and H9N2 were never been detected yet up to now.

Surveillance of Highly Pathogenic Avian Influenza (HPAI) in Wild Birds in China

He Hongxuan

National Research Center for Wildlife Born Diseases SFA-CAS

Institute of Zoology, Chinese Academy of Sciences, China

Surveillance of avian Influenza virus in migratory waterfowl in Qinghai-Tibet plateau (passive surveillance)

Outbreak of H5N1 AIV in Qinghai lake was on May,2005. More than 6,000 birds were dead

Sampling sites from Jun 2006 to Jul 2008

The total number of collected samples is 4,925, including 1,538 fecal samples, 903 sera samples, 717 innards, 426 throat swabs, 426 anus swabs and 915 environmental samples from Qinghai province and Tibet regions.

Analysis result

- H9N2 and H5N1 were predominant subtypes

- H5N1,H9N2,H7N3,and H7N7 were mainly distributed in Qinghai lake region

- Anser indicus was the main carrier of H5N1,H9N2 and H7N3 AIV subtypes among different species

- Peak of prevalence mainly occurred in May to August every year

- H5N1 virus may survive under the extreme weather in Qinghai-Tibet plateau

- Qinghai Lake may be an major natural origin of highly pathogenic avian Influenza Virus H5N1 in Qinghai-Tibet plateau

➢ Different infection rate was found from different bird and/or mammal species.

➢ Anser indicus was a main carrier of AIV.

Bar-headed Goose may be bird flu susceptible animals

Conclusions:

➢ Higher infection rate was mainly discovered in Anser indicus

➢ Birds carried the virus in summer and fall, and the virus may survive in winter in Qinghai-Tibet plateau.

➢ Qinghai lake may be an important and main epidemic focus

➢ The dominant virus isolate is a low pathogenic AIV H9N2, and then, H5N1,H7N3 and H7N7

Active surveillance of Highly Pathogenic Avian Influenza (HPAI) in wild birds in China

Our goal

- Track the epidemic trend of important wildlife diseases
- Determine the migration characteristics of vector animals
- Determine the relationship between susceptible species and their interaction with domestic poultry and other animals.
- Establish the active surveillance model of wildlife diseases
- Develop early warning system and make out control strategies

Our focus

- Focus of disease

Bird flu and other important disease.

- Focus of host

Based on the overall outbreak of wildlife diseases and the established host of a variety of diseases, we mainly monitor the Antedate and Charadra and other cross-regional wild animals.

We have made a tentative active surveillance based on sampling in stations located in eastern part of China (Station 1 and 10) last year, and we are planning to expand our surveillance coverage to a total of 21 monitoring stations.

Session ii

Exchange of Experience in Risk Management Measures

Situation of Control Avian Influenza with Vaccinations in Viet Nam

Dr. Van Dang Ky

Chief of Epidemiology Division, Department of Animal Health, Viet Nam

OUTLINE

1. **HPAI Situation**
2. **Results of HPAI Prevention and Control by vaccine**
3. **Lessons Learned**

I HPAI Situation

Poultry density(as in 2009)

- Total poultry population was about 280 millions.
- Two important areas of poultry production in Viet Nam are Red River (in the North) and Mekong River Basins (in the South) where HPAI outbreaks occurred more frequently.

HPAI situation in Viet Nam

Since the first outbreaks of AI occurred in Viet Nam, 5 epidemic waves reported:

- 1st wave: December 2003 - March 2004, 57/64 provinces infected; ~45 m. birds died/culled.
- 2nd wave: April 2004 - November 2004, 17/64 provinces infected, ~84,000 birds died/culled.
- 3rd wave: December 2004 - March 2005, 36/64 provinces infected, 1,850,000 birds died/culled.

■ 4th wave: October 2005 - December 2005, 24/64 provinces infected, 4,000,000 birds died/culled.

[From December 15, 2005 to December 05, 2006: the AI was successfully controlled in the whole economy]

■ 5th wave: December 2006 - Jan 2007 and from May to December 2007, 30/64 provinces infected, 350,000 birds died/culled.

HPAI Situation

● 2010: Totally, 97 AI outbreaks occurred in 56 communes in 33 districts of 19 provinces; 75,970 birds culled (29,048) chickens (38,2%), 43,975 ducks (57,90 %) and 2,965 Muscovy ducks (3,9 %).

● 2011: Totally, 76 AI outbreaks occurred in 76 communes in 40 districts of 21 provinces; 103,452 birds culled 56,378 chickens (41,70 %), 77,445 ducks (57,29 %) and 1,359 Muscovy ducks (1,01%).

● Now There is a outbreak in Quang Ngai Province

Epidemiological features

■ Outbreaks have been identified always in unvaccinated flocks, particularly in ducks. No reports of disease in fully vaccinated poultry.

■ Recent marked increase in duck population (subsequent to cessation of the ban on hatching waterfowl)

■ Backyard poultry has been seen as the most vulnerable group though it is more likely to detect outbreaks from Sector 3.

■ The effects of vaccination difficult to separate from that of other measures. However, vaccination would have reduced the susceptibility of a significant part of the poultry population.

Summary of H5N1 virus strains in Viet Nam

Year	North	South
2003-05	Introduction of HPAI H5N1 viruses to Vietnam Clade 1 virus were the majority.	
2007-08	Complete shift of clade from 1 to 2.3.4 Clade 7 virus detected in smuggled chicken	Clade 1 virus remains as majority, and continues to evolve. Clade 2.3.2/2.3.4 were occasionally detected.
2009	Multiple sub-lineages of clade 2.3.4 virus were identified	
2010	Re-introduction of clade 2.3.2 which is similar to Monglia, Hong Kong, etc.	
2011	Complete shift of clade from 2.3.4 to 2.3.2	

◆ Major changes of virus were due to the new introductions in the north.

◆ Question 1: Why and how do the old viruses disappear when new one comes?

◆ Question 2: How do clade 1 virus keep circulating in the south?

● In 2010-2011: New clade of H5N1 circulated in the North and Central Viet Nam so-called 2-3-2. Clade 1 keeps remaining in the South of Viet Nam.

● Vaccine H5N1 Re-5 does not work well against these strains.

HPAI H5N1 in Human

■ Since the first HPAI case (H5N1) in Viet Nam (26 December 2003), 119 cases have been reported to date in 35 provinces and cities, 59 of whom died.

■ In 2008: 5 infected people and 5 of them died;

■ In 2009: 4 infected people and 4 of them died ;

■ In 2010: 7 infected people and 2 of them died ;

■ High numbers of human infections and deaths reported in cold season (Janurary, February, March). No evidence of human-to-human transmission, but some clusters of infections were noted in some households.

■ Viet Nam is one of the most at-risk countries.

II. RESULTS OF HPAI PREVENTION AND CONTROL

Achievements:

■ The outbreaks have been under control, only sporadic outbreaks were reported.

■ All outbreaks were timely detected and contained.

- Annual vaccination campaigns provide 300 million doses, achieved 80% coverage with 70% immunity.

- Post- vaccination monitoring confirmed efficacy of the vaccines.

National vaccination plan for HPAI control and eradication

- The National vaccination plan for HPAI control

- Phase I (2005 – 2006),

- Phase II (2007 – 2008);

- Phase III (2009 – 2010)

- Phase III (2011 – 2012).

- Mass vaccination by two campaigns a year.

- Central Government provides vaccines free of charge for small scale farms; local governments contributes vaccination costs, including costs of meeting, training and payments for vaccinators.

Overview of HPAI vaccination programs

The first nation-wide HPAI vaccination campaign (Phase I: 2005-06).

- Finance: central government budget for buying vaccine, local government budget for logistic expenses and vaccinators incentives. Government budget supported 100% for poultry flocks under 2000 heads.

- This was first conducted on 8/2005 in Nam Dinh and Tien Giang provinces (pilot provinces), then on 9/2005 in 15 provinces (widened vaccination) and on 11/2005 in all other provinces of the economy. In 2006, 2 rounds of vaccination were applied.

- The first nation-wide HPAI vaccination campaign

- Chinese vaccine: 265 mil. doses of H5N2 for chicken, 365 mil doses of H5N1 for ducks, Intervet - Netherland vaccine: H5N2 for chicken.

- Zoning approach: compulsory vaccination zones (these zones should be total territories of provinces in RRD and MRD and Eastern area of the South. 100% poultry in these zones must be vaccinated) and high risk areas in other provinces.

The second nation-wide HPAI vaccination campaign (Phase II: 2007-08).

- Finance: same as the first phase

- 2 rounds of vaccination each year were applied.

- Chinese vaccine: 1 bil doses of H5N1 for ducks and chicken, Intervet - Netherland vaccine: 20 mil doses of H5N2 for chicken. Merial – Italy: 9 mil doses of H5N9 for Muscovy duck. 50 mil doses of Trovac AIV-H5 vaccine for day old chicks.

■ Continued of zoning approach. Poultry (chickens, ducks and muscovy ducks) in compulsory vaccination areas, high risk areas, high poultry density areas.

The third nation-wide HPAI vaccination campaign (Phase III: 2009-10).

■ Finance: same as the second phase, 6 provinces (Hanoi, HCMC, Baria-Vungtau, Binhduong, Dongnai, Vinhphuc) used local budgets for vaccination campaign.

■ 2 rounds per year of vaccination were applied.

■ Chinese vaccine: 500 mil doses of H5N1 for ducks, Muscovy ducks and chickens.

■ Zoning approach: 32 provinces vaccinated poultry in the whole territories except Namdinh, Ninhbinh, Quangbinh, Soctrang and Haugiang following GETS design, 14 provinces in central and coastal areas vaccinated poultry in high risk areas, 12 northern mountainous and 4 highland provinces were not vaccinated.

■ Confined broilers and meat ducks were not compulsory vaccinated.

The forth nation-wide HPAI vaccination campaign (Phase IV: 2011-12).

■ Temporarily stopped due to virus changed.

■ New vaccine against H5N1 clade 2-3-2 is needed or the national vaccination campaign MIGHT be stopped.

■ 50 mil H5N1 Re-5 imported to support southern provinces to regularly vaccinate and to use in emergency situation (contain outbreak,..)

■ The national surveillance program is developed in case no more vaccination.

■ Other control measures must be applied.

Surveillance programme

■ Post vaccination surveillance programmes were conducted after each round of vaccination:

● Monitoring for virus circulation: virological surveillance programme has detected Clade 1, clade 2.3.4, clade 7 and clade 2.3.2 H5N1 viruses in Viet Nam.

● Monitoring for virus mutation

● Monitoring for efficacy of the vaccine and vaccine coverage.

■ Online outbreak reporting programme (TADinfo); community-based surveillance.

- Improved capacity of response to outbreaks; AVET trainings: Field Epidemiological Training Program.

- Surveillance for AI in wild birds.

- Joint HPAI outbreak investigation with human health sector

POST-VACCINATION SURVEILLANCE

III LESSONS LEARNED

Strong Commitment & Leadership from the Government

- Establishment of the National Steering Committee for Avian Influenza Prevention and Control (NSCAIPC);

- Political systems from Central to grassroots levels were called upon, resulted in:

- Clear chain of command; and

- Quick response activities, i.e. funds release, human resources, etc.;

- Several missions led by Cabinet Members dispatched to the field;

- Experiences in responding to (SARS) in 2003.

Early Detection and Response

- Emergency reporting system using telephones and faxes;

- Online reporting system (TADinfo) piloted to assist in HPAI information management;

- AI Reporting Hotline set up;

- Compensation policy revised;

- Outbreak containment procedures modified in the light of new knowledge and experiences.

Vaccination: Scope and progress

- Focused on 33 provinces in high risk areas (Red River & Mekong River deltas) with vaccination of all long-lived poultry and all poultry in villages

- Vaccination of high risk poultry in other provinces

- Other minor poultry not vaccinated due to insufficient information on response to vaccination

- In 2005, some 166.3 million doses given to chickens and 78.1 million doses to ducks

- 2006: 368 million doses given to chickens and ducks (for 2 rounds)
- Vaccination Plan Phase II 2007-2008 approved; 1st vaccination campaign in 2007 started mid-March, and as of 15 May, 131.7 million birds vaccinated.

Information, Education and Communications

- Communication plays the critical role in raising public awareness;
- Clear, updated information was disseminated to the public regularly through mass media;
- Daily updates on disease situation and progress of vaccination published on DAH's website, available both in Viet Namese and English.
- Various IEC materials were produced and distributed using diverse media to reach diverse audiences. A National and several provincial telephone hotlines, for HPAI were established.

Pandemic Preparedness

- One lesson learned was that emergency preparedness plans help coordinate local response.
- In August 2005 MARD released its Avian Influenza Pandemic Preparedness Plan;
- Control measures would have been done better if a preparedness was available prior to the first outbreak;
- Integrated National Operational Program of Avian and Human Influenza (OPI) was produced in May 2006 with the participation of various agencies and donors;
- Practical SOPs for humane culling, biosecurity, etc. are needed.

International supports

- FAO was quick to provide limited assistance through regional and national projects;
- A World Bank Project (Phase I) initiated in 2004;
- A UN Joint Program Phase I initiated in 2005 with funds from several donors; Phase II to start.
- A Japan Trust Fund project is providing support through FAO and OIE.
- A credit facility through World Bank will fund a four-year project commencing in mid-2007.
- Various bilateral assistances.

Quarantine Policy for Import and Export and Avian Influenza Protection Program (AIPP)

Dr. Karen Beatris Rose C. Dazo

Officer-In-Charge, Animal Health Division, Philippines

MEAT IMPORTATION PROCEDURE OF THE BUREAU OF ANIMAL INDUSTRY

THE ADMINISTRATIVE CODE OF 1987

EXECUTIVE ORDER NO. 292

July 25, 1987

Title IV - AGRICULTURE

Chapter 4 – BUREAUS AND OFFICES

Sec. 18. Bureau of Animal Industry(BAI) – The Bureau of Animal Industry shall:

- Formulate programs for the development and expansion of the livestock, poultry and dairy industries to meet the requirements of the growing populace;
- Recommend the specific policies and procedure governing the flow of livestock products through the various stages of marketing, as well as the proper preservation and inspection of such products;
- Coordinate and monitor the activities and projects relating to livestock and allied industries;
- Prescribe standards for quality in the manufacture, importation, labelling, advertising, distribution, and sale of livestock, poultry and allied industries; and
- For its own sector, recommend plans, programs, policies, rules and regulations to the Secretary and provide technical assistance in the implementation of the same.

Section 19. Staff Bureau.

(1) A staff bureau shall primarily perform policy, program development and advisory functions.

(2) The Director of a staff bureau shall:

(a) Advise and assist the Office of the Secretary on matters pertaining to the Bureau's area of specialization;

(b) Provide consultative and advisory services to the regional offices of the department;

(c) Develop plans, programs, operating standards, and administrative techniques for the attainment of the objectives and functions of the bureau; and

(d) Perform such other duties as may be provided by law.

(3) The staff bureau shall avail itself of the planning, financial and administrative services in the department proper. The bureau may have a separate administrative division, if circumstances so warrant.

The powers, functions and duties vested in the Bureau of Agriculture by virtue of the Revised Administrative of 1917 on animal quarantine, Act No. 3101 on biological products, Act No. 3166 on the use of rinderpest vaccine and Act No.2758 on establishment of stock farms were all transferred to the BAI. Act No. 3639 served as the statutory mandate of the BAI until 1987 when it was primarily transformed into a staff bureau but with limited line functions.

With the advent of a newer Administrative Code of 1987, the line functions of the BAI within the regions of the economy, particularly on animal quarantine, were decentralized to the various Regional Field Units of the Department of Agriculture. The BAI was primarily changed into a staff bureau and left with the function of providing technical supervision on regional quarantine matters and retaining few stock farms and livestock production centers.

Line functions pertaining to inter-regional (within the economy) and international animal quarantine were, however, retained by the BAI. This includes inspection, examination and testing of live animals, meat and meat products, biologicals, feeds and feed ingredients, as well as the issuance of licenses and permit/s associated therewith

Other Related Laws and Issuances

- DA Administrative Order No. 18 Series of 2000-Issuance of SPS Clearance
- DA Administrative Order No. 26 Series of 2005-Meat Importation
- DA Administrative Order No. 16 Series of 2006-FME Accreditation
- DA Special Order 240 Series of 2000-Creation of NVQS
- DA Administrative Order No. 9 Series of 2010-DA Trade System
- RA No. 9296-Meat Inspection Code of the Philippines
- RA 8485, Animal Welfare Act of 1998

- Memorandum Orders –Banning and Lifting Ban on importations

- Act No. 2627 of 1916 amended by Act No. 2711 of 1917-an Act which among others, provided for animal quarantine powers under the Bureau of Agriculture

- Act No.3101 of 1923-Promulgate regulations among others, sale, shipment, importation of biological products

- Act No. 3639 of 1929- Bureau of Agriculture was renamed BPI and BAI was created with line functions

To date, the Philippines remains FREE from Highly Pathogenic Avian Influenza

The Avian Influenza Protection Program (AIPP) IS A:

- National preparedness and prevention plan for Avian Influenza (AI)

- Joint undertaking between the Department of Agriculture, Department of Health and the Poultry Industry

- Manual of Procedures (MOP)–Stages 1, 2, 3 and 4 plus Annexes

Stage 1. Keeping the Philippines-Bird Flu-Free

Stage 2. Controlling and Eradicating-Bird Flu in Domestic Fowl

Stage 3. Prevention and Control of AI in Humans

Stage 4. Mitigation of Public Health and Socio-Economic Impact of Pandemic Influenza

PREVENTION PROGRAMS

1. Ban on Importation from AI-Affected Countries
2. Minimum Biosecurity Measures
3. Surveillance and Prevention Programs at Airports and Seaports
4. Surveillance of Poultry in Critical Areas in the Philippines
5. Preparedness from the National to Local Level
6. Upgrading of Laboratory facilities – PAHC and RADDLs
7. Enforcement of the Wildlife Act
8. Preventive Measures in Humans
9. Public Awareness

BAN ON IMPORTATION FROM AI-AFFECTED COUNTRIES

● Initiated by the Bureau of Animal Industry, A.O. issued by the Secretary of Agriculture

● Ban covers ALL poultry and poultry products originating from AI-affected countries.

■ No Veterinary Quarantine Clearance (VQC) will be issued

■ Live birds or eggs will be destroyed

■ Processed poultry products will be returned to origin

■ In transit shipment from countries where new outbreak is reported shall not be allowed entry and returned to origin.

● Transshipment through an AI-affected country is also prohibited

Countries with Temporary Bans

Source: BAI-National Veterinary Quarantine Service (as of 23 September 2011)

SURVEILLANCE AND PREVENTION PROGRAMS IN PORTS AND SEAPORTS

● Inspection of luggage / cargo from AI-infected countries

● Confiscation and destruction of unlicensed cargo

● Standardized footbath installations and replenishment of disinfectants

SURVEILLANCE OF POULTRY IN CRITICAL AREAS

Twenty (20) Priority Areas for Surveillance

1. Zamboanga del Norte
2. Zamboanga del Sur
3. Zamboanga City
4. Zamboanga Sibugay
5. Palawan near Quezon and Narra Towns
6. Pampanga – Candaba Swamp
7. Ilocos Norte – Pagudpud
8. Cagayan – Aparri
9. Cebu – Olanggo Island
10. Negros Occidental – Himamaylan
11. Isabela – Magat Dam
12. Agusan del Sur
13. Agusan del Norte
14. Surigao del Norte – Lake Mainit
15. Surigao del Sur
16. Panay Island – Roxas, Capiz
17. Sorsogon – Bulan and Matnog
18. General Santos City
19. Mindoro Oriental – Naujan
20. Cotabato – Liguasan Marsh

Surveillance Program

- Regional AI Coordinators and the Local Government Veterinary Offices collect and submit the samples to BAI
- 30 Samples from 6 Barangays in each of the 20 critical areas, collected and tested 2x a year

Surveillance of Poultry in Critical Areas

YEAR	No. of Samples Collected & Tested
2005	5,976
2006	14,046
2007	10,148
2008	18,253
2009	5,423
2010	3,318
2011	**3,091***
Total	60,255

*As of 23 September 2011 from Regional Avian Influenza Diagnostic Laboratory, Department of Agriculture Region III

All tests yielded NEGATIVE results for the HPAI agent

MINIMUM BIO-SECURITY MEASURES FOR PROTECTING THE FARMS

- Bio-security control points e.g.gates, shower rooms, footbaths, fumigation boxes
- Proper rest period and disinfection between flocks
- Inaccessible to stray animals and free-flying birds
- Proper disposal of mortalities
- No domestic ducks and free-range poultry in migratory bird areas, especially wetlands
- No mixing of poultry and swine in same holding facility
- Record all movement to and from the facility e.g. visitors, vehicles, deliveries

PREPAREDNESS FROM THE NATIONAL TO THE LOCAL LEVEL

Emergency Preparedness and Rapid Response Capability Building

- AI Preparedness and Emergency Response Workshops
  - Evaluation of preparedness and response capabilities of the

regions/provinces/cities/municipalities based on:

1. Creation of Functional Task Forces
2. Enactment of Local Ordinances
3. Presence of Preparedness and Response Plans
4. Checklist/Resource Inventory of Supplies for Rapid Action

ENFORCEMENT OF WILDLIFE ACT

- Intensified monitoring of smuggling of exotic avian species from AI-affected countries (with DENR, DARFUs, LGUs and coastal residents)
- Led by PAWB-DENR, in coordination with the LGUs and local PNP
- No collection of migratory birds, regardless of purpose or collection technique

PUBLIC AWARENESS

Training of animal health, human health workers on public awareness for avian influenza, the disease, its control and prevention, and the AIPP.

A Transboundary Risk Analysis Framework on Animal Influenza

Dr. Qin zhifeng

Shenzhen entry-exit inspection and quarantine bureau of P.R.China

Ladies and gentleman , it's my great honors to have an opportunity to communicate with all of you on risk analysis of animal influenza, especially on H5N1 avian influenza and pandemic H1N1 influenza. My topic is "A transboundary risk analysis framework on animal influenza"

My presentation will be divided into three parts.first I will briefly introduced the international principle of risk analysis, as we all know, there are several risk analysis framework of international like OIE, IPPC and CAC. For animal diseases, the main framework of risk analysis we should follow is the guideline of OIE. Second, I will introduce the risk analysis methods we used in our China, we referred to the experience of developed countries based on OIE risk analysis principles. Last, I will focus on the animal influenza transboundary risk analysis, which is the practical application of risk analysis.

The discipline of risk analysis was introduced in 1995 with the SPS Agreement. The risk analysis process could be initiated by a request for importation, after which a hazard identification followed. At the risk assessment stage, the probability, consequences and uncertainty were examined. Risk assessment posed the questions: what information should we collect? what is the quantity and quality of this information? what is the uncertainty and gaps in the information? After this, a judgement had to be made about whether the risk was acceptable or not. This was the starting-point for risk management , if the risk was not acceptable, then the next question was: what could be done to eliminate or reduce the risk to an acceptable level? the decision concerning whether a risk was acceptable and what would be done to reduce or eliminate risk was taken at a political level.

The process of describing the biological pathway(s) necessary for an importation activity to "release" (that is, introduce) pathogenic agents into a particular environment, and estimating the probability either qualitatively or quantitatively, of that complete process.

This study used the framework that has been recommended by the World Organization for Animal Health for risk analysis. The framework outlines four key steps that should be covered systematically. These are:

1. Release assessment (probability of release from the source);

2. Exposure assessment (probability of exposure to the hazard);

3. Consequence assessment (biological consequences such as incidence and

severity, economic consequences, etc.);

4. Risk estimation (which consists of combining the release, exposure and consequence probabilities).

- **What information is available?**
- **What is the quantity and quality of information?**
- **What is the probability?**
- **What is the magnitude of the consequences (if I do nothing)?**
- ***Should something be done?***
- **What can be done to eliminate or reduce the hazard?**
- **How effective are the options?**
- **How feasible are the options?**
- **What impacts do the options have?**
- **What is the level and type of uncertainty?**
- ***What is the best option?***

▪ risk assessment focussed on probability, consequences and uncertainty, and resulted in conclusions about the risk. Risk management identified and evaluated options for mitigating the risk (efficacy), and considered the feasibility and impacts of using one management option or another.

Risk analysis is a systematic way of gathering, evaluating and recording information which would lead to recommendations, positions or actions in response to an identified hazard.

Information collection include questionnaire to be sent to export country ,retrieve **the World Animal Health Information Database of OIE**, expert opinions and scientific literature. Much information was now readily available through the internet. Used information properly, risk analysis was an extremely useful and powerful tool for determining.

The categories of risk used in this study ranged from negligible through to very high

To qualitatively estimate the risks associated with each pathway, the risk assessment would be applied six probability categories: Negligible, Very Low, Low, Medium, High and Very High.

By combining risk categories, we can conclude the next station.

For combination of the combined release and exposure risk estimate with the consequence (transmission) risk estimate, we used the combination matrix shown in Table.

The events that were considered as contributing to the release, exposure and the consequence pathways were specified and broken down into several stages, with each stage being assigned a conditional probability. The overall probability of a given pathway was then arrived at by combining the probabilities of the various stages defined as indicated.

The probability of animal transit across being infected, the probability of detection in border inspection station. Factors influencing the release are:

• animal influenza status of the source/exporting countries /neighbouring country

• Susceptibility of animal under consideration to virus

• Frequency and volume animal on trade transit to China

• Time spent on transportation to reach to China

• Compliance to veterinary checks at BIP

• Legality of the trade

• Number / Frequency / Proportion of wild birds inspected (clinically and /or swab)

• Time to examination / Description of clinical examination

• Incubation period

• Actions taken on the detected (on the dead at arrival, sick, etc.)

• Presence of appropriate

Which inevitably has major social and economic impacts.

What is the risk of introduction of animal influenza into China via transboundary activities?

What is the risk of introduction of animal influenza via three pathways (wildbirds migration, international trade, free border trade and illegal or into China?

What is the probability that domestic poultry and cattle in China become infected by animal influenza after the release of the virus by an infected invasion through border?

Presence, abundance and susceptibility of the resident animals and vectors around BIP.

Access of birds and vermin to the holding site.

Volume/frequency of wild birds traded.

Duration wild birds kept in the air port in their cages.

Presence of appropriate holding sites for birds on transit.

Survival of the virus in the environment.

Presence of poultry population around BIP.

Possibility of contact between resident wild birds and poultry population.

Survival of the virus in contaminated environment.

Safety procedures followed by the people handling live transit birds in their cages and dead birds.

Contact with DOC importation process.

The indirect transmission of H5N1 HPAIV is strongly influenced by the ability of the virus to survive in different environments.

pH1N12009 viruses are considered to be mainly transmitted via aerosol, but HPAI has no evidence.

Indirect transmission via water is possible, to other water birds using or drinking contaminated water or through domestic poultry drinking unprocessed water from contaminated reservoirs.

They can either transmit the virus through direct contact with poultry or indirectly via faeces, contaminated water and feed.

Mechanical transfer of faeces plays a significant role in the spatial dissemination of the virus ,This mechanical transfer, among others, is usually attributed to movement of people. the evidence suggested that poor biosecurity measures and movement of personnel resulted in the virus being spread to another associated premise (National Emergency Epidemiology Group, 2007a) which was approximately 11 km apart from the index premises. These data again demonstrated that the mechanical transmission could occur in local conditions and result in the transmission of the virus from several meters to several kilometres.

Exposure pathways include 4 categories.

1.Probability of infection of resident animals after exposure to animals from transboundary animals and spread nationaly.

2. Probability that staff handling live and dead animals on transboundary animals get contaminated with animal influenza and transmit to animal population

3.Probability that vermin (rodents) get contaminated with AI and transmit the virus to animal population

4.Probability that transboundary animals on transit kept at border infect other animals imports stored in border and transmit widely.

What is the risk of transmission of animal influenza in China?

The probability of release animal influenza into China through importing animals and animal products (via transportation) is low, the risk of animal in China becoming infected by animal after the release of the virus by an infected animal on trade transit is medium. The consequence of animal influenza outbreak in China is very high because the direct loss and indirect loss. The global risk estimate for the introduction of animal in the animal population in China as a result of the introduction of the hazard through international trade is low .

The release risk assessment on animal influenza into China through wild animals (via migratory birds) is high, the risk of animal in China becoming infected by animal after the release of the virus by an infected wild animal is high because there are some risk for backyard poultry and low biosecurity. The consequence of animal influenza outbreak in China is very high because the high intensive density. The global risk estimate for the in the animal population in China as a result of the introduction of the hazard through border is high .

Chinese neighbouring southeast countries such as Thailand and Viet Nam were all report the outbreak of animal influenza.

Critical control points were identified, for which actions to be taken in order to reduce the risks of introduction, subsequent exposure of animal population and transmission of animal influenza. require official permit to be exported and animal health certificate.

Session iii

Exchange of Experience in Risk Management Measures and Risk Analysis Technology

Current Situation and Strategy to Prevent and Control Avian Influenza in Poultry in Indonesia

1. Dr. M. Azhar MM, DGLAHS, MoA(azhar_drh@yahoo.com)

2. Dr. drh RM. Abdul Adjid, IRCVS, MoA(rm_adjid@litbang.deptan.go.id)

Introduction

- First HPAI-H5N1 outbreak in Indonesia in 2003
- New poultry disease made panic to poultry farmers
- Government declared in January 2004
- 9 Strategies to control HPAI: (1) Biosecurity (2) **Vaccination** (3) Stamping out/Focal culling (4) Surveillance (5) Poultry Movement (6) IEC (7) Poultry Restructuring (8) Research & Development (9) Regulation.
- First autonomy era since 2003
- First Bird Flu case in Human in June 2005
- Backyard poultry as a potential risk of source of infection to human
- Participatory approach to empower community ◊

  Participatory Disease Surveillance and Response (PDSR) since 2006.

Factors influence to increase AI cases
in poultry in 2011

- Rainy season → virus AI more survive longer in environment, outbreak of other diseases (ND,CRD, dll)
- Farmers sell infected poultry to poultry traders → Collector yards, traditional markets

- Broiler, layer farm sector-3 are not yet implementing minimum biosecurity and vaccination failure.
- No compensation fund allocated → depopulation slow
- Poultry movement between area/island, particularly through illegal movement
- Water flow/river and after flooding

Key Message for Control of HPAI

"The control of HPAI requires a comprehensive and Intensive approach that addresses disease prevention and control in village-based poultry, commercial poultry, poultry market chains, and ducks."

Roadmap towards Indonesia
Free AI Status per island

- East Indonesia Archipelago (2014)
  - Papua (2013), Papua Barat (2014)
  - Maluku, Maluku Utara (2013/2014)
- Kalimantan Island (2014)
  - Pulau Tarakan Kaltim (2012)
  - Kalsel, Kalteng (2014)
  - Kaltim, Kalbar (2014)
- Bali and Nusa Tenggara Islands (2014)
  - Bali, NTT, NTB (2014)
- Sulawesi Island (2017)
  - Gorontalo, Sulawesi Utara (2014)
  - Sulteng, Sultra, Sulbar (2015)
  - Sulsel (2017)
- Sumatra Island (2018)
  - Bangka Belitung, Kep. Riau (2014)
  - Sumatra Utara, NAD (2016)
  - Sumatra Barat, Riau, Jambi (2016)
  - Bengkulu, Sumatra Selatan (2017)

- Lampung (2018)

■ Jawa Island (2019)

- Jawa Timur (2019)
- D.I. Yogyakarta (2019)
- Jawa Tengah (2019)
- Jawa Barat, Banten, DKI Jakarta (2019)

■ Indonesia (2020)

Strategies of AI control and eradication to achieve

Indonesia Free AI Status in 2020

AI Control in Sector-4

PDSR method (Participatory Disease Surveillance & Response)

■ Early Detection, Report and Response

■ PDSR officers 2,500 staffs, in 30 provinces, assisted by 15,737 village volunteers

■ SMS gateway : direct report to district, province, HQ

■ Improvement of PDSR – DSO (District Surveillance Officer, Min. of Health) collaboration for One Health

■ Public awareness

■ Issues : local government commitment, organization, budget transition from donor to Central and local governments

■ Challenges : Sustainability of PDSR programme : application to other zoonotic diseases (e.g. Rabies), Animal Health Centre-based National Veterinary System (NVS)

AI Control in Commercial Poultry

Sector 3

1. Pilot Project : Control of AI in commercial poultry by Dinas District, namely Commercial Poultry Veterinary Programme = Program Veteriner Unggas Komersial (PVUK)

2. Training Biosecurity

   To improve farmer awareness of cost effectiveness biosecurity

3. Biosecurity Cost Effectiveness

To identify and implement best practices in biosecurity for small scale poultry farms

4. Vaccination

Right vaccine, good practices vaccination

Sector 1 & 2

1. **Compartmentalization and Zoning**

Establishment of AI free compartment in breeding farms

- 6 Breeding farms has been declared free of AI in 2009
- Acceleration to audit based on request from breeding farms in 2011

2. **National Poultry Health Improvement Plan (NPHIP)**

- NPHIP is developed as a plan under Public Private Partnership (PPP) → National Committee of Poultry Health : representatives of 3 pillars : Industry, Government, Universities/experts
- Involvement of poultry industry to support control programme of AI & other major poultry diseases

AI Control on Poultry Market Chain

- Market Surveillance : is a local government programme in Greater Jakarta
- Cleaning & Disinfection programme : poultry collector yards, live bird markets and Cleaning Stations (in Greater Jakarta = JABODETABEK)
- Restructuring of poultry market chain
- Supporting relocation programme of poultry collector yards and slaughterhouses in DKI Jakarta (Provincial Regulation 4 / 2007)

Challenges

- Decentralization/autonomy era → AI control program not priority
- Strengthen veterinary services, limited budget & veterinary human resources
- Poultry movement control
- Encouraging poultry industry (commercial farm and market chain) involvement in implementing biosecurity and case reporting
- Integrating the viral dynamics knowledge derived from animal and human sources in order to better understand H5N1 epidemiology

- Achieving Indonesian AI Free status

Policy of Vaccine and Vaccination Strategy

- Antigenic drift mutation in commercial poultry → Clade 2.1.1, 2.1.2, 2.1.3
- Evaluation of registered vaccines while awaiting production of AI new vaccine
- AI new Vaccine using 4 new local isolates H5N1 (recommended by OFFLU Project)

→ Plan to produce new vaccine in 2011

→ Virus isolates for vaccine candidate will be reviewed regularly based on virus dynamics

- New vaccination strategy : from mass to targeted vaccination according to appropriate technical guidelines

Challenges to control HPAI H5N1 using vaccine

- Viral mutation
- Highly pathogen and infectious
- Virus isolate for Vaccine candidate should be matched with virus in the field

New updated vaccine

Vaccine Protection

- Swayne (2007): available vaccines in Indonesia gave low protection (highest 50%) against new isolate A/ck/wj/Pwt-Wij/2006
- Cartography finding:
- A/ck/wj/Pwt-Wij/2006 mutated in HA gen, 18 amino acids changed compared to AI isolated in 2003

The Analysis and Assessment of the Economic Effect of Highly Pathogenic Avian Influenza

Dr. XieZhonglun

China Animal Health & Epidemiology Center

1. Analysis of the economic impact of epidemic disease

In recent years, the loss and the impact which caused by epidemic disease become more and more influence. To undermine the effectiveness of the risk management tactic, the rationality of the disaster-prevention, the disaster-decrease and the disaster-rescue, firstly we need to have enough data on the loss and impact caused by epidemic disease. In the below, I will give a brief introduction on the achievement about the analysis and the assessment of economic loss caused by epidemic disease and the, which can help us to establish the model of assessment of the loss and the setting of parameters.

2. The economic losses caused by disease can divided into two classes: direct economic loss and indirect economic loss. The indirect economic loss can divided into two classes: initial indirect economic loss and secondary indirect economic loss. Direct economic loss means the losses that direct generated during the disease happening and controling. For instance, economic losses of the poultry death, the cost on disease controlling, the economic losses of production stopping, during the breaking out of the High Pathogenic Avian Influenza (HPAI) .. Indirect economic loss means the other aspects (related business) caused by the disease, such as feed industry, crop farming, tourism industry, nature, social economy , human health, etc.

3. The introduction of economic losses assessment in HPAI in China:

Taken HPAI in 2004 in China for example, we mainly focus on introduction of the assessment process, assessment model and assessment conclusion.

3.1 HPAI economic losses assessment (basement program) generalied procedure

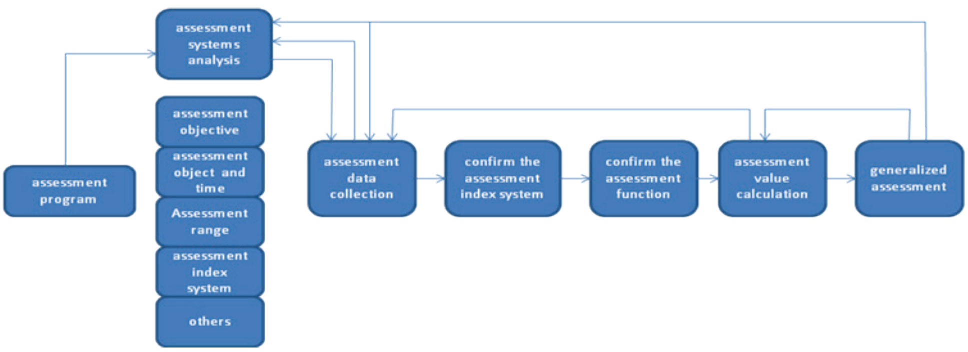

Fig.1 The basement program on economic losses assessment of HPAI.

3.2 The conclusion on economic lossess assessment of HPAI

3.2.1 . From the Economy point of view

The national economic loss in 2004, up to 78.26 thousand million. Accounts for animal husbandry value was 5.71%. Accounts for agriculture value was 2.10%. Accounts for GDP was 0.57%. the following was the proportion of branch in HPAI economic losses.

(1) Direct economic loss: indirect economic loss=1:3

(2)The proportion of the components of direct economic loss (Table.1, Table.2)

Table.1 direct economic losses caused by HPAI in 2004

Item		Proportion(%)
Direct economic loss		100%
1	Disease losses	1.13%
2	Controlling cost	7.71%
3	Trade losses	91.16%

Table.2 Disease controlling cost proportion

Item		Propotion(%)
controlling cost		100%
1	Killing compensation cost	6.98%
2	Killing management cost	4.87%
3	Emergency vaccination cost	1.04%
4	Emergency disinfection cost	19.02%
5	Organizatin and management cost	13.77%
6	Laboratory monitoring cost	1.56%
7	Preventive vaccination cost	52.84%

(3) the proportion of the components of indirect economic loss(Table.3).

Table.3. Indirect economic losses caused by HPAI in 2004

Item	Propotion(%)

Indirect economic loss		100%
1	Consumer cost	34.74%
2	Poultry raising follow-up cost (incomplete)	24.48%
3	Upstream industry cost (incomplete)	16.21%
4	Downstream industry cost (cannot estimate)	
5	Catering industry cost (incomplete)	14.16%
6	Revenue and soft loan cost (incomplete)	8.10%
7	Tourism industry cost (incomplete)	2.30%
8	Ecological environment cost (cannot estimate)	

(4)HPAI preventing and controlling strategies in 2004 was feasible and effective in China

(5)Cost efficiency caused by poultry vaccination was 42:1

3.2.2 From the farmer point of view to evaluate the losses caused by HPAI.

The conclusion on the impact to different farmers caused by HPAI were different (Table.4).

Table.4 Compare the impact to different farmers caused by HPAI

District / Farmers		epidemic area	safety and nonepidemic region
Scale farmers	breeding bird farmers	Maximum loss	Ordinary loss, Maximum income
	Legehenne farmers	More loss	Ordinary loss, more income
	Dorking farmers	Large loss	More loss, ordinary income
free-range farmers		Less loss	Less loss,less income

Risk analysis and Prevention- Control System for the Spread of Animal Flu on borders

Dr.Xu Zizhong

Yunnan entry-exit inspection and quarantine bureau of P.R.China

Ⅰ The unknow factors of animal Flu

1、 Etiology

2、 Hosts

3、 Distribution

4、 Spread by migrants

5、 Shedding virus after vaccination

6、 Effect by climate change

7、 Effect by globalization

8、 Effect by modernization

9、 Effect by environment

Ⅱ Rationale and method of Risk analysis

1、Risk

2、Risk analysis

(1)Risk identification

(2)Risk assessment

(3)Risk management

(4)Risk communication

3、Basic elements for Risk analysis

(1)Country factors

(2)Biological factors

(3)Commodity Factors

4、Basic principle of Risk analysis

(1)To analyze scientifically

(2)To assume reasonably

(3)To judge comprehensively

(4)To conclude cautiously

Ⅲ Commodity Factors could spread animal flu

1、Animals

2、Animal Products

3、Contaminated stuff

4、Vehicles

5、Birds

6、Terrestrial wildlife

7、other means

Ⅳ. Measures for prevent-control Flu spreading on borders

1、Quarantine management

(1)Quarantine permit policy

(2)Quarantine and inspection

(3)Registration policy

(4)Pre-quarantine at abroad

(5)Exit quarantine policy

2、prevention

(1)preventive vaccination

(2)Emergency vaccination

3、surveillance and monitoring

(1)sentinel animals

(2)Lab testing

4、Emergent reaction

(1)Quick identification

(2)Quick control

5、Quarantine disinfection

(1)Vehicles

(2)Packaging materials and contaminated stuff

6、Ban on illegal activities

(1)Ban on illegal entry

(2)Ban on illegal sell-buy

7、Capacity building

(1)Lab and technology, R&D

(2)Technical staff: scientist, technicists

8、International cooperation

(1)information exchange

(2)technology cooperation

Session iv

Monitoring, Surveillance and Risk Analysis of Animal Influenza in Wild Animals

Study and Application of the Genechip Technology for Diagnosis and Rapid Subtype Identification of Influenza A Virus

Dr.Han Xueqing

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Diagnostic Technique for AIV Detection

Lots of AIV diagnostic technique were successfully developed based on the detection of AIV (antigen) or the antibody against AIV, such as AIV Isolation, HA-HI, AGP, AIV Immune colloidal gold Technique, RT-PCR, Real-time Fluorogenic RT-PCR, RT-PCR-ELISA, Multip-lex RT-PCR, etc. Many of them were acknowledged as the standard methods for AIV detection in GB , because their unique ad-vantages, and playing the leading role in the diagnosis and detection of AI.

Problems in AIV detection and Characteristics of AIV

AIV was subtyped as encoding one of sixteen different hemagglutinins (HAs, H1～16) and one of nine different neuraminidases(NAs, N1～9), But the main AIV diagnostic methods are developed for the detection of highly pathogenic AIV such as H5N1, H7N1 and H9N2, not for other AIV subtypes. This viruses present an important diagnostic problem, a new rapid and sensitive molecular detection and identification procedure is required for typing and subtyping of AIV, which is of both clinical and epidemiological value.

The Rapid Typing and Identifying Technique AIV Genechip offer a potential solution to these problems, the application of this technology as a detection tool for the prevention and control of AIV shows great promise according to the theory and the research practice of Genechip technique. Some districts & countries have started much work associated with the research of AIV genechip techno-logy, such as Hong Kong, China; and the USA.

Advantages of AIV Genechip Technology

Genechip technology is a new high-crossing molecular detection procedure, synchronizing with molecular biology, physics, chemistry, computer science and microelectronics. The main advantages of AIV genechip technology may be summarized as follows:

(1)This technology could identify and distinguish all the AIV subtypes including H1～H16 and N1～N9, which can achieve the goal of large-scale samples quarantine in very short time;

(2) This technology is a sensitive ,specific and accurate tool. The genetic Variation and unknown pathogenic AIV subtypes could be detected in time by using this tool.

We may say, AIV genechip technology is a systemic, ideal detection method for AIV, it will supply new reliable detection tools for the efficient surveillance and control of AI epidemics, and the detection of the genetic variation and new subtypes pathogenic AIV strains in time. the development of this technology will greatly contribute to the prevention and control of AI.

We started this study on AIV genechip in November 2005, and have made great progress in the research.

Sialic Acid Receptor Detection in Pigeon and Some Animal Respiratory Tract

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A wide range of domestic poultry, migratory birds, waterfowls, and even wild animals have shown to be susceptible to AIV H5N1 and can potentially transmit the virus to other susceptible hosts.

Existing data on the susceptibility of pigeons to AIV H5N1 is controversial

Pigeon and Avian Influenza Virus H5N1 and H9N2

1. Data of Epidemiological Investigation.

2. The experimental data of infection.

3. The primary studies on mechanism of resistance to HPAIV H5N1.

Purposes of the our work were to provide the data to the policy-maker.

•No Dead or Abnormal Pigeons for infection with AIV H5N1 in Beijing Area.

•No AIV H5N1 HI antibody were detected from Pigeons in Beijing Area.

Our data suggest that the pigeons (experimental breed) are a particular species resistant with infection of AIV H5N1and H9N2 (experimental virus) and pigeons may not serve as a transmission host.

Pigeons had SAα2,6Gal as the predominant SA receptor preferred by mammalian influenza viruses;

SAα2,3Gal was the major type of receptor in the epithelia of the SPF chickens.

The differences in the abundance of SAα2,3Gal and SAα2,6Gal in the epithelial surfaces of the respiratory tracts of pigeons and chickens provide a rational explanation for why pigeon embryos, chickens and their embryos are prone to infections by AIV H5N1, while pigeons are not.

Background—Epidemiology of Avian Influenza Virus on Raptor in World

H5N1 : American Kestrel (Falco sparrerius);

Thai Eagles;

Saker Falcons (Falco Cherrug);

Houbara bustards (Chlamydotis undulata macqueenii)

H7N3: Falco peregrine

H7N7: black kite (Milvus migrans)

Aims

To examine the sialic acid receptor profiles in the respiratory tracts of the selected raptor species and to assess the potential susceptibility of raptors to avian and human influenza viruses and the role of raptors in the epidemiology and evolution of influenza A viruses.

Conclusion

MAA can be detected in upper and lower respiratory tract from all of eight selected raptors.

Both MAA and SNA positive staining were present in the upper respiratory tracts of five species raptors : Accipiter gularis , Buteo buteo , Otus sunia , Bubo bubo , Asio otus, suggesting that these species of raptors may be susceptible to both avian and human influenza A virus and could serve as a natural reservoir for influenza A viruses.

FORUM RESULTS

The project responds to the realities within APEC and seeks to prevent or mitigate similar future occurrences, as APEC economies were severely affected by outbreaks of animal influenza, especially in poultry. Animal product is a significant part of international trade — for either domestic consumption or export — in many APEC economies. A number of other APEC economies may be at risk of an incursion of HPAI either from movement of contaminated poultry products or via migratory birds. There is evidence that the movement of poultry and poultry products plus migrating wild birds have contributed to the spread of the virus from Asia to Europe, the Middle East and Africa. APEC member economies suffered severe economic and health consequences from Animal influenza. According to the World Health Organization (WHO), HPAI is thought to have caused illness in 500 persons, with approximately 296 of those affected having fatal outcomes so far. The economic impact of HPAI and pandemic influenza A/H1N1 (2009) has been estimated by the World Bank to be 15 billion USD and 3 trillion USD respectively. With a potential of HPAI mutating into a pandemic influenza, health concerns are significant. Preparedness should be the utmost priority with such a potentially disastrous bio-threat.

We are establishing a mathematical model of cross-border spread of disease and the evaluation model of losses, based on the study of Qualitative Risk Analysis and Quantitative Risk Analysis on cross-border spread of animal influenza in the trade areas of borders. Therefor this project is proposed to help member economies with the control and prevention of animal influenza both for human health and livestock farming. The ultimate goal is to promote international trade in Asia-Pacific region.

The outbreak of Highly Pathogenic Avian Influenza (HPAI) in Asia since December of 2003 has caused negative impact on the regional poultry industry and public health. Since then, animal influenza has become a major concern to the region and the international community. We should play a long-term effort to eliminate this Zoonosis.

Along with the development of the bilateral free trade arrangement, international trade between APEC economies will get even closer. The risk that animal influenza spread from one economy to other economies through passengers and goods is also increased. As no economy could hold back the transnational spread of avian influenza by itself, the situation require APEC economies to strengthen cooperation and communication on the prevention and control of avian influenza, especially their inspection and quarantine agencies, so as to eliminate the threat of animal influenza to the region's public health and reduce the losses caused by its transmission on the on-going trade.

APEC economies will improve capacity building in preventing and controlling a pandemic of avian origin at its source, and assessment of pandemic preparedness efforts and impacts. Participants will have a briefly understanding of the steps taken and the future plans of each economy in this region to enhance international quarantine and inspection cooperation. By discussion, participants from different economies not only be able to exchange views each other, also can learn a lot from other experiences and lessons, it will be helpful for them to improve their ability to prevent and control animal influenza. Personal friendship between officers in charge of animal quarantine and inspection from various countries will be established to facilitate timely communication and effective cooperation. Participants will discuss how to improve the coordination of the different cooperation mechanism to prevent the transmission of animal influenza.

This forum offers us a platform to communicate with APEC economies and help all of us to accomplish the mechanism of the communication on cross–border spread of animal influenza in trade areas of borders.

In the process of organizational, we have run into a lot of difficulties, include booking the hotel rooms for participants, adjust the agenda and even the entry problems, but through the effort of all the members of Organization Group and the help of APEC secretariat , we resolved the difficult days quickly. Ms. Daphne Ho (from APEC secretariat) gives us much help to deal with the hole process.

PAPER CONTRIBUTIONS

A transboundary risk analysis framework on animal influenza

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ABSTRACT: The cross-border introduction of highly pathogenic avian influenza virus (HPAI) and pandemic H1N1 2009(pH1N1) into the domestic and wild animal can have devastating consequences. Risk analysis can give a scientific and objective result on the potential impaction on one country and available risk management would enforced to make a balance between protection domestic animals production and promotion international trade. A transboundary risk analysis framework of on animal influenza was proposed based on the guideline of OIE. Four steps related with HPAI and pH1N1 were adopted to complete the qualitative transboundary risk analysis. A classification measures were applied to differentiate risk analysis for different animal production. The probability of release animal influenza into China through importing animals and animal products (via transportation) was low, through border (via free border trade, smuggle and run across border freely) was medium and through wild animals (via migratory birds) was high. Four kinds of risk border were identified and risk managements were recommended.

Key words: Highly pathogenic avian influenza, pandemic H1N1, risk analysis

Animal influenza caused unprecedented losses in the world, especially in East

Asia and Southeast Asia. Because animal influenza is a zonoistic disease and HPAI & pH1N1 has attracted considerable public and media attention because the viruses involved have been shown to be capable of producing fatal disease in humans, which gives rise to the fear that the virus might acquire the capacity for sustained human-to-human transmission and thus causes a global influenza pandemic Risk analysis can help determine the likelihood of animal influenza introduction and its associated consequences. Risk analysis is a systematic way of gathering, evaluating and recording information which would lead to recommendations, positions or actions in response to an identified hazard. Further, risk management will assist the decision-maker in selecting the most efficient risk mitigation measures as part of a comprehensive, integrated strategy considering populations of animals. It is a process comprising four interrelated steps: hazard identification, risk assessment (including release assessment, exposure assessment, consequence assessment, and risk estimation), risk management, and risk communication. It is, therefore, imperative that countries adopt a comprehensive, science based approach to disease risk management, ideally in coordination with their neighbor and major trade partners.

Initiation

There are three kinds of situation which would initiate the risk analysis on animal influenza. First, a risk analysis should be begun when a novel high pathogenic subtypes or strains outbreak which would have great impaction on China. For example, when pandemic H1N1 (2009) outbreak in Mexico on May 2009, and documents were published that pigs and turkeys were infected with the virus. A risk assessment would need to conduct and risk management needed to recommendation for decision-making. Second, A Risk Analysis would be started when specific Pathways are discovered, as for animal influenza, there are three pathways identified to introduce animal influenza virus into China potentially including international trade of animal and animal products (via transportation), land border activities(via free border trade, smuggle and border movement freely) and wild animals movement(via migratory birds).In these situations, the pathways are not themselves the hazards, rather, the potential hazards are the organisms or disease that may be introduced with the pathways. Of course, a risk analysis would be initiated if a review or revisions of measures or policy are required, for examples, a national review of biosecurity regulations, requirements or operations are changed greatly.

Hazard identification

Hazard identification is an essential step that must be conducted prior to a risk assessment where the hazards are not themselves defined in the scope of the risk analysis, so hazard identification is the process of identifying the pathogenic agents (hazards) that could potentially be introduced by different pathways. A hazard is defined as any pathogenic agent that could produce adverse consequences on the importation of a commodity. Hazard identification aims at identifying the adverse event of concern. In animal influenza case, the hazard can be defined as the introduction of any notifiable avian influenza, including any H5 or H7 subtypes or IVPI is greater than 1.2 (or mortality is at least 75 percent). A risk analysis might be concluded if the hazard identification step fails to identify potential animal influenza virus associated with different pathways.

Risk assessment

Risk assessment is defined as the evaluation of the likelihood of entry, establishment, and spread of a disease, in conjunction with the associated potential biological, economic, and public health consequences (World Trade Organization [WTO], 1995; OIE, 2010). So risk assessment is a process of describing the biological pathway(s) to “release” (that is, introduce) pathogenic agents into a particular environment, and estimating the probability either qualitatively or quantitatively, The risk assessment framework outlines four key steps that should be covered systematically. These are: release assessment (probability of release from the source), exposure assessment (probability of exposure to the hazard), consequence assessment (biological consequences such as incidence and severity, economic consequences, etc.), risk estimation (which consists of combining the release, exposure and consequence probabilities). During the risk assessment process, risk analysis usually needs to take into consideration the results of an evaluation of Veterinary Services, zoning, compartmentalisation and surveillance systems in place for monitoring of animal health in the exporting country or neighbor countries. The events that are considered as contributing to the release, exposure and the consequence pathways are specified and broken down into several stages, with each stage being assigned a conditional probability. The overall probability of a given pathway is then arrived at by combining the probabilities of the various stages defined as indicated there is qualitative assessment, quantitative assessment and semi-quantitative assessment to describe the risk magnitude. Qualitative assessment does not require mathematical modeling skills to carry out and so is often the type of assessment used for routine making decision. In the crossing-border animal influenza risk assessment, it is more likely that a qualitative assessment is preferred than others.

In qualitative risk assessment the probabilities are assessed and described textually. The categories of risk used in this study ranges from negligible through to very high. For each biological pathway, a risk estimate is obtained by combining parameters/ risk categories according to the combination matrix presented in table 1.

Table 1 Risk categories combination matrix

		Parameter 2 /Exposure risk category					
Parameter 1 / Release risk category		Negligible	Very Low	Low	Medium	High	Very High
	Very High	N	VL	L	M	H	VH
	High	N	VL	L	M	H	H
	Medium	N	VL	VL	L	M	M
	Low	N	N	VL	VL	L	L
	Very Low	N	N	VL	VL	VL	VL
	Negligible	N	N	N	N	N	N

For combination of the combined release and exposure risk estimate with the consequence (transmission) risk estimate, d the combination matrix is used as shown in Table 2.

Table2 Risk categories combination matrix

		Consequence/transmission risk category					
Combined release and exposure risk category		Negligible	Very Low	Low	Medium	High	Very High
	Very High	N	VL	L	M	H	VH
	High	N	VL	L	M	H	VH
	Medium	N	VL	L	M	H	VH
	Low	N	VL	VL	L	M	H
	Very Low	N	N	VL	VL	L	M
	Negligible	N	N	N	N	N	N

3.1 Release assessment

Under the OIE framework, the release assessment consists of a description of the biological pathways necessary for an importation to release animal influenza virus into a particular environment and an estimate of the likelihood of the pathways occurring. For a transboundary animal influenza risk analysis, each hazard associated with the pathway is discussed individually. The release assessment describes the probability of the 'release' of animal influenza virus under each specified set of conditions with respect to amounts and timing, and how these might change as a result of various actions, events or measures. Three kinds of risk factors are considered, including biological factors, country factors and commodity factors. For the influenza virus nature, factors influencing the release are: animal influenza status of the source/exporting countries /neighbor country, frequency and volume animal on trade transit to China, time spent on transportation to reach to China, compliance to veterinary checks at BIP(border inspection post), legality of the trade, number /frequency / proportion of wild birds inspected (clinically and /or swab), time to examination / description of clinical examination, incubation period, actions taken on the detected (on the dead at arrival, sick, etc.) . For the country factors, surveillance body, import policy for HPAI and pandemic H1N1 in the last 5 years, train of animal influenza, financial security system , including cull and compensation policy, border trade quarantine measures ,smuggle control, nature battery on border (mountain、river、desert) of source/exporting countries /neighbor country would be considered. As for commodity factors, a classification methods on commodities are utilized to assess the carry of influenza virus. Live animals, organs with respiratory system such as chicken neck, pig head et al with lung or laryngotracheal system would be categorized high risk commodities. Other commodity factors, such as agent predilection in different tissue, effect of processing, effect of storage and transport, Frequency and volume animal on trade are all needed consideration.

The animal influenza virus can be introduced into China via international trade of animal and animal products (transportation), land border activities (free border trade, smuggle and border movement freely) and wild animals movement (migratory birds). Legal trade of animal and animal products should be considered safe if the import requirements are based on the OIE recommendations, and the probability of release animal influenza into China via importing animals and animal products (transportation) is low. The border activities like illegal trade of animal products as well as free border trade and free border movement will arise medium influenza risk to the border diseases control. And the probability of release animal influenza into China through border (via free border trade, smuggle and movement across border freely) is medium. Although it is worth noting that a positive finding in wild birds does not necessarily mean that the domestic poultry population will become infected because biosecurity plays a central role in preventing the introduction of the virus into domestic poultry, three flyways of migratory birds will imposed great influenza risk to the lines. So the release risk assessment on animal influenza into China through wild animals (via migratory birds or wild animals) is high.

3.2 Exposure assessment

Exposure pathways include four categories. First is the Probability of infection of resident animals after exposure to animals from transboundary animals and spread nationally. Second is the probability that staff handling live and dead animals on transboundary animals get contaminated with animal influenza and transmit to animal population. Third is the probability that vermin (rodents) get contaminated with virus and transmit the virus to animal population. Fourth is the probability that transboundary animals on transit kept at border infect other animals imports stored in border and transmit widely.

For animal influenza virus, we should answer the question about what is the probability that domestic poultry and cattle in China become infected by virus after the release of the influenza virus by an infected invasion across border. pH1N1 (2009) viruses are considered to be mainly transmitted via aerosol, but HPAI has no evidence. The indirect transmission of H5N1 HPAIV is strongly influenced by the ability of the virus to survive in different environments. Indirect transmission via water is possible, to other water birds using or drinking contaminated water or through domestic poultry drinking unprocessed water from contaminated reservoirs. They can either transmit the virus through direct contact with poultry or indirectly via feces, contaminated water and feed. Mechanical transfer of feces plays a significant role in the spatial dissemination of the virus, this mechanical transfer, among others, is usually attributed to movement of people. The evidence suggested that poor biosecurity measures and movement of personnel resulted in the virus being spread to another associated premise which is approximately 11 km apart from the index premises. These data again demonstrate that the mechanical transmission could occur in local conditions and result in the transmission of the virus from several meters to several kilometers.

3.3 Consequence assessment

The animal influenza outbreak in China will produce great adverse direct consequences because the virus is zonoistic disease and will arise public impaction on human. Once the animal infects and virus spread widely, the animal production losses will be greater. The indirect consequences including surveillance and control costs, compensation costs, and potential trade losses will have great impactions on economy and society.

3.4 Risk estimation

Risk estimation consists of integrating the results from the release assessment, exposure assessment, and consequence assessment to produce overall measures of risks associated with the hazards identified at the outset.

the probability of release animal influenza into China through importing animals and animal products (via transportation) is low, and the risk of animal in China becoming infected by animal influenza virus after the release of the virus by an infected animal on trade transit is medium. The consequence of animal influenza outbreak in China is very high because the direct loss and indirect loss. The global risk estimate for the introduction of animal in the animal population in China as a result of the introduction of the hazard through international trade is low.

the probability of release animal influenza into China through border activities (via free border trade, smuggle and movement across border freely) is medium, and the risk of animal in China becoming infected by animal after the release of the virus by an infected animal on trade transit is medium because there are some risk for domestic animals to be infected. The consequence of animal influenza outbreak in China is very high because the direct loss and indirect loss. The global risk estimate for the in the animal population in China as a result of the introduction of the hazard through border is medium.

The release risk assessment on animal influenza into China through wild animals (via migratory birds or movement of wild animals) is high, the risk of animal in China becoming infected by animal after the release of the virus by an infected wild animal is high because there are some risk for backyard poultry and low biosecurity. The consequence of animal influenza outbreak in China is very high because the high intensive density. The global risk estimate for the in the animal population in China as a result of the introduction of the hazard through border is High.

So, the final risk assessment for three pathways was concluding as table 3.

Table 3 Final risk assessment for three pathways

pathways	Release assessment	Exposure assessment	Consequence assessment	Risk estimation
animals and animal products international trade (via transportation)	low	medium	Very high	low
border activities (via free border trade, smuggle and movement across border freely)	medium	medium	Very high	medium
wild animals (via migratory birds)	high	medium	Very high	high

Combined three pathways risk assessment, the animal influenza introduction risk magnitude across border was concluded and shown(fig.1). The scales of these maps have four classes, very high, high ,medium, and low, that refer to the relative risk of the regions. This means that, based on the combination of three pathways risk assessment at the particular border areas, a red area has a relatively higher risk than a yellow area, whereas a yellow area has a relatively higher risk than a green area. In the animal influenza introduction map, strong emphasis on the wild bird introduction routes is laid. In the southwest China, a very high risk border with red areas was identified because there is a cross-point of two migratory route, and there is lots of borer activities such as free border trade, smuggle and movement across border freely with neighbor countries such as Thailand and vie nam which were all reported lots of outbreak of animal influenza. In the north China, because there is lack of wild animals movements like southwest China and others are same as, so the high risk border with orange areas were concluded. Legal trade of animal and animal products in north China should be considered low risk border with green areas because the import requirements are based on the OIE recommendations.

Fig.1 the final map of animal influenza introduction risk magnitude across border

4 risk management

Critical control points were identified, for which actions to be taken in order to reduce the risks of introduction, subsequent exposure of animal population and transmission of animal influenza to our country's appropriate level of protection. For animal and animal products international trade, there are five measures to mitigate the import risk such as requirement official permit to be exported and animal health certificate, examination and approval, quarantine in border station, Surveillance and monitoring, Traceability, follow-up supervision and management, et al. for the wild animal control, risk management include Surveillance and monitoring, Traceability and good biosecurity for domestic animals. For the border activities, zoning for free border trade is needed and good biosecurity for domestic animals is critical, Vaccination separation zones between countries were broadly applied to prevent the invasion of animal influenza, especially HPAI. Cracking down on smuggling is the main measures to prevent the virus introduction. We still need to Increase the number of border inspection post on the southwest border to strengthen the quarantine. Animal influenza epidemiological surveillance implies the collection of information related to the occurrence of disease and the implementation of actions for prevention, control, and eradication. In the case of animal influenza, surveillance in wild birds, wild mammalians is an important component of a comprehensive surveillance program to generate information that should lead to specific actions. Few, if any, of these actions are or should be directed toward wild birds; the vast majority are applied to the domestic poultry and swine sector. A comprehensive surveillance plan should address four key areas: early warning, prevention, detection, and emergency response. Different risk management were emphasized for different risk factors, and the final recommendations were summarized in table 4.

Table 4 Final recommendations for different risk factors

5 risk communication

Risk communication is the interactive exchange of information and opinions concerning risk among risk assessors, risk managers, consumers and other interested parties. After risk analysis report were drafted, we would consult the specialist in China, domestic government(MOA, MOH,SFA, et al), exporting country or neighbor country government, Domestic and foreign industry groups, domestic livestock producers (Industry Association of China) and consumer groups with the open, interactive, iterative and transparent principles.

	Risk factors	Risk management
1	Import animal and animal products	examination and approval quarantine in border Surveillance and monitoring Traceability follow-up supervision and management
2	Wild animals to spread influenza	Surveillance and monitoring Traceability biosecurity
3	Freed border trade	Zoning for free border trade Vaccination separation zones between countries supervision and management
4	smuggle	Supervision and management cracking down on smuggling
5	High risk border	Strengthen epidemiological surveillance Increase the number of border inspection post

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Epidemiological Research Of Wild Migratory Bird Influenza On The Border Between China And Russia

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Keyword: border between China and Russia avian influenza virus

wild migratory bird epidemiological research

Abstract: In order to establish an avian influenza monitor and control system on the border between China and Russia, in 2009-2010, epidemiological research had been taken to wild migratory bird population on the border between China and Russia. 2029 samples had been collected in wild duck, mandarin duck and other 17 kinds of wild migratory bird in Heihe,Xunke, Fuyuan, Mishan, Hulin, China, and Amur Region Russia, samples including oropharyngeal swab, cloacal swab, feces, serum etc. Avian influenza virus infected research had been conducted towards these samples by embryonated egg virus subculture isolation test, RT-PCR test, ELISA test. The result is:17 samples were AIV antibody positive, 12 samples were AIV positive, these 12 AIV positive samples were identified to be H3N8 low pathogenicity AIV by Chinese National AIV Reference Laboratory. It shows wild migratory bird is LPAIVcarrier, we should pay high attention to the problem that AIV can be transmit by wild migratory bird.

Avian influenza (AI) is caused by specified viruses that are members of the family Orthomyxoviridae and placed in the genus influenza virus A, AIV can be divided into high pathogenicity, low pathogenicity and no pathogenicity. All virulent strains isolated to date have been either of the H5 or H7 subtype. The assessment of virulence in bird is through inoculating virus, if it has the ability to produce not less than 75% mortality within 8 days in at least eight susceptible 4- to 8-week-old chickens, or any virus that has an intravenous pathogenicity index (IVPI) greater than 1.2, the virus is determined to be pathogenicity. Regardless of their virulence for chickens, H5 or H7 viruses with a HA0 cleavage site amino acid sequence similar to any of those that have been observed in virulent viruses are considered HPNAI viruses. H5 and H7 isolates that are not pathogenic for chickens and do not have an HA0 cleavage site amino acid sequence similar to any of those that have been observed in HPNAI viruses are identified as low pathogenicity notifiable avian influenza (LPNAI) viruses, non-H5 or non-H7 AI isolates that are not highly pathogenic for chickens are identified as low pathogenicity avian influenza (LPAI) viruses.

Research showed that wild migratory bird can transmit AIV when it flying long distance pass through national boundaries , and it is AIV carrier. Scientist all agree that a wild bird avian influenza monitor network should be established, and carry out epidemiological dynamic research, it will provide important scientific evidence for preventing and controlling AV.

1 Material And Sample

1.1 Time and site for collecting samples

Time: In spring and autumn of 2009 and 2010, from 15 March-30 April in spring, 20 September-30 October in autumn.

Six site was: sanjiang natural reserves(Fuyuan), xunbiela river natural reserves(Xunke), gongbiela river natural reserves (Heihe), qihulin natural reserves(Hulin), xingkailake natural reserves(Mishan), Amur region Amur river basin, all these site are migratory bird intensive activity area.

1.2 Species of migratory bird

Wild duck, mandarin duck, mallard, egret, cormorant, wild goose, water cock, yuan sparrow, brambling, Small orioles, heron, Eophona migratoria , Parus palustris, turtledove, Uragusibiricus, tomtit, about 18 species.

1.3 Category and amount of sample

947 of oropharyngeal swabs, 965 of cloacal swabs, 62 of serum, 55 of feces, total 2029 samples. Among them, 309 are collected from Russia, 1720 are from China.

1.4 Method of sampling

According to 《sampling, conserving and transporting technical regulation of high pathogenicity avian influenza 》(NY/T 765-2004). Collect one oropharyngeal swab and one cloacal swab separately in one bird, and one serum sample if possible. 54 fresh feces samples were collected in sanjiang natural reserves.

When collect oropharyngeal swabs, stretch cottonswab deeply into larynx and upper cleft palate, apply back and forth for 3-5 times, take faucial secretion away. When collect cloacal swabs, stretch cottonswab deeply into cloaca then turn around, take a spot of feces away. Put two swabs into Liquid nitrogen tube together (1.0 ~ 1.5mlPBS ,penicillin 2000IU/ml ,streptomycin 2mg/ml prepared in tube), record the number.

Feces samples could be collected for little rare bird and other bird which can not be collected swabs easily, each sample 1-2g, put into tube(1.0 ~ 1.5mlPBS ,penicillin 2000IU/ml ,streptomycin 2mg/ml prepared in tube), record the number.

Blood samples were separated quickly, stored under -20^0C, record the number, information about the bird was attached.

All the samples recorded number, date, specie, collected site, and then sent to lab as quickly as possible.

2 Method

2.1 Virus isolation

2.1.1 Sample pretreatment

Add 3ml PBS to oropharyngeal swab and cloacal swab, 10000r/min centrifuge 10min, extract supernate filtrate through filter membrane into EP tube.

2.1.2 Sample inoculate, culture and gather

PBS obtained through clarification by centrifugation and filter are inoculated into the allantoic sac of at least three embryonating SPF chicken eggs of 9–11 days' incubation, each egg 0.1-0.2ml, these eggs are incubated at 37°C (range 35–39°C) for 5 days, observed everyday, discard the egg which died within 24hr, others chilled to 4°C, stored in refrigerator. Allantoic fluids then be tested with a haemagglutination [HA] test, haemagglutintin inhibition [HI], RT-PCR test ,(allantoic fluids should be stored under -20^0C, stored for long time should under -70^0C, avoid frostthawing repeatedly).HA and RT-PCR positive samples passaged 1-2 further batch of eggs.

2.2 Haemagglutination test [HA] and haemagglutintin inhibition [HI] test

Allantoic fluids and serum samples conducted HA and HI test

2.3 ELISA test

Serum samples conduct ELISA test, used universal type AIV antibody kit(IDEXX).

3 Result

3.1 HA and H5/H7/H9 HI result

No positive

3.2 ELISA result

17 samples AIV antibody positive

3.3 RT-PCR result

82 samples positive, among them, 22 samples was collected in autumn, 60 samples was collected in spring; 63 samples was oropharyngeal swabs and

cloacal swabs, 19 was feces samples; 15 samples were from Russia, 67 samples were from China. Positive samples were collected from mallard, Fulica atra, mandarin duck, egret, wild duck, cormorant.

3.4 Determination result of amino acid sequence

RT-PCR positive samples were identified by national AIV reference laboratory, their result showed that 12 samples were LPAIV H3N8 subtype, gene evolution position belong to Eurasian branch, polygenes and multi-recombinant virus.the highest homology between HA gene and Asian virus in GeneBank is 97%, the highest homology to other strain found in China such as A/Quail/Nanchang/7-026/2000(H3N6) is 96%, the highest homology between NA gene and Eurasian virus in GeneBank is 96%, the highest homology to other strain found in China such as A/Duck/Eastern China/163/2002(H6N8) is 96%.

4 Discussion

4.1 Research indicated that LPAIV exist on the border between China and Russia, some birds arose AIV antibody after infected by LPAIV, the HA and NA gene of virus isolated in this research is similar to the virus found in china and some Eurasian area according to the genetic orientation, origin of gene may be related to wild bird migration.

4.2 Migratory bird fly pass through the border from Heilongjiang to Russia in spring, fly back in autumn. During this process, AIV existed in bird transmit between two country, even to much longer distance. Within Eurasian continent, AIV existed in migratory bird population is LPAIV at present, but these LPAIV can be transmitted from wild bird to poultry, after recombination and variation in poultry, can caused HPAIV. Since 1959, this kind of recombination and variation have already taken placed for several times in the world.

4.3 Migratory bird contribute important effect in AIV transmission, many advanced country pay more attention in recent years, USA, Canada established migratory bird high pathogenicity AI interlocal early stage monitor system separately, in order to early detect if the diseased and dead bird are infected by AIV. set up a fast diagnose and notice mechanism, then start HPAI warning and emergency system promptly. In 2006, FAO initiate a bird migration tracking program, to ascertain what role a bird play in AIV transmission.

4.4 There are eight bird migratory channel in the world, three of them west pacific channel, East Asia-Australia channel, central Asia-India channel pass through china and Russia, China located in critical position of bird migration. China has 4300km Frontier Line with Russia, Heilongjiang province, Jilin province, Argun river inner Mongolia are on the border to Russia. Lake wetland, forest grassland involved in the research are migratory bird intensive activity area, it is possible that these area are major area where AIV possess and transmit. Monitor AIV infected situation on the border of China-Russia, can provide much valuable information about AI epidemic situation, and promote governmental emergency response.

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Characteristics of the Prevalence and Prevention and Control Measures of Avian Influenza in China

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Summary

The current avian influenza epidemic situation is generally stable in China and there is no unexpected occurrence of major outbreaks of highly pathogenic avian influenza in poultry. But because of the immune instability or immune system disorders, coexistence of multiple subtypes and widespread H9N2 subtype, China's avian influenza prevention and control situation remains grim. The avian influenza virus does not readily cross the species barrier, though there is a potential for strengthening surveillance and early warning, especially providing expertise and improved surveillance tools for timely and accurate diagnosis. Daily comprehensive biosafety practices are recommended to realize the global concern for improving the prevention and control measures and to share the experiences of prevention and control. Compulsory immunization will a really good job to create a herd immunity to protect those who cannot be vaccinated. Local governments timely regulate the diagnosis of HPAI and culling of poultry, bio-safety disposal, sealing off of epidemic areas, disinfection and protection of personnel. Epidemic will be controlled in the epidemic spot so as to strictly prevent the epidemic from spreading further. China is enhancing management and market access of the breeding registered enterprises and breeders. According to the avian influenza virus antigenic variation, the immune strain of avian influenza virus will be adjusted in time to ensure immunity. A suitable plan has been researched and established for the early realization of effective control and eradication targets of avian influenza and clearing of avian influenza in China.

Keywords: Avian influenza; HPAI; Epidemiological characteristics; Prevention and control measures

Introduction

The highly pathogenic avian influenza(HPAI) subtype H5N1 is already panzootic and extremely infectious disease. The risk from HPAI is currently low to most people and in a stable level to poultry. The China's HPAI prevention and control work makes great progress in the past ten years but still faces a very arduous and difficult task. Outbreaks of HPAI in the poultry industry have caused devastating economic losses and the characteristics of the HPAI epidemic among humans and poultry are obviously determined, indicating HPAI not only a sudden outbreaks but also a consistent disease. Vaccinations are voluntary in some countries and mandatory in some countries, which have contributed to the success of immunization programmes in China from 2004 to the present. However, as a pandemic of moderate severity is wide-spreading HPAI is one of our greatest challenges and the prevention and control work has become more difficult in China.

Instability of immune effects

Vaccination is the most important preventive measures against HPAI in the past years in China. Some vaccinated flocks have lower effects of vaccination which become atypical and latent chronic carriers of the HPAI virus while it is considered that it should not happen to be infected or excreting virus especially after the vaccines have been approved for use in China. The monitoring results from the laboratory and production units showed the fact of atypical HPAI was indisputable and the farmers should pay more attention to the HPAI prevention and control work.

The main features of the epidemic

Spreading speed: In the past HPAI could spread very rapid and the infected flocks quickly died within a week (5~7 d) in China. Now the spreading speed of HPAI in the vaccinated flocks slows down to a month or more without relation to the wind direction. Unlike H9 subtype it has clinical and transmission features, the H5 subtype is irregular.

Mortality and death duration: The survival rate was significantly higher in animals vaccinated with higher antibody levels. A peak mortality rate appeared in 5~10d,sometimes until 1 month after the onset of HPAI in China. The disease status is closely related to the extent of strain variation, level of antibody and the control effect of the secondary infection. The previous pure HPAI is very different in poultry without immune impact.

Clinical symptoms and lesions: Clinical symptoms of atypical HPAI in poultry with high antibody levels may range from lower mortality, mild respiratory symptoms to only often laying down. The performance of the HPAI is related to the poultry species, age, antibody levels control effects of secondary infection, health conditions, feeding management, isolation, disinfection measures and so on.

Meat poultry: The symptoms are the decline in feed intake, respiratory symptoms and abnormal feces with turquoise and so on. Sometimes the nerve symptoms of head and neck may be visible Few cases have larynx,trachea and intestinal bleeding, mucosal hyperemia. Sometimes bleeding of nipple and glandular stomach muscles under the cuticle is visible. The late occurrence of inflammation included a typical balloonitis, pericarditis, perihepatitis, peritonitis, etc..The mortality of fast growing-up chickens is high.

Laying birds: The egg production, fertilization rate and hatching rate decrease obviously. There will be eggshell fading, abnormal eggs increasing, follicle congestion and hemorrhage, tubal mucosal edema, hyperemia and bleeding.

Performance of antibody levels: Signs of acute sepsis, rapidly spreading infection and increased mortality develop when the HI antibody titres in most birds are 0~5log2.Then the HI antibody levels in most birds increase to 5~8log2 and the disease spread more slowly with a longer duration(1 month) and signs similar to the hemorrhagic septicemia of atypical Newcastle disease. The incidence and mortality rates are 10%~70% and egg production decrease more obviously. When the HI antibody levels in most birds are 8~12 log2 even 14~15log2 the main clinical performance include the abnormal increase of antibody levels, respiratory systems(cough, asthma), low mortality, slight drop in egg production. It is often mistaken for normal respiratory diseases, ignoring the HPAI epidemic. It helps to compare the antibody levels before and after the epidemic by HI antibody testing and the rapid increase of the HI antibody level indicate the occurrence of HPAI. The test results may have some difference depending upon the appropriate choice of the antigen selected according to the vaccine. The detection results in the wild virus infections may discounted using the selected antigen and we should pay attention to the variation of the virus by a timely antigen cross-testing.

Natural disease in vaccinated Birds:It still exists that the vaccinated birds with low antibody levels are infected and excreting viruses. In the past the excreting is rare after vaccination. But now infection and excreting seems more possible as long as the antibody levels after immunization is not so high.

Subtypes coexisting: Current situations of avian influenza in China is complex with coexistence of multi-subtype viruses(H5,H6,H9 subtypes,etc.). Phylogenetic analyses showed HPAI H5N1 subtype virus was most diversified. Compared with other countries, China is rather special: First, a compulsory vaccination policy has been adopted in the HPAI prevention in China; Second, there are many subtypes of epidemic strains, especially H9N2 subtype and H5N1 subtype; Last and most important, laboratory monitoring results show that, currently in addition to H9 and H5 subtypes, there is also H6 subtype virus. The impact of the H6 virus was not yet clear in poultry production in China. However, some recombinant viruses have found with the H6 virus genes.

Recombinant viruses of different sub-types: The existence of multiple subtypes will bring two significant problems: first, the different subtypes will interfere with each other. Second, the coexistence causes more fast mutation of HPAI virus.H9 subtype virus infection may not show obvious symptoms, but clinical death appears to increase and egg production drops significantly because of the potential impact of coexistence of E. coli, Newcastle disease virus and even the H5 subtype of avian influenza virus to create conditions for further infection.

Waterfowl-infected carriers of the virus: Waterfowl, mainly ducks and geese, and fast growing meat chickens are more likely to be infected of HPAI and carrying the virus than other poultry and considered to be the biggest source of HPAI infection and dissemination. The particular vulnerability to the current epidemic of HPAI is waterfowl-infected carriers of the virus and increasingly prominent role as the host medium of HPAI which is likely to cause widespread pollution and long-term wild virus epidemic. The poultry does not produce antibodies after immunization, or only produce a certain level of antibodies after immunization while excreting is more obvious. Avian influenza viruses have been detected in the water with the onset of the flocks which means that the virus not only in poultry in vivo, but also in their living environment, especially water. Poultry farming enterprises, especially surrounded by goose and duck farm fields, should be concerned about the excreting because these places tend to be a virus storage library. Waterfowl are also recognized as the worldwide most important natural reservoir hosts of avian influenza viruses. HPAI infection can also cause death of waterfowl, but compared with that in chickens, the virulence of strains is weaker.

Wide distribution of H9N2 subtype avian influenza: The first strain of H9N2 subtype avian influenza virus has been isolated in 1994 in China, now all the isolates of the H9N2 subtype at different places and different times are cross-protective presenting an limited genetic and antigenic diversity. Genetic data indicate the H9N2 viruses isolated from 1994 to the present in China are G1 group viruses circulating in Eurasia. Taking into account pathogenic variation, gene sequence mutation (ie, the genetic relationship changes) and the variation of immune protection, the work is dealing with the phenomenon of H9N2 antigenic variation which has been observed as a frequent occurrence in certain species of avian influenza virus. The results showed that the cross-protection of all H9N2 isolates is better. Recently, researchers have found that pathogenicity of some H9N2 isolates in mice increased while the virulence and other key sites of HA and PB2 genes have changed, showing the characteristics of human influenza virus. Several new isolates of H9N2 influenza virus have showed genetic recombination with the H1, H5, and H6 subtypes. A serological survey for antibodies to H9N2 influenza viruses was performed and found that the seropositivity rates in sales persons of live poultry market were significantly higher than the others.

Live poultry transportation: Live poultry trade is distributed mostly among China without trade restrictive measures. From the monitoring results most cases of avian influenza infection in poultry have resulted in live poultry trade market and there is no a distinct difference between seasons and regions. The occurrence of avian influenza in Xinjiang, Tibet and Qinghai in China is mainly caused by transporting through a wide range. There are two main reasons in mainland China for the market outbreaks through transporting poultry: first, the live poultry markets are relatively complex and the birds are not necessarily from the regulated farms; second, the live poultry markets is operating throughout almost the whole year without intermittence and the risk continues increasing the same as the poultry farms keep operating for many years without all-in-all-out disinfection of the empty fields.

Vaccination cannot eliminate the HPAI incidence: Although Vaccination can reduce the probability of HPAI infection disease, vaccination cannot eliminate the HPAI incidence. Even if HPAI antibody levels are very high in poultry, the virus infection can still occur. The varying quality of vaccine may have some impact on the ideal immunity, although the vaccines of government procurement are used.

Public health impact: Although the strains are not highly lethal in human beings and do not have the characteristics of human to human transmission, HPAI subtype H5N1 virus is still posing a serious threat to human health. Although the cases of avian influenza infection in humans occur and persist from 2007 to the present, there is no one case of probable person-to-person transmission. From the results of analysis, the avian influenza is the often greatest threat to poultry, and there are no human transmission characteristics although people were only occasionally infected.

Analysis of major reasons with high HPAI incidence in China: Avian influenza viruses can mutate to create a new strain that can be transmitted easily among birds. This mutation includes pathogenicity, gene sequence and antigenicity and so on. It is naturally variable that is one of the characteristics of avian influenza virus.

Environmental pollution is caused by avian influenza viruses excreting by poultry because of immunization failure with high stocking density or inappropriate measures of disinfecting.

Control levels of avian influenza are not high while the breeding of waterfowl and broilers is too large-scale large. It is the main reason that avian influenza virus become one of the most important sources of infection.

The other reasons including low standard of disease prevention, vulnerability of breeding models, live poultry transportation and trade while avian influenza will exist as a long-term risk. There are a great variety of feeding patterns and the prevention concepts and measures are very different in China although the breeding way of the yellow broilers is the same as white broilers.

The persisting outbreaks of avian influenza in neighboring countries and regions will be a great threat to the poultry industry in China.

Timely and accurate diagnosis to strengthen monitoring: Concerns should exist about the monitoring results of the local veterinary authorities and research institutes. Now virus isolation and identification, AGP, HA and HI, ELISA, neutralization test, immunofluorescence, RT-PCR,NASBA and real-time fluorescent PCR were commonly used for detection of avian influenza.

Strengthening daily biological safety for integrated prevention and control: We should deepen the understanding of the complexity and long-term impacts of the epidemic. We must be well prepared and rehearsed according to the contingency planning. We should adhere to the principle that “prevention is more important than cure" and there is no virus in the poultry farm. Deep cleaning and a daily routine of cleaning and disinfection, including disinfection of doors and barriers, disinfection with chickens, ground sterilization, disinfection of equipments, disinfection of transport tools and roads.

We should strengthen the routine immunization programs and disease prevention and control plan to avoid deadly infectious diseases such as Newcastle disease and infectious bursal disease and other immunosuppressive diseases. Avian Influenza immunization is heavily dependent on the immunization of other diseases, especially Newcastle disease.

We should adhere to self-support reproduction or purchasing chicks from healthy breeding farms without infection. We should adhere to all-in-all-out breeding pattern to avoid mixed feeding of multi-age or multi-source poultry and wild bird invasion. We should pay attention to keeping the number of birds in the feeding area calculated according to the ventilation and house size. Complete adequate nutrition should be provided to increase body resistance. During the late fall through early spring we should take the necessary precautionary measures to reduce the seasonal chance of the virus into flocks, including severe restrictions on movement and strengthening daily disinfection of roads, doors, and sheds.

Suspected cases should be diagnosed as soon as possible. If a suspicious case occurs in flocks in the avian influenza high season, it must be promptly eliminated while we should cull the poultry flocks and strictly control the spread of pathogens.

The incidence of unexplained infected groups should be promptly reported and the infected birds should be processed under the guidance of the veterinary authorities. It is strictly prohibited without permission to sell or thrown away the infected birds.

A really good job of compulsory immunization of poultry: We should select the best vaccine for H5N1 avian influenza immunization. It is important to develop a scientific immunization program. One way can be considered to increase the number of vaccination, the other way to increase the dose of each vaccine. Not all birds can produce the best antibody level after immunization while the greater population will experience the greater individual differences. If the antibody levels of individual flocks in are relatively low, they will become the carriers of the virus first copy, causing infection and expanding the number of infections. When stress occurs in chickens or infected by other diseases, the virus is easy to spread throughout the whole flock.

We should avoid to use the own vaccine: The vaccine strain replication per unit time is better and the virulence is relatively weak while the current vaccine strains have a clear choice. The Isolates from the production site tend to be strong pathogenicity. Inactivated vaccine prepared by their own tissues and organs of the infected chickens is a very high risk. Although the tissue grinded a complete inactivation of the virus in cells cannot be guaranteed. The inoculated chickens will have greater irritation because of long duration of action of formaldehyde. The inactivated vaccine is not so good and also easily lead to pathogen spreading. If the infected chickens are provided to some institutions to isolate the virus and then inoculate chicken embryos to produce vaccine, the effects are also not really good because the H5N1 avian influenza virus subtype is highly pathogenic for chicken embryos and in a short time after the death of inoculated chick embryo, chick embryo allantoic fluid obtained is often not high viral load. So the antibody levels in chickens after immunization are not high and there is also no protection.

Promptly dispose of the epidemic to prevent the spread: The suspicious highly pathogenic avian influenza must be promptly reported to the local veterinary authorities for the timely diagnosis and to take effective measures to prevent the spread of the epidemic.

Farms within the emergency handling of the epidemic should pay attention to the problems:

First, once the suspected cases appear, we should take partial blockade and the preferred disinfection and diagnose as soon as possible. After confirmation we should eliminate the source of infection immediately, block the whole flock, disinfect thoroughly to prevent spread of the epidemic. We should grasp the best time for the culling, quarantine and blockade to prevent the spread of the epidemic. Although in the same farm other buildings can be free from infection by taking strict isolation, blockade and disinfection measures, the risk is too great and rapid culling of infected source is the best way.

Effective disinfection is the lime to pave road and drench the birdhouse with automatic spray device. Sprayer with the disinfecting power of disinfection is also good. To achieve 100% coverage, we should spray 3 to 4 times a day and replace disinfectants from time to time.

We should strengthen staff management, to avoid artificial insemination, feeding and drinking, or other conduct to aggravate the spread of the epidemic at the venue. We also should properly handle of dead chickens and related products.

Once birds have been infected an emergency vaccination should implement immediately in the uninfected flocks once a week for 2~3 times choosing the vaccine for best antibody levels to minimize the risk of infection of other chickens.

Amantadine, rimantadine, etc. can play a role (10~20mg/day/bird) in the prevention of infection. But they belong to the banned drugs in poultry by Ministry of Agriculture of China and its therapeutic effect is not so good and they also have some side effects. Antibiotics and herbal adjuvant therapy can play a certain role in early and late onset, but the effect is instable while mainly antibiotics can control secondary infection to reduce production losses. It can play little role at the peak of the death. The role of antibody preparation is not sure and we should focus on prevention before infection.

Timely submission of poultry serum collected will help to diagnose and detect whether there is a new variant strains and evaluate the immune effect.

Policy recommendations for the prevention and control of avian influenza: We should continue to strengthen the mandatory enforcement of national immunization program of avian influenza and strengthen poultry immune surveillance and immunization antibody level assessment.

We should strengthen the registration of farming enterprises and breeders and market access management.

We should take efforts to strengthen epidemiological surveillance of avian influenza, fully mobilize and use technology and resources of universities, research institutions and special funds into the joint monitoring, regular consultation with the epidemic to grasp the epidemic dynamic, truly early detection of outbreaks and rapid and effective treatment of the epidemic.

According to the avian influenza virus antigenic variation, we should adjust the immune strain of HPAI to ensure immunity. we should encourage people with bio-security conditions and research strength of the units to involve in avian influenza vaccine research and development and impact assessment.

we should research and establish suitable plan for the early realization of effective control and eradication of avian influenza.

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