National Strategies for Controlling Avian Influenza Viruses

Thailand

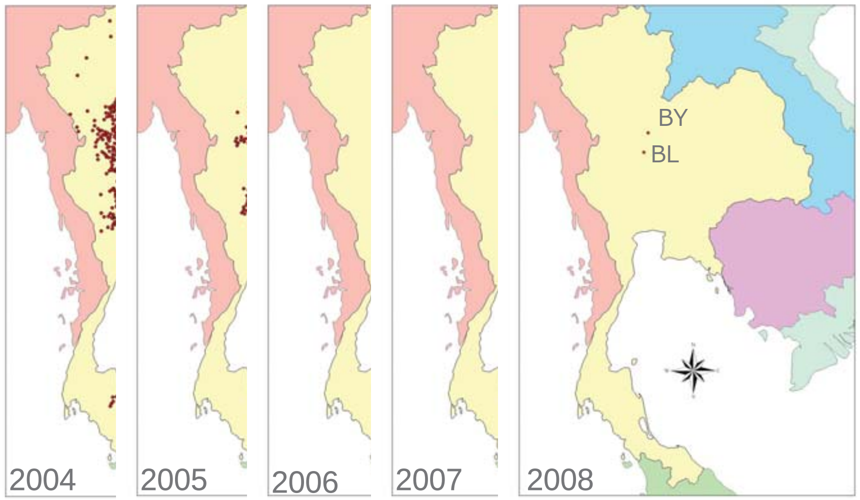
Poultry Population in 2013

Type of Poultry	Number of animal /owner
Native chicken	67,386,455 (2,247,852)
Broiler	235,595,019 (34,527)
Layer	51,028,772 (50,911)
Breeder	23,552,952 (13,377)
Duck	28,374,798 (446,175)

Major Animal Diseases of Concerns in Thailand

Zoonoses	Avian Influenza, Brucellosis, Tuberculosis, Anthrax, Rabies, Melioidosis
Non-zoonoses	Newcastle Disease, Foot and Mouth Disease, Hemorrhagic Septicemia, Black Leg, Paratuberculosis, Caprine Atritis and Encephalomyelitis, Swine Fever, PRRS, Procine Epidemic Diarrhea
Exotic Diseases	BSE, Rinderpest, PPR, Nipah, West Nile Encephalitis

Influenza Outbreaks History



National Control Strategy: Strengthening Veterinary Services

- Laboratory capacity
- Human resource capacity
- Risk assessment
- A contingency plan

National Institute of Animal Health and Regional Diagnostic Center

Field Epidemiology Training Program for Veterinarians, FETPV

Development of FETP for Veterinarians

2005
- First cooperation by sending Vets/years from DLD to train in in MOPH

2007
- MOU between DLD and DDC for 5 years cooperation
- Curriculum development for vet in FETP

2008
- LOA between DLD and FAO for supporting FETPV development for the region and Thailand until present

2009
- Start first batch of FETPV

2011
- Graduation of 1st Batch FETPV

2013
- Start Modular Program
- 2-year full-time program

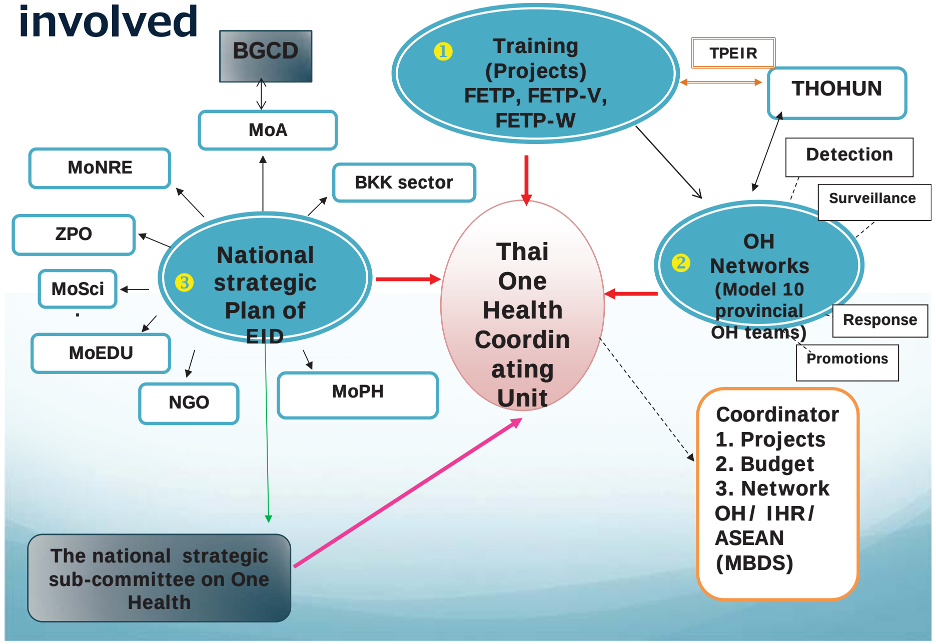
Progress

Output	No.
2-year program (since 2009)	Graduated – 15 persons (9 inter & 6 Thai) In training – 3 trainees
Modular Program – Batch 2013 (since 2013)	Participated – 12 trainees Graduated 1st Module – 5 trainees Graduated 2nd Module – 4 trainees
Modular Program – Batch 2014	Participating - 10 trainees (6 inter & 4 Thai)

International Presentation
- TEPHINET, ESCAIDE conference
- CRWAD conference
- International conference i.e. one health conference

* With support from FAO, this Regional Training model has been expanded to China, Indonesia and South Asia.

Multi-sectoral partners were involved



A table-top exercise

National Control Strategy: Achievement of a Disease-Free Status at Compartment, Zone, Region and Country Levels

- GAP and compartmentalization
- Effective surveillance
- Effective and rapid containment of suspecious, infections and outbreaks

National Control Strategy: Enhancement and Promotion of Bio-Security

- Large scale and good bio-security farm – Compartmentalization and Good Agriculture Practice Certification
- Small scale commercial farm and native chicken holder

Strict Biosecurity on Commercial Poultry farms

Improvement of bio-security of backyard poultry

Before **After**

National surveillance programme

- Clinical and active surveillance (Low and high Pathogenic AI i.e. H5, H7)
- Surveillance and control at border area and live bird market
- Cooperation under the One Health Approach

Avian Influenza Surveillance in Thailand, 2014

Poultry Group	Farm Status	Clinical surveillance	Active surveillance	
			Cloacal and Oropharyngeal swab	Serum
1.Compartmentalized Farms	To certify and maintain NAI free status	√	√	√
	Buffer zone	√	√	√
2. GAP certified farms	Breeder / Layer farms	√	√	-
	Broiler farms	√	√	-
3. Non GAP certificated farms	Breeder / Layer farms	√	√	-
	Broiler farms	√	√	-

Avian Influenza Surveillance in Thailand, 2014

Type of poultry	status of farm	Clinical surveillance	Active surveillance	
			Cloacal and Oropharyngeal swab	Serum
4. Native poultry, fighting cocks	Basic biosecurity management	√	√	√
5. Backyard poultry	Low biosecurity management	√	√	-
6. Free grazing ducks	Low biosecurity management	√	√	-

Bordering Surveillance

SRRT and H5N1 Avian Influenza Control

Laboratory Diagnosis: Number of Tested Sample

Year	Number of samples	Type of samples	Species
2010	493,516	Swab and serum samples	Poultry and wild bird
2011	267,344	Swab and serum samples	Poultry and wild bird
2012	216,950	Swab and serum samples	Poultry and wild bird
2013	213,000	Swab and serum samples	Poultry and wild bird

Lessons learnt

- Clinical surveillance and early response are the most important strategies for Thailand
- Cooperation from private sector and support for high level policy maker are crucial for eradication program
- Changing behaviour of traditional raising system need long term strategy

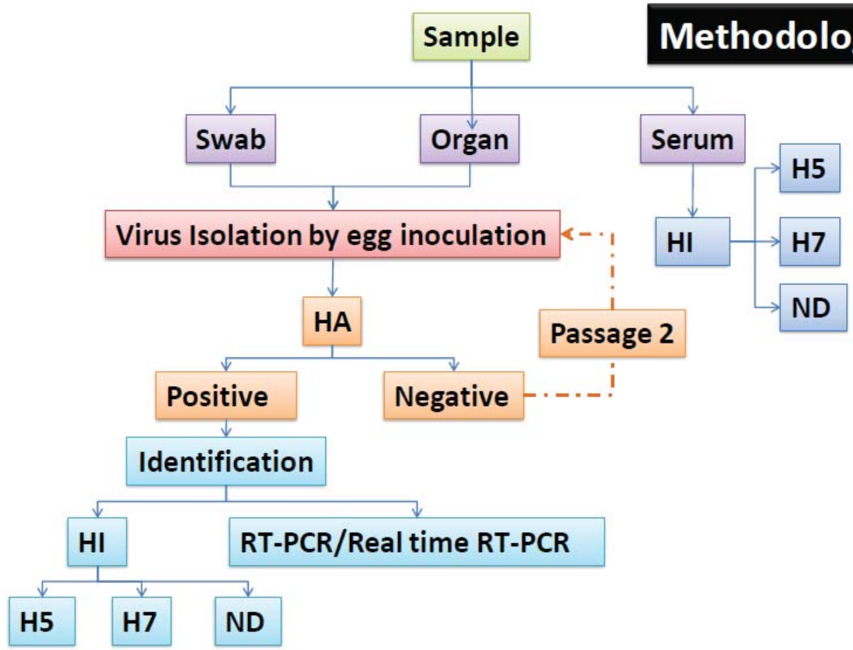
Future plan

- Maintain strategies and free status of NAI
- Strengthen activities and collaborate for other emerging animal diseases
- Continue support and encourage small scale holder to change their raising behavior
- As a leading country for ASEAN Epidemiology group, we committed to keep momentum of FETPV for the region.

Thank you

OIE Regional Workshop on Enhancing Influenza Viruses National Surveillance Systems, Tokyo, 26-28 August 2014

Methodology

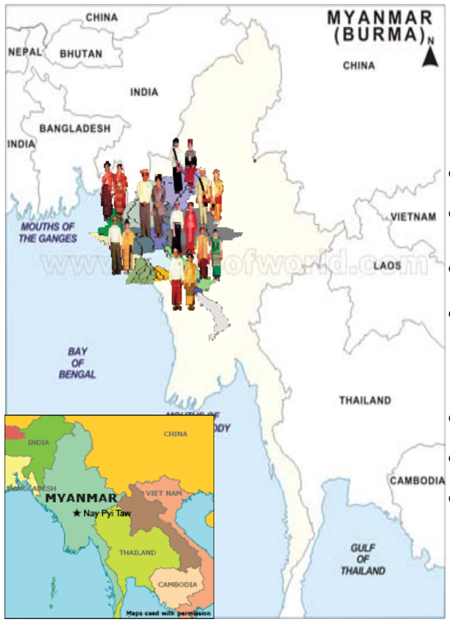


OIE Regional Workshop on Enhancing Influenza A viruses National Surveillance Systems
OIE/JTF Project for Controlling Zoonoses in Asia under One Health Concept
Tokyo, Japan, 26-28 August 2014

Country Report Presented by

DR MYINT THAN
DIRECTOR GENERAL
LIVESTOCK BREEDING & VETERINARY DEPARTMENT
MINISTRY OF LIVESTOCK, FISHERIES AND RURAL DEVELOPMENT

Contents



Republic of the Union of Myanmar

- Situated in South East Asia
- **Area – 676,577 sq km**
- bordered with China,
- India, Bangladesh, Laos, Thailand , Bay of Bengal and Andamen sea
- ***60 million people,***
- 135 national races
- **(14) Regions and States and (1) Council**

Location

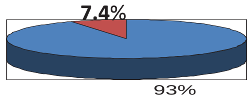
The Republic of the Union of Myanmar lies between latitudes 9° and 29°N and longitudes 92° and102°E.

It is extending 2000 km from north to south and 900 km from east to west.

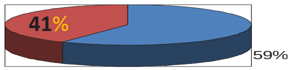
It is bordering with Bangladesh in the west, India in the North West, China in the north and north east, Thailand in the south east and Laos in the east.

- 135 national races live together in the country
- Myanmar is agro-based country
- Total cultivated area is about 23.5 million acres
- 75% of the population involve in Agriculture Sector

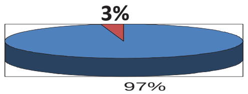
Livestock & Fisheries is a combined sector, which constitutes about **7.4 %** of National GDP.



Livestock share of the GDP under Livestock & Fisheries sector are **41%.**



Livestock share of the total GDP was **3%**



Private sector constitutes **98%** of total national livestock value.

Ministry of Livestock, Fisheries and Rural Development

DOLF | LBVD | DRD | DOF | UVS | NGOs

DOLF	= DIRECTORATE OF LIVESTOCK , FISHERIES & RURAL DEVELOPMENT
LBVD	= LIVESTOCK BREEDING AND VETERINARY DEPARTMENT
DOF	= DEPARTMENT OF FISHERIES
DRD	= DEPARTMENT OF RUAL DEVELOPMENT
UVS	= UNIVERSITY OF VETERINARY SCIENCE
ALF	= ACADEMY FOR LIVESTOCK AND FISHERIES
MVC	= MYANMAR VETERINARY COUNCIL
MVA	= MYANMAR VETERINARY ASSOCIATION
MLF	= MYANMAR LIVESTOCK FEDERATION
MFF	=MYANAMR FISHERIES FEDERATION
RDB	= RURAL DEVELOPMENT BANK

ALF
MVC
MVA
MLF
MFF
RDB

Village youth for Livestock and Fisheries

Population of livestock Animals 2013-2014

Species	Number (million)
Cattle	15.9
Buffalo	3.5
Sheep/Goat	7.6
Pig	15
Chicken	250.23
duck	16.77
Turkey,goose, muscovy	1.5
Quail	0.85

5 Priority Zoonotic Diseases in Myanmar

Myanmar:
- Avian influenza
- Rabies
- Anthrax
- Plague (last in 1994)
- leptospirosis

TADs Control in Myanmar

Legislation and policies (Notifiable TAD animal diseases)

List A diseases (Myanmar)

- ✓ FMD
- ✓ Anthrax
- ✓ Haemorrhagic Septicemia
- ✓ Black leg
- ✓ Hog Cholera
- ✓ Newcastle Disease
- ✓ Infectious Bursal Disease
- ✓ Rabies
- ✓ Highly Pathogenic Avian Influenza
- ✓ PRRS

List B diseases (Myanmar)

- ✓ Brucellosis
- ✓ Tubercullosis
- ✓ Surra (Trypanosoma)
- ✓ Glanders (Burkholderia) Pseudomonas mallei
- ✓ Avian Pasteurellosis
- ✓ Infectious Bronchitis
- ✓ Pullorum Disease
- ✓ Marek's Disease
- ✓ Duck Viral Enteritis (Duck Plaque)
- ✓ BSE

Occurrence of Notifiable animal diseases in 2013 Myanmar

Disease	Species
FMD	Cattle
NDV	avian
Echinococcosis	canine
Rabies	Canine, equine, suis
Babesiosis	Bovine, canine, elephant
Equine Pinoplasmosis	Equine
Trypanosomiasis	Equine, bovine
Classical Swine fever	Suis
Fowl cholera	Avian
Fowl typhoid	Avian
Infectious bursal disease	Avian
Avian mycoplasmosis	Avian
Clostridium infection	Avian, elephant
Pasteurellosis	Avian, bovine, canine, feline, ovine, leopard, suis
Fowl Pox	Avian
Coccidiosis	Avian, Bovine, canine, elephant, feline, suis
Filariasis	Elephant
Infectious coryza	Avian
Salmonellosis	Suis, avian
Avian Leukosis	avian
Infectious bronchitis	Avian
Distomatosis (liver fluke)	Elephant, bovine
Anthrax	Elephant
Leptospirosis	Bovine, vanine
HS	Bovine, ovine
Oesophagostomiasis	Bovine, Suis, ovine
Schistosomiasis	Bovine, elephant, suis
Parvoviral infection	Canine
Anaplasmosis	Bovine, canine, equine
Porcine Circo Virus	Suis
Colibaccilosis	Avian, canine, suis
Tetanus	suis

TADs Control in Myanmar

- **TADs**
  - Rabies
  - H7N9
  - FMD
  - PRRS

Animal Movement Management and Constraints

- Official check points cannot perform Animal Movement Management effectively especially at border areas
- Movement is mainly to China and Thailand.
- TADs Control and vaccination could not be performed at Remote border area where Illegal Displacement person (IDP) located in China and Thailand
- Control relax in those areas and information sharing and coordination among China, Myanmar and Thailand is needed

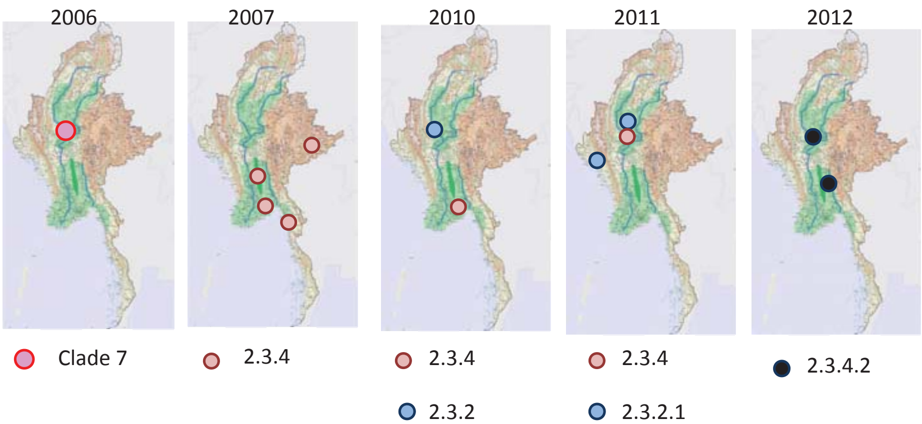
- A mechanism and system should be developed and requested OIE to facilitate animal movement control at border areas

Overview of HPAI Status Myanmar

Wave	Year	Virus Clade	Affected birds
1	2006	Clade 7	0.66 million
2	2007 early	Clade 2.3.4	0.113million
3	2007 late	Clade 2.3.4	0.03million
4	2010	Clade 2.3.4 Clade 2.3.2	16293 birds
5	2011	Clade 2.3.2.1 Clade 2.3.4.2	53496 birds 38521 birds
6	2012	Clade 2.3.4.2	999 birds 1831 birds

Multiple introduction of HPAI viruses on multiple occasions

Location Maps of Clades in HPAI Outbreak in Myanmar



No Reported Case in 2008, 2009 and 2013

Principle of HPAI Control measures in Myanmar

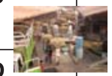
- Stamping out
- Quarantine and Movement Control
- Infected premises, suspected premises and dangerous contact premises (1km, 5km, 10km)
- Zoning and Compartmentalization
- Enhanced biosecurity in production zones and LBM
- Trace and monitor each AI suspected cases
- Risk based surveillance (Active and Passive)
- Treatment Option(Myanmar; No vaccination)
- Disposal, Decontamination
- Public Awareness Education (behavioral changes)
- **Established National Contingency Plan for Emergency Control of HPAI in February 2009**
- **Simulation exercise / table exercises conducted annually if possible**

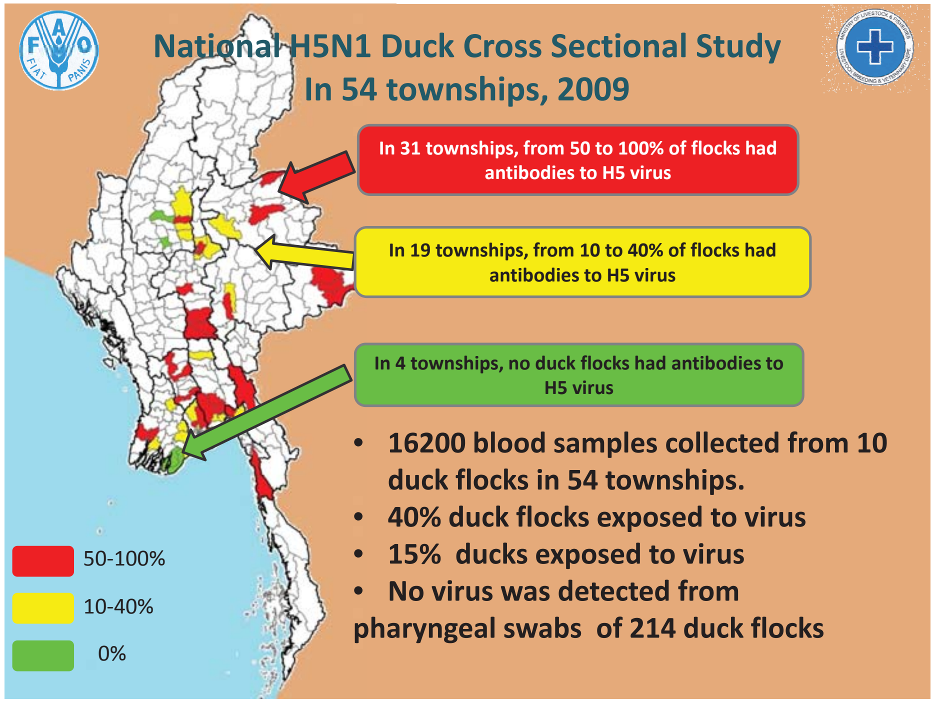
Early Detection and Notification

- Rapid detection of suspected AI Cases in Poultry
- Reliable and rapid laboratory confirmation (<12hrs)
- Rapid field investigation
- Strengthen mechanism collaboration between the human health and animal sector
- Trace and monitor each AI suspected cases
- Sharing of clinical and virus samples to reference laboratories internationally
- Timely notification to OIE of each HPAI case

Surveillance and Monitoring Program for HPAI (2006-2013)

Year	Activities	Organized by
2006-07	Routine Surveillance in LBM, Breeder Farm, Hatcheries, Commercial farms	FAO/LBVD
2008	Wet land area (MoeyunGyi Area)	FAO/LBVD
2009	•Wild Bird Related Areas Surveillance and Supply Chain Study, •National H5N1 Duck Cross Sectional Study In 54 townships	FAO/LBVD
2011	HPAI Active Surveillance and duck cohort study in 78 townships	FAO/LBVD
2012	Day Old to 5 Month Old Duck Longitudinal Duck Study	FAO/LBVD
2013	H7N9 Emergency border area Surveillance (implemented) LBM surveillance (ongoing)	FAO/LBVD

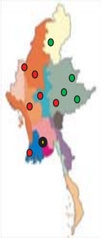




Challenges in HPAI Control

- Decentralization Political System affects practice of culling and stamping out
- No Vaccination with poor biosecurity farming
- Culling without compensation
- Control without vaccination
- Lack of public participation in controlling disease
- Lack of Transparency
- Growing number of poultry raising farms with poor biosecurity
- Duck plays as an AI reservoir
- Failure to base disease control measure on socioeconomic impact assessment
- Cross-Border trade
- Budgetary needs
- Inadequate skilled trained staff

Laboratory Diagnosis



Capacities	Yangon	Mandalay	Taungyi	Pathein	4 Quarantine Labs:
M &Rapid test Kit	Yes	Yes	Yes	Yes	Yes
Biosafety Cabinet Class II	Yes	Yes	Yes	Yes	No
Serology (HA, HI,)	Yes	Yes	Yes	Yes	Yes
Serology (ELISA, IPMA)	Yes	Yes	No	No	No
Virus Isolation	Yes	Yes	No	No	No
Conventional PCR	Yes	Yes	No	No	No
Real Time PCR	Yes	Yes	No	No	No
Gene Sequencer	Yes	No	No	No	No

Laboratory Services (Issues& Challenges)

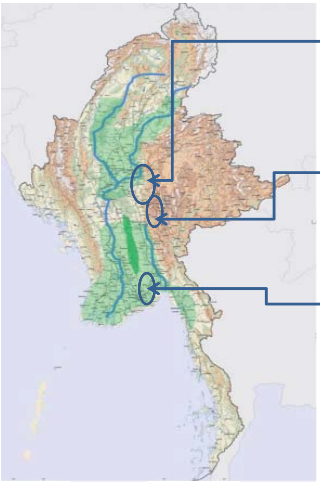
- Needs to improve sample submission
- Needs to improve National Laboratory Network
- Already established SOPs for AI differential diagnosis
- Depending on external sources
- Maintaining skill staff
- Maintaining the skill base and applying generic technologies to new diseases
- National laboratory system needs strong link to poultry sector
- Need to maintain Domestic QA/QC system
- Needs to upgrade lab quality management system and Proficiency testing
- Not yet accredited to ISO 17025 for AI diagnosis
- Need laboratory strategic Planning
- Thanks FAO for providing certifying Biosafety Cabinets

H7N9 Activities

Activities on Preparedness and Response for Avian Influenza 2013 & 2014

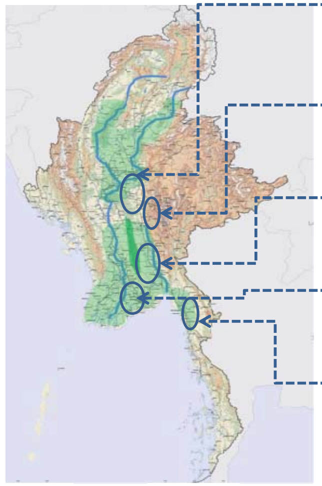
Present Project(OSRO/MYA/702/USA) Phase VII

Community Based Poultry Disease Surveillance



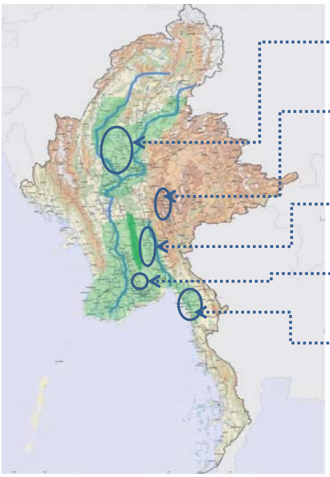
- 5 Risk Townships in Mandalay Region (Feb 2013 to May 2014)
- 2 Risk Townships in Shan State (December 2013 to March 2014)
- 3 Risk Townships in Yangon Region (December 2013 to March 2014)

CAHW Training



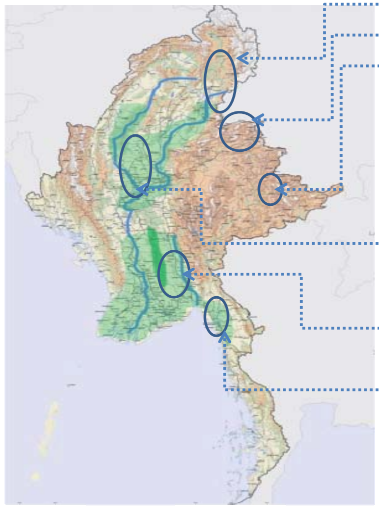
- 5 Risk Townships in Mandalay Region 59 CAHWs
- 2 Risk Townships in Shan State – 30 CAHWs
- 2 Risk Townships in Bago Region – 40 CAHWS
- 3 Risk Townships in Yangon Region – 45 CAHWs
- 2 Risk Townships in Mon State – 43 CAHWs

Awareness Meeting, Biosecurity Training for Stakeholders



- 7 Livestock Zones in Sagaing Region
- 1 Livestock Zone & 1 Chicken Raising Village in Shan State
- 2 Townships in Bago Region
- 1 Livestock Zone in Yangon Region
- 2 Townships in Mon State

Poultry Products Value Chain Study



- **3 townships in Kachin State**
- **7 townships in Shan North**
- **2 townships in Shan East**

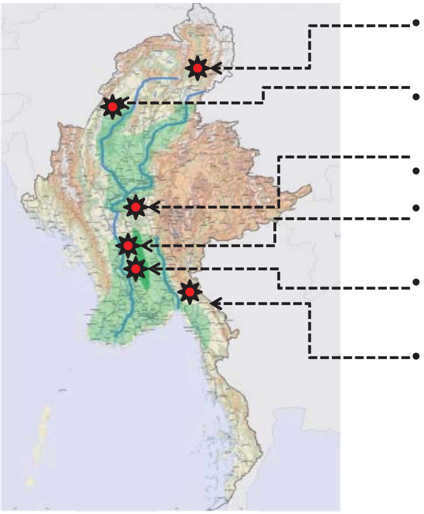
For H7N9 Risk Assessment

- **7 townships in Sagaing Region**
- **2 townships in Bago Region**
- **2 townships in Mon State**

Avian Influenza Risk Assessment

CAHW Training on Community Based Poultry Disease Surveillance and Awareness Meeting on Avian Influenza Prevention and Control

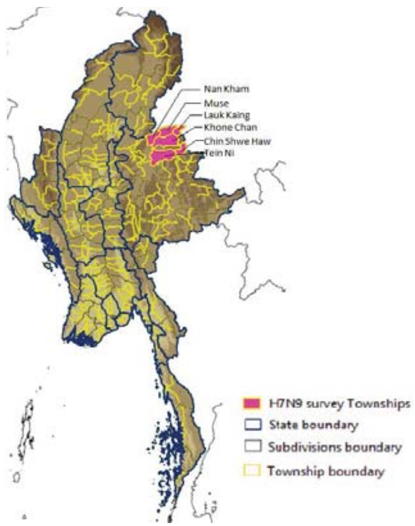
Future Activities for October – December 2014



H7N9 Surveillance in Myanmar

- Emergency Surveillance of H7N9 (May & July 2013) **(1st Round)**
- Risk Based H7N9 Surveillance (December 2013 to February 2014) **(2nd Round)**
- Risk Based H7N9 Surveillance for Preparedness and Response (July to September 2014) **(3rd Round)**

Emergency Surveillance of H7N9 (May & July 2013) (1st Round)



Township	n	Flu A	H7
Nam Kham	80	16%	0%
Muse	100	48%	0%
Laukkai	154	16%	0%
Kone Chan	82	7%	0%
Chin Shwe Haw	80	50%	0%
Theinni	14	7%	0%
Total	**510**	**26%**	**0%**

Emergency Surveillance of H7N9 (May & July 2013) (1st Round)

Surveillance Area	Total tested	Flu A detected	% Flu A	H7
Yangon LBM	854	120	14%	0
Mandalay LBM	1010	120	11.9%	0
Total	**1864**	**240**	**12.9%**	**0**

Emergency Risk Based Surveillance December 2013 to February 2014 (2nd Round)

LBM

Yangon LBM

- Mingalartaungnynut
- Kyimyindine
- Hlaingtharyar

Mandalay LBM

- Bone Ooh, Amarapura
- Taung Myint, Pyigyitagun
- Taungpyone, Madaya

Collecting Points, Entry Points

Shan State (North)

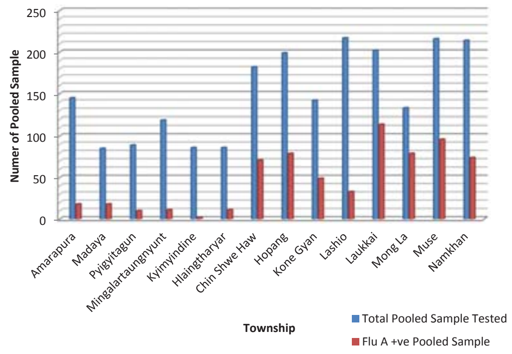
- 7 townships

Shan State (East)

- 1 Township

Emergency Risk Based SurveillanceDecember 2013 to February 2014 (2nd Round)

Total Pooled Sample Tested and Flu A Detected by Township

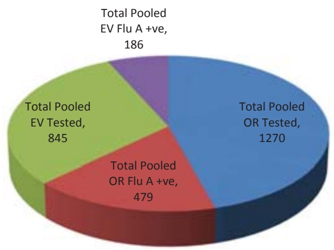


Township	Total Pooled Sample Tested	Flu A +ve Pooled Sample	Total Flu A +ve %
Amarapura	145	18	12.40%
Madaya	85	18	21.20%
Pyigyitagun	89	10	11.20%
Mingalartau ngnyunt	119	11	9.20%
Kyimyindine	86	2	2.30%
Hlaingtharya r	86	11	12.80%
Chin Shwe Haw	182	71	39%
Hopang	199	79	39.70%
Kone Gyan	142	49	34.50%
Lashio	217	33	15.20%
Laukkai	202	114	56.40%
Mong La	133	79	59.40%
Muse	216	96	44.40%
Namkhan	214	74	34.60%

Emergency Risk Based Surveillance December 2013 to February 2014 (2nd Round)

Total Pooled OR Tested	**1270**
Total OR Flu A +ve	479
Pooled OR % Flu A +ve	37.7%
Total Pooled EV Tested	845
Total EV Flu A +ve	186
Pooled EV % Flu A +ve	22%

Graph Show Pooled Oropharyngeal and Environment Sample Tested and Flu A Detected



Emergency Risk Based Surveillance December 2013 to February 2014 (2nd Round)
Comparison between Influenza A Detected Oropharyngeal and Environment Sample in Different Township

Township	Total Flu A +ve %	Pooled OR Flu A +ve %	Pooled EV Flu A +ve %
Amarapura LBM	12.40%	14.8%	5%
Madaya LBM	21.20%	16%	28.6%
Pyigyitagun LBM	11.20%	9%	14.3%
Mingalartaungnyunt LBM	9.20%	6%	12.7%
Kyimyindine LBM	2.30%	2%	2.8%
Hlaingtharyar LBM	12.80%	9%	18.8%
Chin Shwe Haw	39%	33%	48%
Hopang	39.70%	50.8%	20.5%
Kone Gyan	34.50%	47.2%	11.8%
Lashio	15.20%	12%	18.8%
Laukkai	56.40%	76%	21.6%
Mong La	59.40%	63%	48.6%
Muse	44.40%	57%	31.5%
Namkhan	34.60%	55%	13.3%

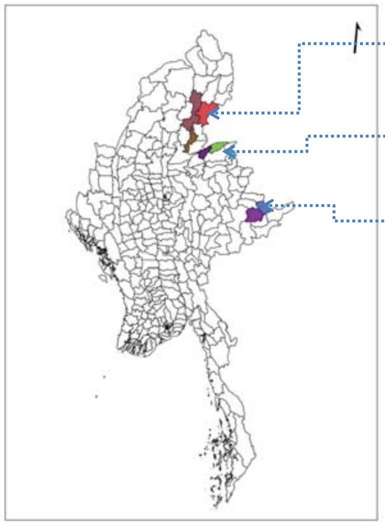
Emergency Risk Based Surveillance December 2013 to February 2014 (2nd Round)

No Detection of H7 Virus from Influenza A Detected Pooled Sample

Emergency Risk Based Surveillance December 2013 to February 2014 (2nd Round) Sera Collected and Antibody Detected in Different Surveillance Township

Township	Number_Sera_Tested	Number of Sera H7 Antibody Detected	% of H7 Antibody Detected
Chin Shwe Haw	180	4	0.60%
Hopang	200	16	8%
Kone Gyan	146	1	0.70%
Lashio	180	0	
Laukkai	188	12	6.40%
Mong La	123	0	
Muse	180	0	
Namkhan	180	1	0.60%
Amarapura LBM	90	0	
Pyigyitagun LBM	90	0	
Madaya LBM	90	0	
Mingalartaungnyunt LBM	182	1	0.50%
Kyimyindine LBM	90	0	
Hlaingtharyar LBM	90	0	
Total	**2009**	**35**	**1.7%**

Risk Based H7N9 Surveillance for Preparedness and Response (3rd Round) (July to September 2014) (Ongoing Activities)



- Kachin State – Myitkyina, Wine Maw & Ban Maw
- Shan North – Muse, Namkhan, Laukkai & Chin Shwe Haw
- Shan East – Kyaing Tong & Mong La

Sample Size of Risk Based H7N9 Surveillance for Preparedness and Response (3rd Round) (July to September 2014) (Ongoing Activities)

State	Township	Number of Sampling Site	Number of Round (21 days interval)	Number of OR per round per location	Number of EV per round per location	Number of OR per round for 3 location	Number of OR 3 round for 3 location	Number of EV per round for 3 location	Number of EV 3 round for 3 location
Shan (North)	Muse	3	3	70	50	210	630	150	450
Shan (North)	Mnamkhan	3	3	35	25	105	315	75	225
Shan (North)	Laukkai	3	3	70	50	210	630	150	450
Shan (North)	Chin Shwe Haw	3	3	35	25	105	315	75	225
Kachin	Myitkyina	3	3	35	25	105	315	75	225
Kachin	Wine Mae	3	3	35	25	105	315	75	225
Kachin	Ban Maw	3	3	35	25	105	315	75	225
Shan (East)	Mong La	3	3	35	25	105	315	75	225
Shan (East)	Kyaing Tong	3	3	35	25	105	315	75	225
Total				**385**	**275**	**1155**	**3465**	**825**	**2475**

Risk Based H7N9 Surveillance for Preparedness and Response (3rd Round) (July to September 2014) (Ongoing Activities)

- **Sample tested and Lab result (1st Time)**

Laboratory	Pooled Oropharyngeal OR Swab Tested	Flu A Detected OR	Pooled Environment Sample Tested	Flu A Detected EV	Total Pooled Sample Tested	Total Flu A Detected Pooled Sample	H7 Detected Pooled Sample
Mandalay	189	56	134	25	323	81	0
Yangon	42	5	30	7	72	12	0
Total	**231**	**61**	**164**	**32**	**395**	**93**	**0**

Activities on Preparedness and Response H7N9 (Ongoing Activities)

Advocacy Meeting

State & District Level – Kyaing Tong & Muse (Shan State)
Myitkyina (Kachin State)
Township Level – *9 townships* in Kachin State and Shan State

Table Top Exercise for Rapid Response

State & District Level – Kyaing Tong & Muse (Shan State)
Myitkyina (Kachin State)
Township Level – *9 townships* in Kachin State and Shan State

Training on Cleaning and Disinfection in the Market

State & District Level – Kyaing Tong & Muse (Shan State)
Myitkyina (Kachin State)
Township Level – *9 townships* in Kachin State and Shan State

Jointly Developing National Contingency Plan for H7N9 (MLFRD, MoH)

Future Programme

- PREVENT/EPT USAID/AusAID
- Improve Farmers Livelihoods - LIFT/UNDP

Thank you for your attention

Regional Overview of the implementation of National Control Strategies for Avian Influenza

Summary review of questionnaire
OIE RRAP

The OIE Questionnaire on Influenza A surveillance in animals in the Asia Pacific Region

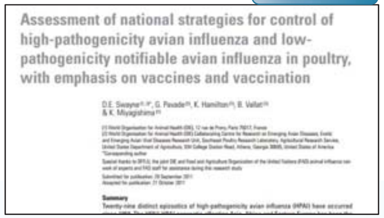
2009


OFFLU review of avian influenza surveillance and epidemiological projects in some European, African, and Asian countries

Gounalan Pavade, Laure Weber-Vintzel, Keith Hamilton, Alain Dehove, Cristóbal Zepeda

Summary

2010


Assessment of national strategies for control of high-pathogenicity avian influenza and low-pathogenicity notifiable avian influenza in poultry, with emphasis on vaccines and vaccination

2014


OIE/JTF Project for controlling zoonoses in Asia under One Health Concept

Influenza A surveillance in animals in the Asia Pacific Region

Country:

Reporting officer:

1. General Information

1) National Control Strategy for controlling influenza A viruses

The information is being requested as a supporting document for the implementation of activities under the OIE/JTF Project for Controlling Zoonoses in Asia under One Health Concept (2013-2018)

Requested Member countries

Twenty Member countries in the Asia Pacific Region

- Influenza Endemic
- with reported cases of Influenza outbreaks during 2009–2014
- Regional Importance

Country	2009	2010	2011	2012	2013	2014
Australia				H7N7	H7N7, H7N2	H7N1
Bangladesh	H5N1	H5N1	H5N1	H5N1	H5N1	
Bhutan		H5N1		H5N1	H5N1	
Cambodia	H5N1	H5N1	H5N1	H5N1	H5N1	H5N1
China P.R.	H5N1	H5N1	H5N1	H5N1	H5N1, H5N2	H5N1, H5N2, H5N6
Chinese Taipei				H5N2, H5N1	H5N2	H5N2
Hong Kong	H5N1	H5N1	H5N1	H5N1	H5N1	
India	H5N1	H5N1	H5N1	H5N1	H5N1	H5N1
Indonesia			H5N1			
Iran			H5N1	H5N1		
Japan	H5N1	H5N1	H5N1			
Korea DPR					H5N1	
Korea R.O.		H5N1	H5N1			H5N8
Laos	H5N1	H5N1				H5N6
Malaysia						
Mongolia	H5N1	H5	H5N1			
Myanmar		H5N1	H5N1	H5N1		
Nepal	H5N1	H5N1	H5N1	H5N1	H5N1	H5N1
Philippines						
Thailand	H5N1					
Vietnam	H5N1	H5N1	H5N1	H5N1	H5N1	H5N1, H5N6

Part 1

General Information (for all countries)

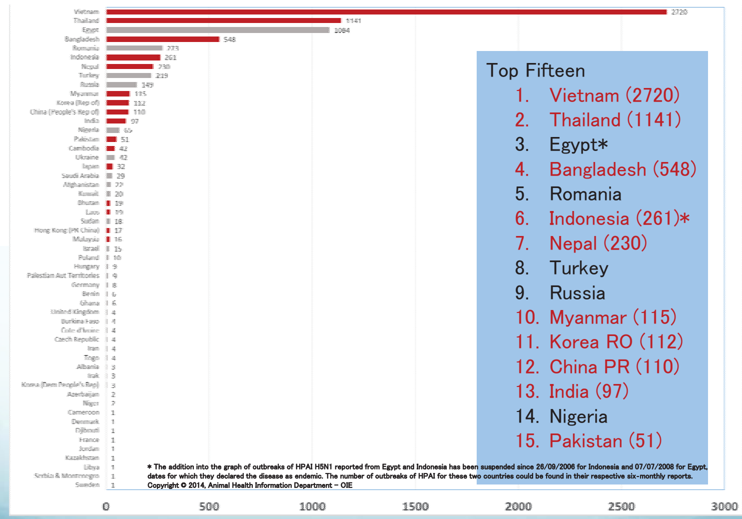
1. National control strategy
2. Surveillance programme
3. Subtype of virus screened for each species
4. Type of surveillance programme by species
5. Number of samples collected and tested each year (2010-2013)
6. Laboratory capacity
7. List of National laboratory(ies) for the diagnosis of influenza viruses in animals
8. Ongoing and future projects/programme
9. Lessons learned/constraints
10. Areas in need, to be supported by OIE/JTF Project
11. Other issues

Part 2

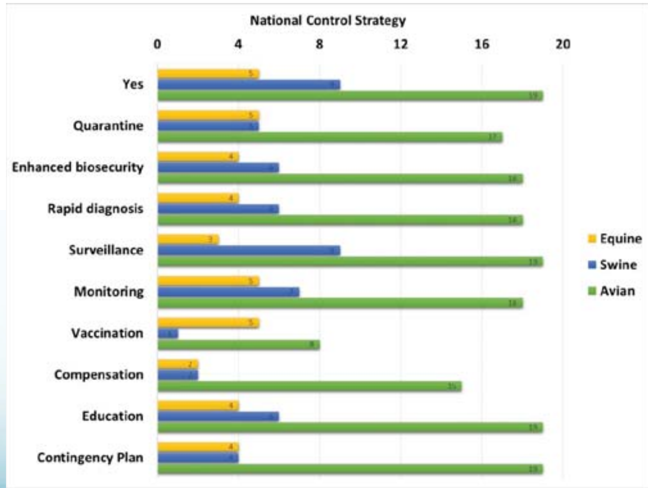
Vaccination against avian influenza (for the countries applying/going to apply vaccination to prevent and control of avian influenza)

- ✓ Five vaccine specific questions
- ✓ Constraints/lessons learned
- ✓ Plan for next 5 years including criteria to stop AI vaccination (exit strategy, if any)

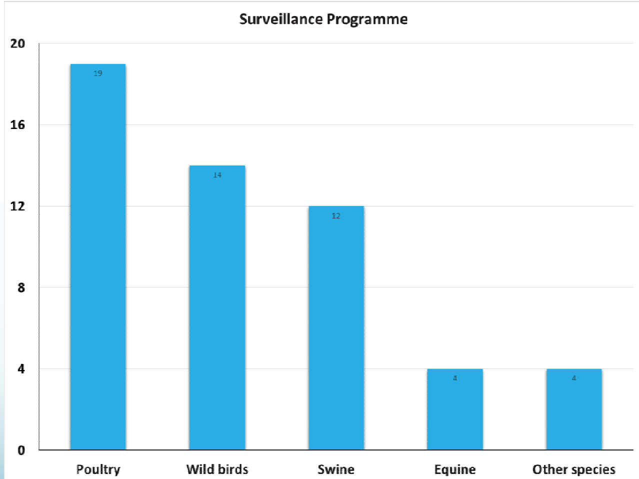
Influenza outbreaks history (2003 – 17 July 2014)



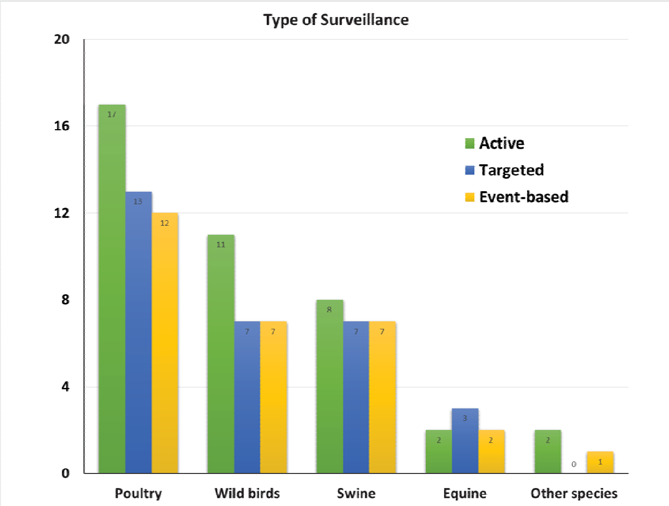
1.1. National control strategy for influenza A viruses



1.2. National surveillance programme for influenza A in animals (2010-2014)



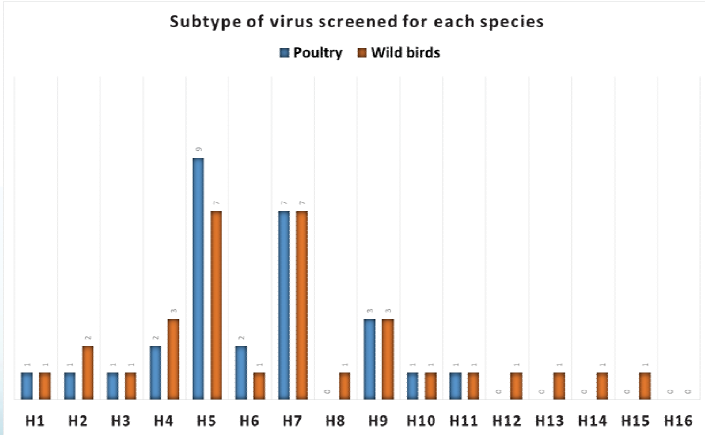
1.4. Type of surveillance programme followed for each species



1.3. Subtype of virus screened for each species

Out of 12 countries

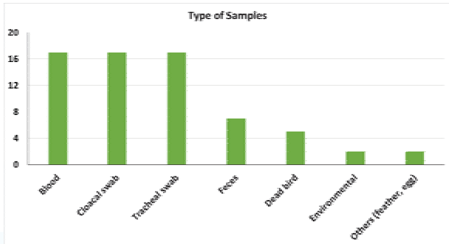
Seven countries screen all influenza A subtypes in poultry and wild birds



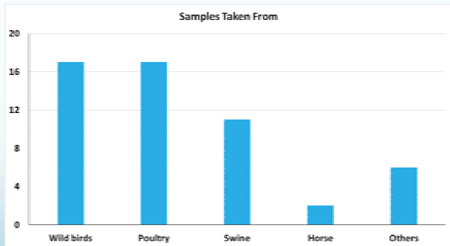
1.3. Subtype of virus screened for each species

	All subtypes	Selected subtypes	None
Swine	4	6	9
Equine	1	2	16
Other Species	1	3	15

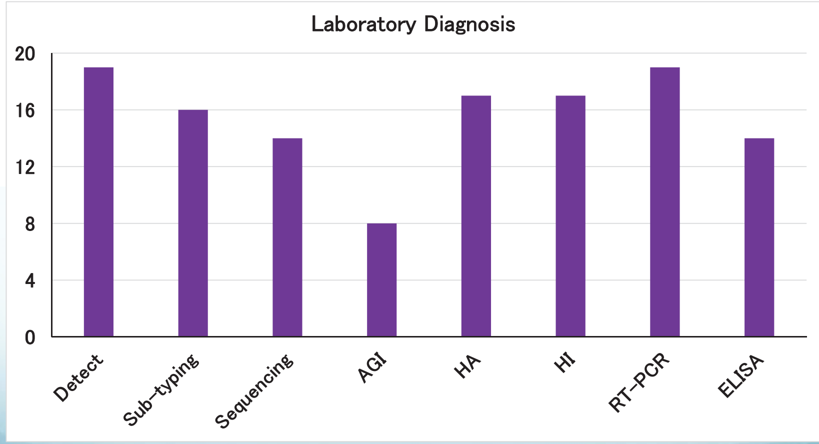
1.5. Samples collected and tested



Sample numbers varies among countries from year to year



1.6. Laboratory diagnosis



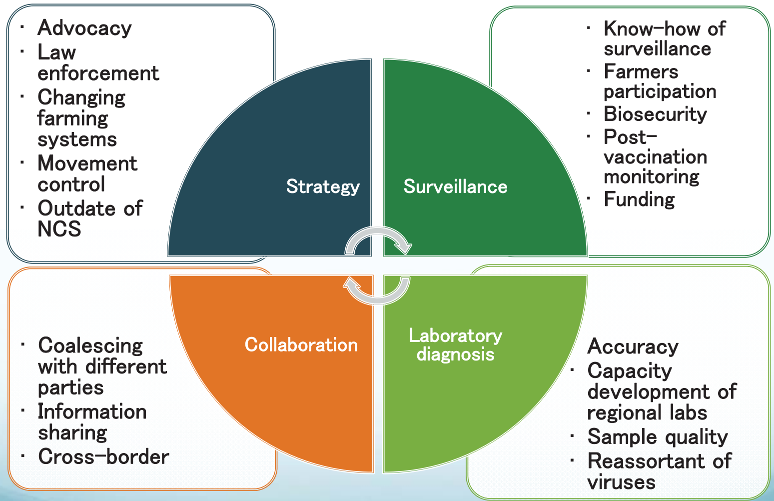
1.7. National and regional laboratory for the diagnosis of influenza viruses in animals

- Australia, China, India and Japan has OIE RL
- All Members have National Lab
- Some members also have Regional Lab

1.8. Ongoing and future projects/programmes

- International Support, mainly by USAID
- National Support

Lessons Learnt



Summary of Part 1

- Every Member Countries has National Control Strategy for Avian Influenza
- Surveillance programmes are mainly implemented for poultry and wild birds
- Every Member Countries has capacity to diagnose AI viruses and can screen at least one influenza virus subtype
- Most of the AI control activities are funded by international organisations, e.g. USAID
- Number of gaps are still to be filled

OIE Regional Workshop on Enhancing Influenza Viruses National Surveillance Systems, Tokyo, 26-28 August 2014

Part 2

Vaccination against avian influenza (for the countries applying/going to apply vaccination to prevent and control of avian influenza)

- ✓ Five vaccine specific questions
- ✓ Constraints/lessons learned
- ✓ Plan for next 5 years including criteria to stop AI vaccination (exit strategy, if any)

Nine Members provided the information (Australia, Bangladesh, China, Chinese Taipei, Indonesia, Hong Kong, Japan, Mongolia, Vietnam)

Vaccination against avian influenza

Vaccination Policy	
Mass vaccination	2
Targeted vaccination	3
Field trial	0
Others	4

Vaccine	
Imported	4
Locally Produced	4
Provided by donors	0
Vector vaccines	2
Inactivated vaccine	5
Other	1

Chinese Taipei
Prohibited

Mongolia
Stop vaccination

Australia
Retains the option to use vaccine in any future outbreak that cannot be contained by other measures

Japan
AI vaccination is basically prohibited. Only emergency targeted vaccination is allowed.

Mass vaccination and Targeted Vaccination

	Mass Vaccination (China and Hong Kong)	Targeted Vaccination (Bangladesh, China, Hong Kong, Vietnam)
For disease control	1	3
For disease prevention	2	3
For vaccine trial	0	0
Commercial farms	2	4
Backyard farms	2	1
Gallinaceous poultry	2	2
Ducks	1	3
Others	1	1

Post vaccination monitoring

	Bangladesh	China	Indonesia	Hong Kong	Vietnam
Clinical		✓	✓	✓	
Virological	✓	✓	✓	✓	
Serological	✓	✓	✓	✓	✓
Vaccinated flocks	✓	✓	✓		✓
Vaccinated Flocks and others			✓	✓	
Commercial farms	✓	✓	✓	✓	
Backyard farms		✓		✓	
LBMs		✓		✓	
Gallinaceous poultry		✓	✓	✓	
Ducks		✓	✓		
Others		✓		✓	

Constraint/lessons learned

- Lack of knowledge and awareness on handling vaccine, cold chain vaccine management and proper technique of vaccination
- Reduced vaccine efficiency due to mutation in viral genome
- Lack of monitoring antibody post vaccination
- Farmers participation and willingness to vaccinate their flock is low
- Risk assessment for food safety of vaccinated poultry meat has not been performed
- etc……

Plan for next 5 years

- Australia will continue to work to ensure that vaccine is available if required for a control programme
- China will continuing perform the compulsory vaccination in the poultry
- Indonesia: exit strategy to stop vaccination is implemented gradually and geographically, start from sporadic area/low risk area or free zone
- Hong Kong: constant monitoring of viral genome sequence in order to rapidly pick up the emergence of new mutations, which may lead to reduction in the efficiency of current vaccines

Summary 2

- Five Member Countries apply the vaccination as a part of national control strategy
- Vaccination is applied mainly to commercial farms
- Vaccines are imported or locally produced
- Post vaccination monitoring is in place
- Some countries has plan for exist strategy by increasing influenza free zones

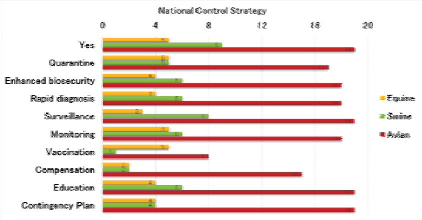
Overall summary

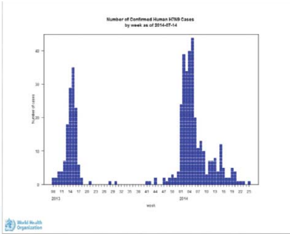
- National control strategy exists
- Surveillance programme is implemented mainly in poultry and wild birds
- Every Member Country has National Laboratory for diagnosis of avian influenza
- Vaccination is applied in some countries with post vaccination monitoring plan

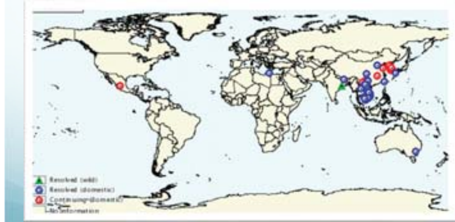
BUT

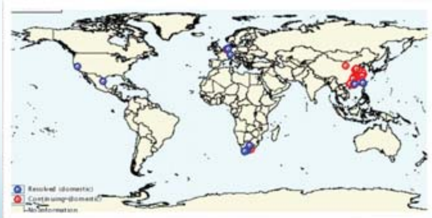
- Influenza outbreaks are still reported

Our next step??









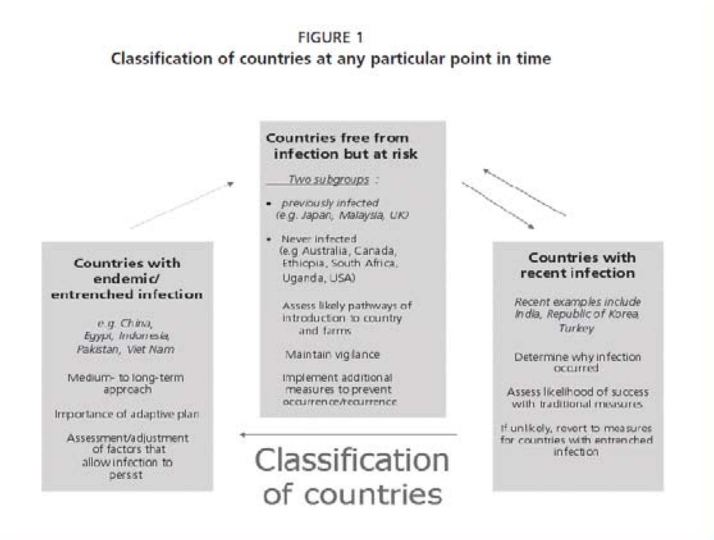
Principles for event-based and active avian influenza surveillance

Les Sims
Asia Pacific Veterinary Information Services
apvis@bigpond.net.au

Introduction

- No 'one size fits all' surveillance system for avian influenza (AI)
- But limited number of options
- Keep as simple as possible
- Lots of experiences to build on – examine what has worked/not worked and why

- Depends on:
- Strain of virus (e.g. H5N1 vs H7N9)
- Disease/infection situation (recent, endemic, free)
- Structure of poultry production and marketing systems (including major species – ducks vs turkeys vs chickens)
- Purposes of surveillance (often more than one)



Purposes

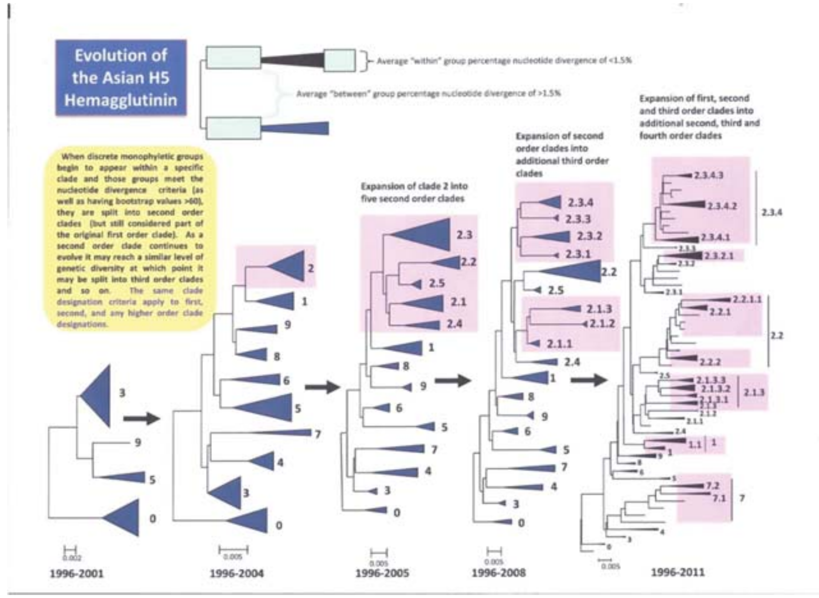
- Intelligence on emergence of new strains of virus
- Early detection of infection/disease
- Helping to determine effectiveness of control and prevention programs (including monitoring of immune status (vaccination))
- Disease elimination/eradication and demonstration of 'freedom'
- Detecting AI infection in mammals

Intelligence on new strains of virus

- Wild birds (dead and live)
- Markets
- Disease outbreaks

- Virus isolation
- Subtyping and gene sequencing

- Historical data available on successful programs to guide sampling strategy



WHO 2011

Early detection of outbreaks or infection

- Set trigger points for investigations (event-based surveillance)
  - e.g. 2 or more poultry >2 wks of age in a household flock in 24 hours
  - 2% mortality in a commercial flock in birds >2 weeks of age in 24 hours
  - Human case of Influenza A(H7N9) associated with a farm or market

- Active surveillance for agents that don't cause disease (e.g. H7N9, H5N1 in ducks and potentially in markets)

- Dead birds in markets

- Disease outbreaks – virology
- H7N9 – primarily serology for farms, virology for markets

Effectiveness of control and prevention

- Demonstrating improvements
  - effects of 'rest days' in markets
  - reductions in the number of positive markets
- Regular standardised testing
  - Seasonal factors

- Cost effectiveness of surveillance (especially in countries where virus is endemic)

- Post-vaccination seromonitoring
  - HI test an imperfect measure of protection

Disease elimination

- Systematic and thorough
- Designed to detect infection as early as possible
- Must detect clinical and sub-clinical infections
- Currently beyond reach of countries with endemic H5N1 infection, but can do so in compartments

- Tests depend on agent but routine dead birds for virus detection are excellent samples for HPAI
- Serology for LPAI or for HPAI virus that does not cause disease

Demonstration of ‘freedom’

- Not possible on single set of samples from an individual flock
- Beware ‘false negatives’ due to sampling and limits of tests
- “Freedom” requires dossier of information

- Routine mortalities especially for HPAI
- Serology for viruses that do not kill the host

Detection in mammals

- Consider including tests for AI in routine surveillance for influenza in other species (especially pigs)
- Slaughterhouse samples – serum and swabs
- Often traceable
- H9N2 has been detected in the past in pigs
- Value of serum banks in the event of emergence of new strains

Serology vs Virus Detection

- Serology
- past exposure (>2 to 3 weeks previously)
- limited value for viruses with high case fatality ratio (e.g. H5N1 in chickens)
- smaller sample numbers needed per farm when testing healthy birds
- can require follow up especially if multiple strains of AI virus circulating
- tests cheaper than virus detection
- bleeding not welcomed in markets

Serology vs Virus Detection

- Virus detection
- limited window of shedding
- detects active infection
- usually larger number of samples required if testing ‘healthy’ birds
- more expensive
- pooling possible (use pooled sample calculator for result interpretation)
- relatively easy to take samples
- molecular techniques allow rapid turnaround
- rapid tests lower sensitivity but useful in outbreaks of HPAI

Sample numbers

- Depends on purpose but the lower the expected prevalence the larger the number of samples required
- Tools available to assist in calculating sample size (but based on random samples)
- Agent detection needs fewer samples than determining prevalence of agent in a population
- Often two stage sampling required (selection of premises and selection of birds to sample)

- Cost effectiveness – are there alternative ways to achieve the same result?
- Review program regularly to ensure it is providing the required results

Markets or farms for routine surveillance

- Depends on purpose
- Markets if amplification occurs along marketing pathways and in markets
- Not easy to trace from retail markets
- Markets changing (e.g. no overnight keeping)

- Farms for outbreaks and serology for LPAI viruses

- Slaughterhouse sampling for serology

Which species to test?

Records and analysis

- Importance of good record keeping
- sources of samples
- date of collection
- balance cost of collection of data with benefits
- ensure market traders keep good records

- Importance of data analysis and timely reporting

- Importance of ownership of results and involvement in planning of surveillance at local level

Samples from birds or environment?

- Advantages and disadvantages of both
- Environmental samples less traceable but may need fewer samples to demonstrate presence of virus - a form of targeting
- Dead birds, if available, always preferable especially for HPAI
- Birds at entry or after being in market for >24 hours – again depends on purpose

Targeted or random

- Depends on purpose
- Targeted used most frequently (e.g. H7N9 detection in uninfected countries)
- Species to test depends on the biology of the agent

Complications

- Lack of funds (need to keep demonstrating importance of surveillance to stakeholders)
- Non-compliance/cooperation
- Capacity (field and lab)
- Laboratory quality management systems
- Political interference

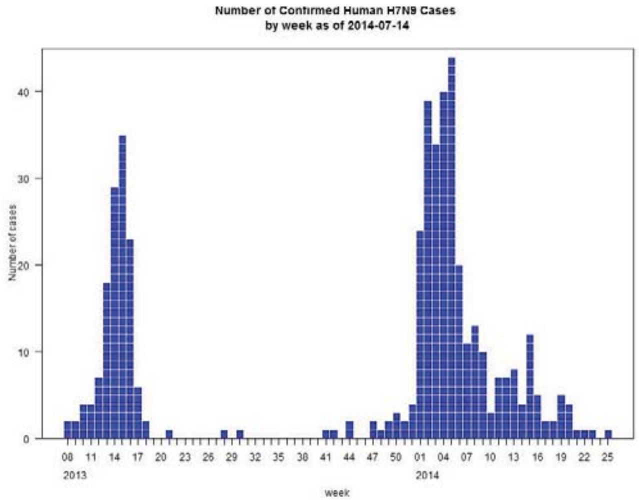
Questions still remain on best sampling strategies for H7N9

- Diverse views – depends on purpose of testing
- Are strategies for detecting H5N1 appropriate for H7N9 – systemic vs non-systemic infection?
- Environmental swabs vs swabs from birds – the former may be more sensitive
- Drains, chopping boards, drinking water, cage swabs – all have been positive but gaps in knowledge
- Appropriate numbers and sites not yet determined for H7N9 environmental samples
- Do environmental swabs result in detection of viable virus
- Beware certain disinfectants and market surveillance if using PCR (chlorine based disinfectants denature nucleic acid, some others don't)

Seasonal patterns

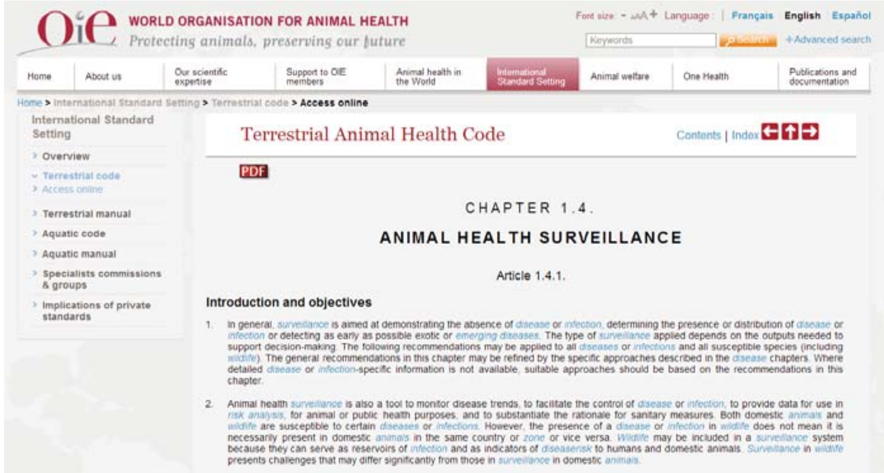
- Pepin et al (2013) demonstrate that influenza viruses do not all demonstrate typical seasonal patterns in southern China although official surveillance strongly suggests a winter peak for H5N1 viruses
- Still too early to make a call on H7N9 (winter peak and spring peak so far)
- Earlier results in Hong Kong demonstrate that markets can be infected in periods outside winter (e.g. May 2001 outbreak in markets)

Influenza A(H7N9)



WHO July 2014

Guidance is available



WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

Font size: - AA+ Language : | Français English Español

Keywords Search +Advanced search

Home | About us | Our scientific expertise | Support to OIE members | Animal health in the World | International Standard Setting | Animal welfare | One Health | Publications and documentation

Home > International Standard Setting > Terrestrial code > **Access online**

International Standard Setting
- Overview
- Terrestrial code
  - Access online
- Terrestrial manual
- Aquatic code
- Aquatic manual
- Specialists commissions & groups
- Implications of private standards

Terrestrial Animal Health Code

Contents | Index

PDF

CHAPTER 1.4.

ANIMAL HEALTH SURVEILLANCE

Article 1.4.1.

Introduction and objectives

1. In general, surveillance is aimed at demonstrating the absence of disease or infection, determining the presence or distribution of disease or infection or detecting as early as possible exotic or emerging diseases. The type of surveillance applied depends on the outputs needed to support decision-making. The following recommendations may be applied to all diseases or infections and all susceptible species (including wildlife). The general recommendations in this chapter may be refined by the specific approaches described in the disease chapters. Where detailed disease or infection-specific information is not available, suitable approaches should be based on the recommendations in this chapter.

2. Animal health surveillance is also a tool to monitor disease trends, to facilitate the control of disease or infection, to provide data for use in risk analysis, for animal or public health purposes, and to substantiate the rationale for sanitary measures. Both domestic animals and wildlife are susceptible to certain diseases or infections. However, the presence of a disease or infection in wildlife does not mean it is necessarily present in domestic animals in the same country or zone or vice versa. Wildlife may be included in a surveillance system because they can serve as reservoirs of infection and as indicators of diseaserisk to humans and domestic animals. Surveillance in wildlife presents challenges that may differ significantly from those in surveillance in domestic animals.

Guidance available

Method	Purpose					
	Population freedom from infection	Individual animal freedom from infection prior to movement	Contribute to eradication policies	Confirmation of clinical cases	Prevalence of infection – surveillance	Immune status in individual animals or populations post-vaccination
Agent identification[1]						
Virus isolation	+	+++	+	+++	+	–
Antigen detection	+	+	+	+	+	–
Real-time RT-PCR	++	+++	++	+++	++	–
Detection of immune response[2]						
AGID	+ (Influenza A)	+ (Influenza A)	++ (Influenza A)	+ (convalescent)	++ (Influenza A)	++ (Influenza A)

1 A combination of agent identification methods applied on the same clinical sample is recommended.
2 One of the listed serological tests is sufficient.

Guidance available

Method	Purpose					
	Population freedom from infection	Individual animal freedom from infection prior to movement	Contribute to eradication policies	Confirmation of clinical cases	Prevalence of infection – surveillance	Immune status in individual animals or populations post-vaccination
HI	+++ (H5 or H7)	++ (H5 or H7)	+++ (H5 or H7)	++ (convalescent)	+++ (H5 or H7	+++ (H5 or H7)
ELISA	+	+	++	+ (convalescent)	++	++

Key: +++ = recommended method; ++ = suitable method; + = may be used in some situations, but cost, reliability, or other factors severely limits its application; – = not appropriate for this purpose.
Although not all of the tests listed as category +++ or ++ have undergone formal validation, their routine nature and the fact that they have been used widely without dubious results, makes them acceptable.
RT-PCR = reverse-transcription polymerase chain reaction; AGID = agar gel immunodiffusion;

Fig. 1. *Schematic representation of laboratory tests for determining evidence of avian influenza infection through or following serological surveys*

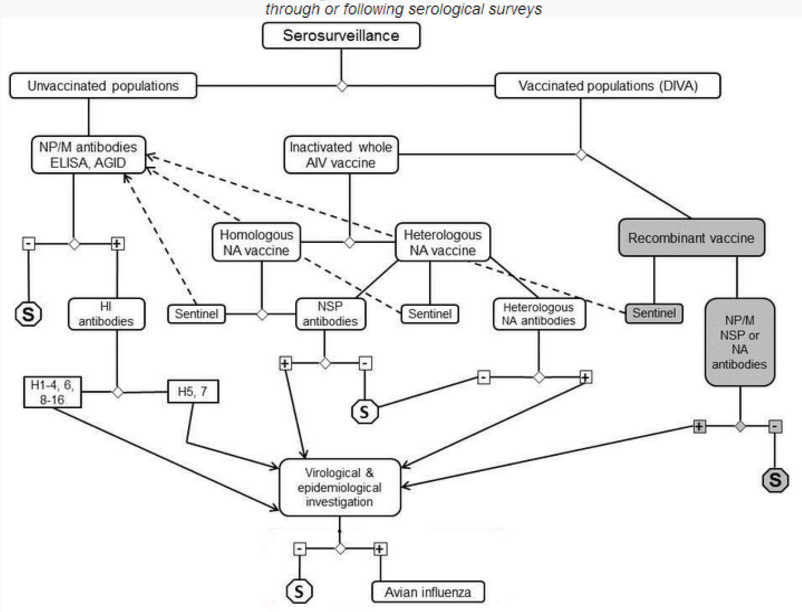
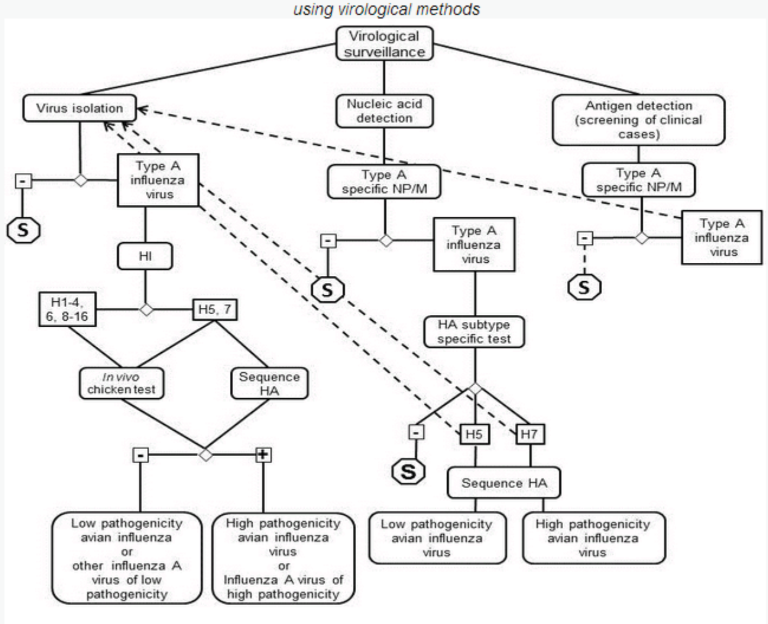
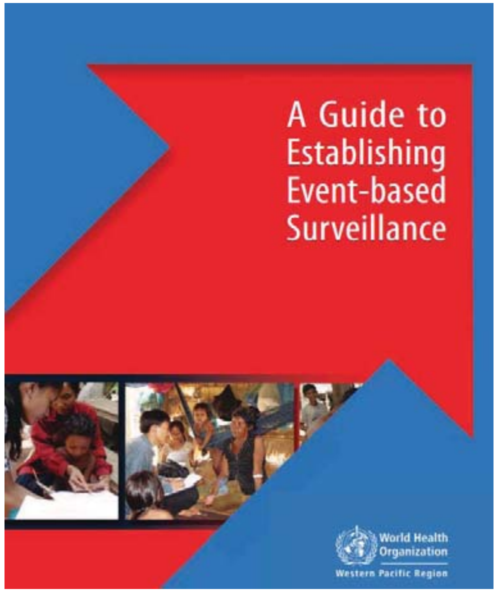


Fig. 2. *Schematic representation of laboratory tests for determining evidence of avian influenza infection using virological methods*





Event-based and active surveillance for avian influenza

Regional Workshop on Enhancing Influenza A viruses
National Surveillance Systems
Tokyo, Japan
August 28-28, 2014

Cristóbal Zepeda MVZ, MSc, PhD
International Animal Health Standards Services
USDA-APHIS-VS

Objectives of surveillance

- At the level of a country, zone or compartment
  - Detection of infection
  - Determine the presence or absence of AIV infection (disease freedom)
  - Determine the prevalence of AIV

Flexibility

- Avoid prescriptive recommendations
- Recognition of existence of different productions systems/mixes in different countries
  - Intensive, backyard, free-range
  - Single/multiple species
- Need for a flexible approach

Differences

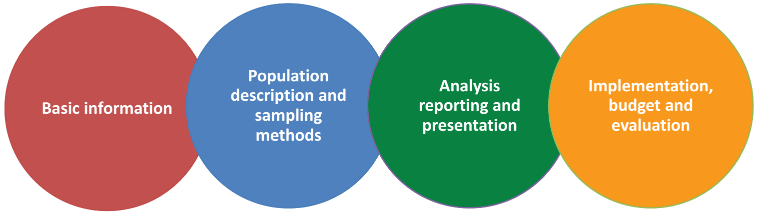
Surveillance

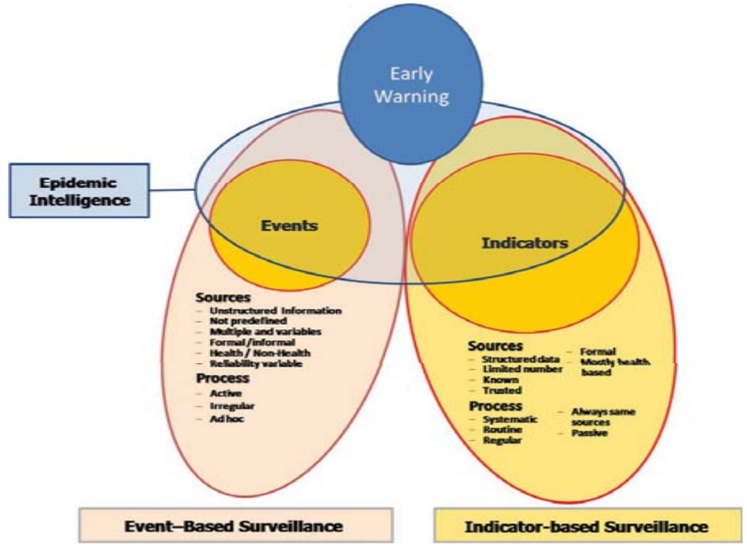
- Transforms data into information
- Implies an action
- Essential for diseases under a program

Monitoring

- Overview of disease occurrence
- Does not imply an action
- Basis for the development of a program

A comprehensive surveillance plan





WHO/HSE/GCR /2013 Technical consultation on event-based surveillance, Lyon 19-21 March, 2013

Indicator-based surveillance

- Systematic (regular) collection, monitoring and interpretation of structured data,
  - indicators produced by a limited number of well identified formal sources

Event-based surveillance

- Collection, monitoring and interpretation of unstructured ad hoc information
- Sources
  - Unstructured information
  - Not predefined
  - Health/Non-Health
  - Variable reliability

Examples

- Increased mortality
- Changes in patterns of disease
- Unexpected clusters of disease or syndromes
- Other health related events
  - Increased sales of veterinary drugs
  - Unexplained changes in price of animal products

Event-based surveillance

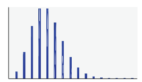
- The main hurdles are:
  - The large volume of information to be treated;
  - The amount human resources and expertise needed to carry out this task;
  - The significant level of duplication prevailing (main events are systematically monitored by several organizations);
  - The lack of international collaboration.

Indicator and Event-based surveillance

- EBS acts in complement to IBS
- The characteristics of the information collected differ:
  - IBS: structured, organized, regular
  - EBS: ad hoc, informal
- Sources of information which are shared by both systems

Case Definition

- **Cases** of disease can be measured (and defined) in many different ways
  - Mortality (caused by the disease)
  - Morbidity (illness) based on specific signs or severity of signs
  - Diagnostic test results e.g. antigen or antibody detection tests
  - Combinations of the above



Case definitions

- Individual level
  - Animal or bird level
- Population level
  - Flocks or herds
  - Building/house within a flock
  - Village

Example: Case definitions for AI

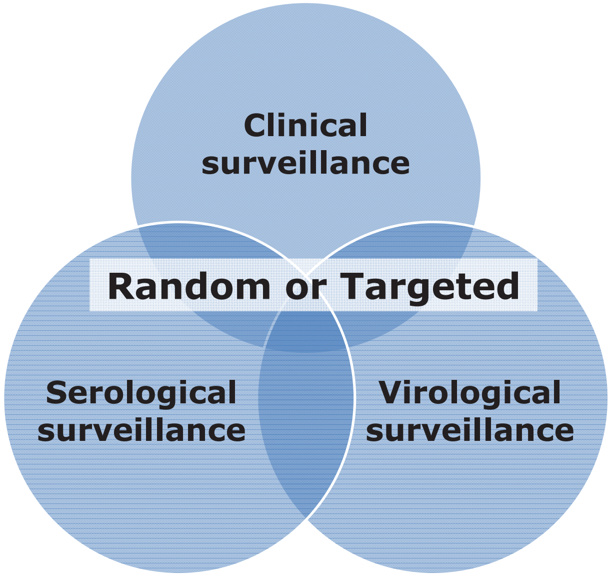
- Individual level?
- Population level?
- Different definitions maybe necessary for
  - Commercial poultry
  - Backyard poultry
  - Ducks
  - Wild birds

Case definitions

- Choice of diagnostic tests affects the **sensitivity** and **specificity** of the case definition
  - Some situations may need to emphasize sensitivity and other situations emphasize specificity

Confidence in disease freedom

- Scientifically impossible to demonstrate the absence of disease in absolute terms
- Sufficient confidence can be achieved through a combination of approaches



Two approaches

- Random surveillance
  - Statistically based surveys
  - Serological testing followed by virological methods for confirmation
- Targeted surveillance
  - Aimed at high risk groups
  - Serological and virological methods concurrently

Clinical surveillance

- Detection of clinical signs of NAI at the flock level
  - Important for HPNAI
  - Less important for LPNAI
- Strategies
  - Clinical followed by serological surveillance or
  - Serological followed by clinical surveillance

Virological surveillance

- Monitor at risk populations
- Confirm clinically suspect cases
- Follow up positive serological results
- Test ‵normal′ daily mortality, to ensure early detection of infection in the face of vaccination or in *establishments* epidemiologically linked to an *outbreak*

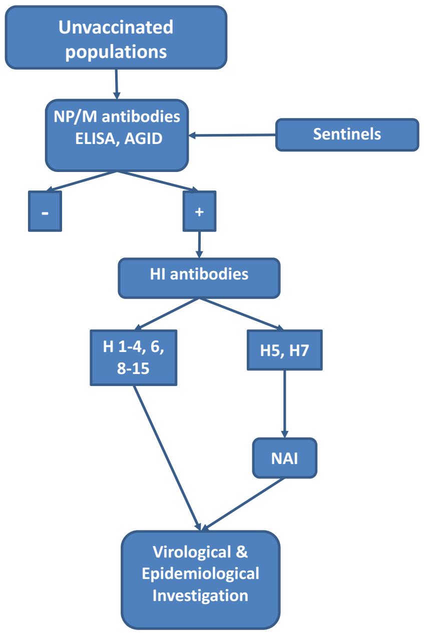
Serological surveillance

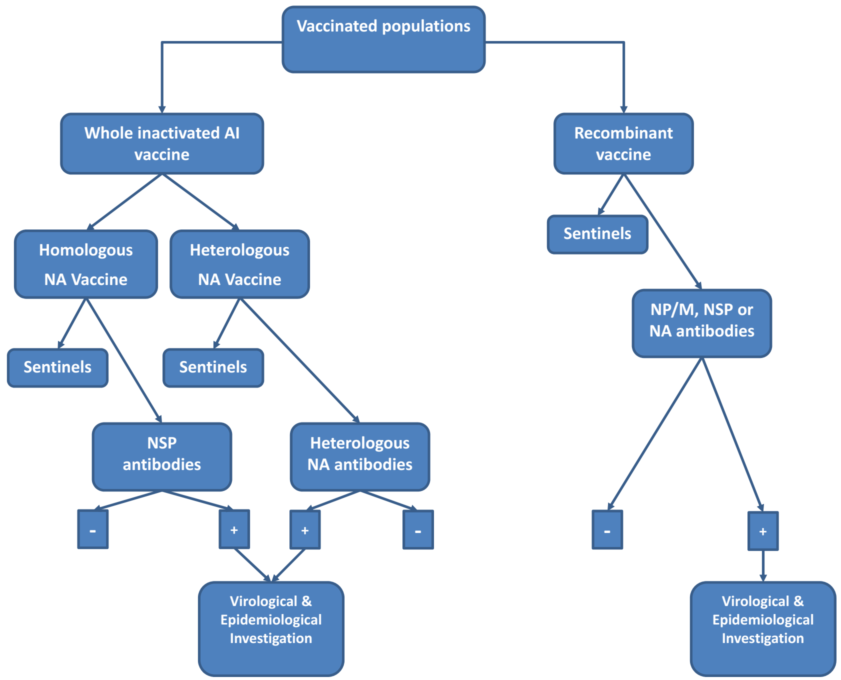
- Most useful in non-vaccinated flocks
- In vaccinated flocks a DIVA strategy and/or sentinels should be used
- Clustering of seropositive flocks should always be thoroughly investigated
  - Virological, serological and clinical methods

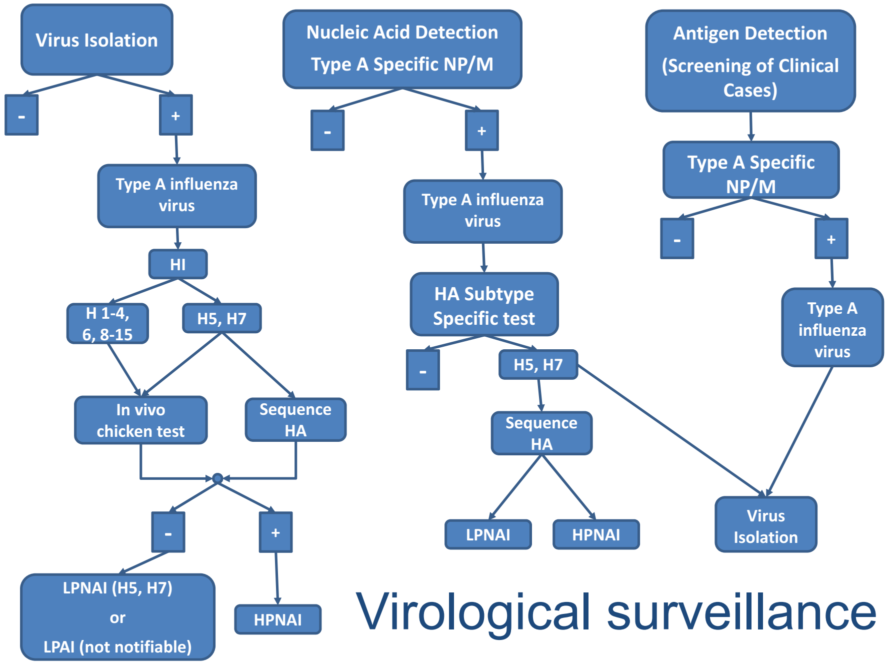
Vaccinated flocks

- Strategy dependent on the type of vaccine used
  - Inactivated whole AIV
  - Hemagglutinin expression-based vaccines
- DIVA
- Sentinel birds
  - Unvaccinated, permanently identifiable

Serological Surveillance







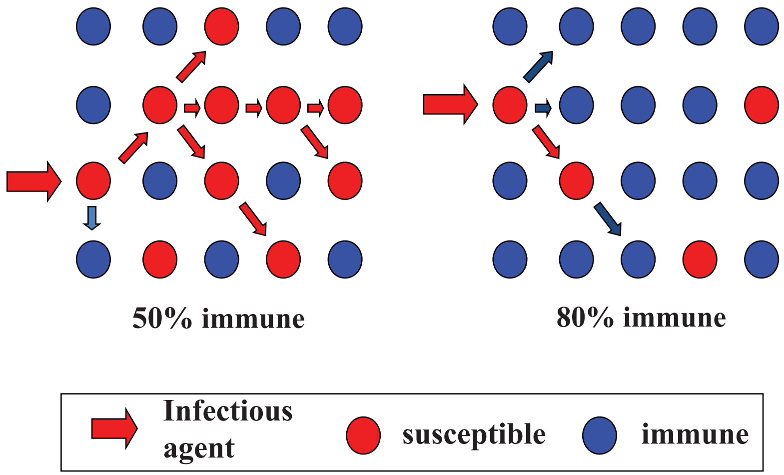
Virological surveillance

Random surveys

- Based on a random representative sample of the population
- Important tool to declare disease freedom
  - Not sufficient on their own
- Used to determine
  - Absence of infection
  - Prevalence
  - Immunity coverage

news.bbc.co.uk/

Population immunity



www.daylife.com/photo/08mzdtp5PMgVc www.nytimes.com/.../asia/15laos.html

Random surveys in disease freedom

- They are based on a detection threshold
  - Design prevalence
  - Commonly:
    - 1% at herd level
    - 5-10% at within-herd level

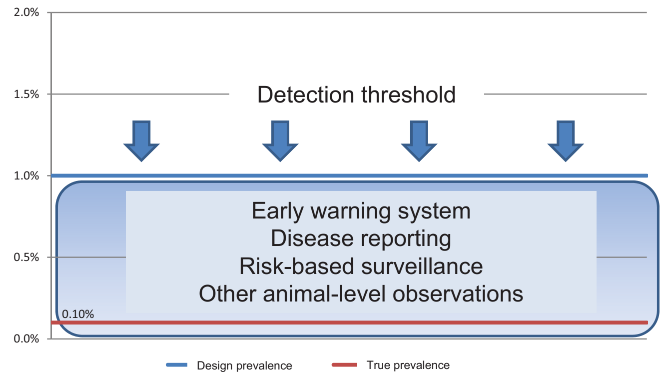
- Frequently, budget constraints limit the number of samples that can be collected

Random surveys in disease freedom

- Have important limitations when the prevalence is low and cases are clustered

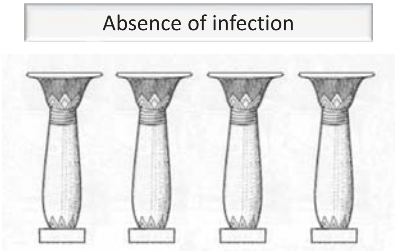
- What are the options?

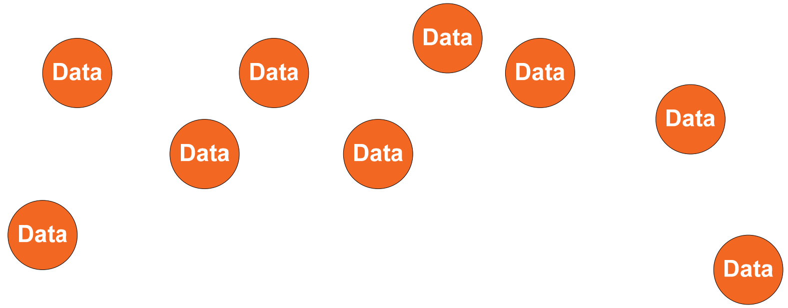
Random surveys in disease freedom



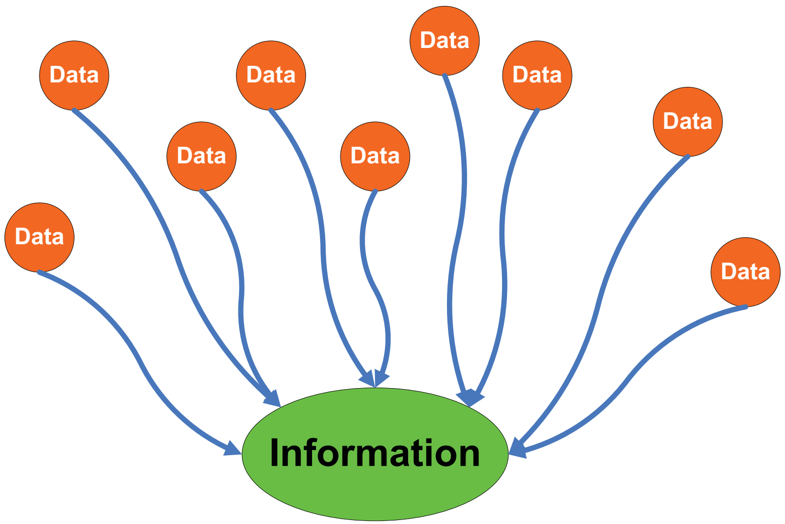
Four pillars

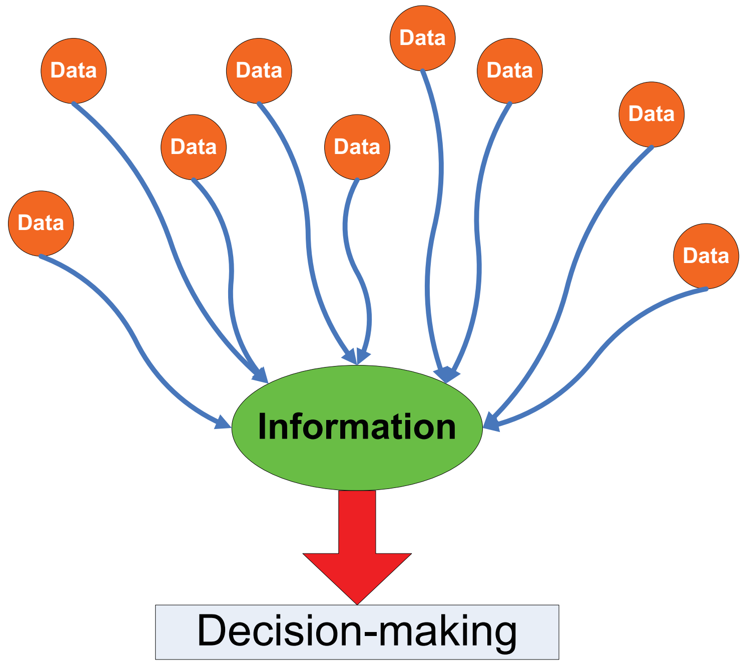
- Early warning system
  - Including event-based surveillance
- Disease reporting
- Risk based surveillance
- Other animal-level observations

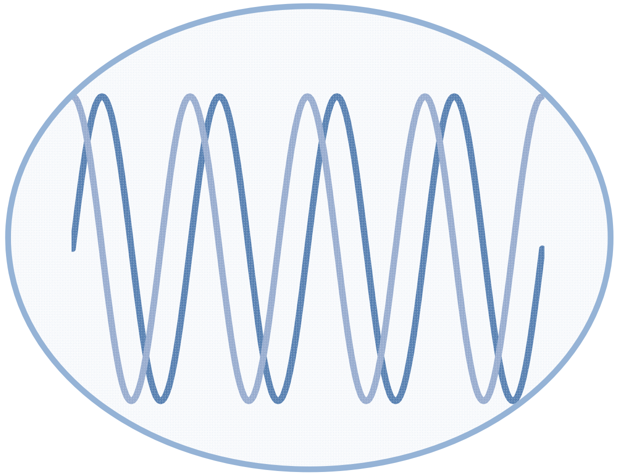




The role of epidemiology





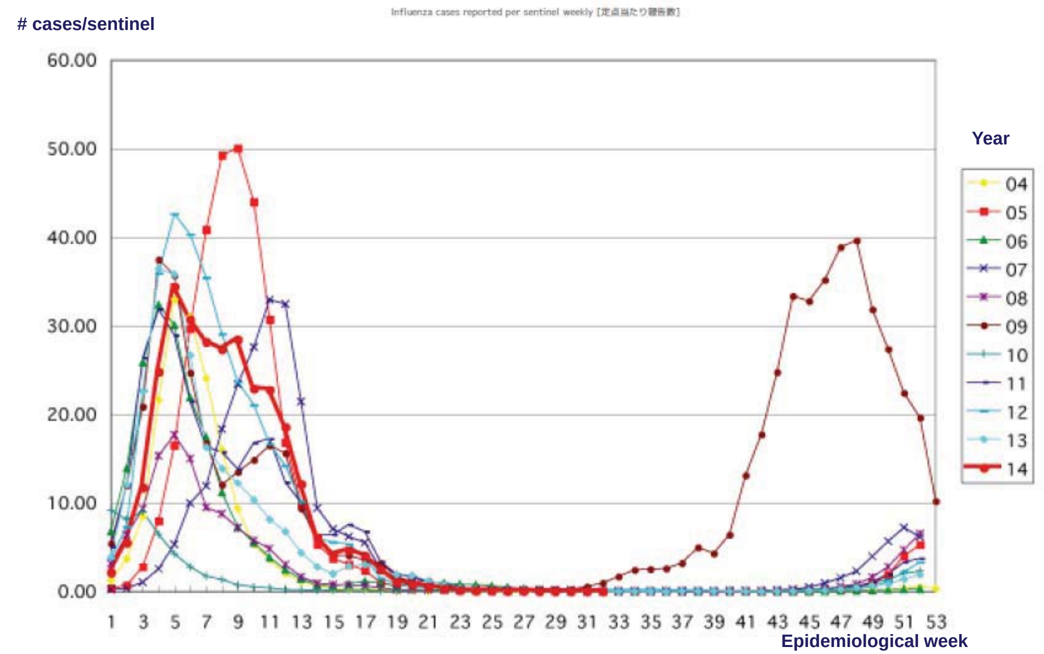


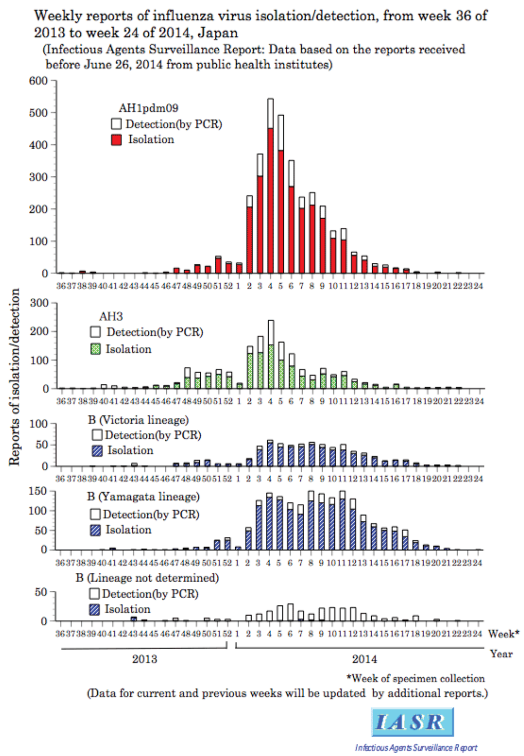
OIE Regional Workshop on Enhancing Influenza A viruses National Surveillance Systems
OIE/JTF Project for Controlling Zoonoses in Asia under One Health Concept
27 Aug 2014, Tokyo University

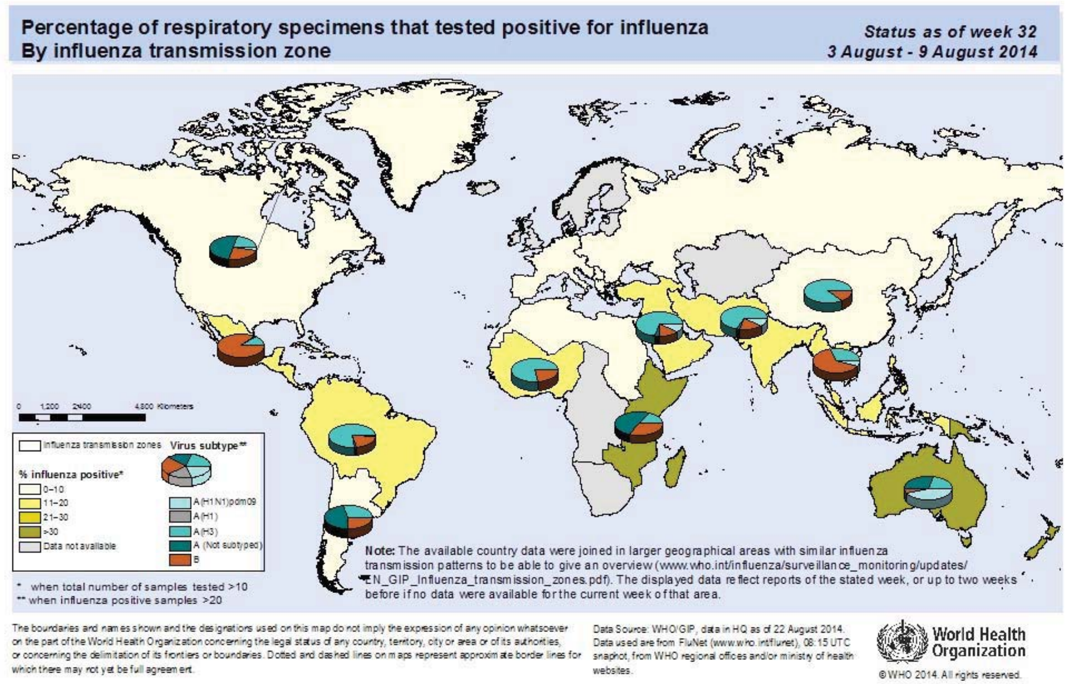
Avian Influenza A surveillance from One Health Perspective

Kazutoshi Nakashima, MD, PhD
Department of Clinical Laboratory
Department of Infectious Diseases
Tohoku University Hospital

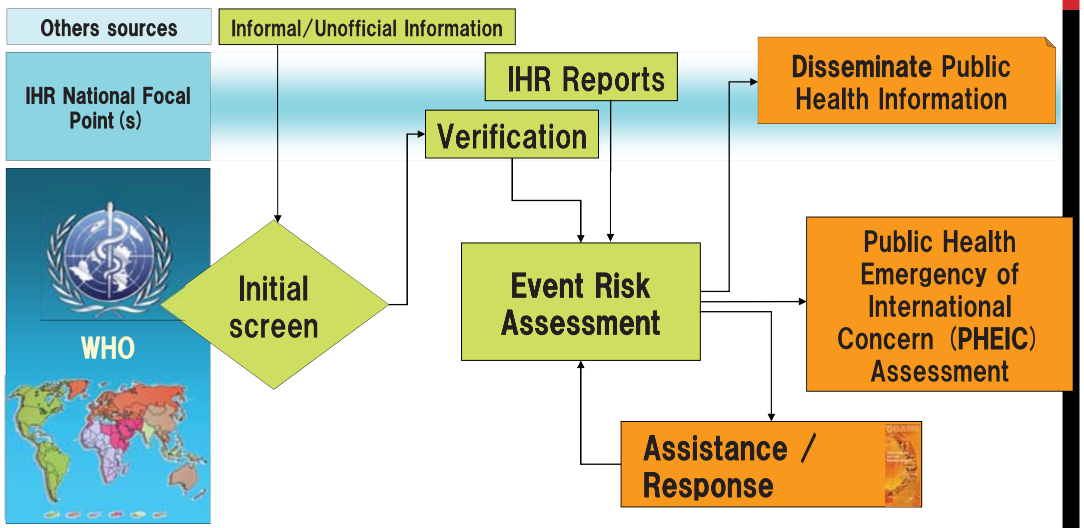
Influenza cases weekly reported per sentinel in Japan





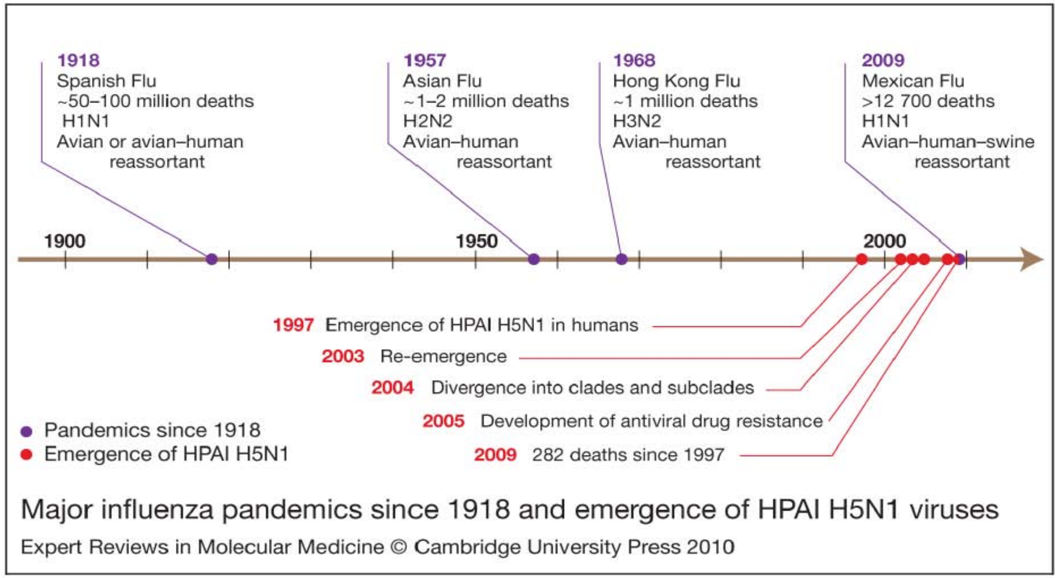


WHO's Outbreak management under IHR 2005: Epidemic Intelligence and Event-based Surveillance



Source: WHO

IMPACT OF PANDEMIC INFLUENZA



Singh, N, et.al, Expert Rev Mol Med 12: e14, 2011

EXPECTATIONS TO SURVEILLANCE FOR PANDEMIC PREPAREDNESS

To predict the emergence of pandemic influenza

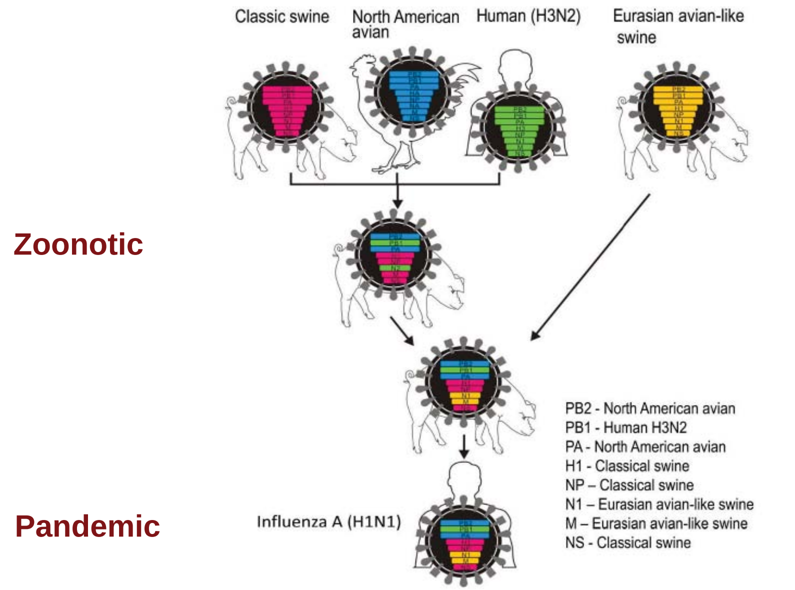
To assess the potential risk of pandemic influenza

To assess the severity of zoonotic/pandemic influenza

To prevent pandemic influenza

To prepare pandemic vaccine in advance/ ASAP when it happens

Genesis of swine-origin H1N1pdm influenza viruses



Neumann, G, et.al, Emergence and pandemic potential of swine-origin H1N1 influenza virus. Nature 18(459):931-939, 2009

Was there an omen of pandemic influenza A(H1N1)pdm?

DISPATCHES

Human Case of Swine Influenza A (H1N1) Triple Reassortant Virus Infection, Wisconsin

Alexandra P. Newman,[1] Erik Reisdorf, Jeanne Beinemann, Timothy M. Uyeki, Amanda Balish, Bo Shu, Stephen Lindstrom, Jenna Achenbach, Catherine Smith, and Jeffrey P. Davis

Zoonotic infections with swine influenza A viruses are reported sporadically. Triple reassortant swine influenza viruses have been isolated from pigs in the United States since 1998. We report a human case of upper respiratory illness associated with swine influenza A (H1N1) triple reassortant virus infection that occurred during 2005 following exposure to freshly killed pigs.

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 14, No. 9, September 2008

Triple-Reassortant Swine Influenza A (H1) in Humans in the United States, 2005–2009

Table 1. Demographic and Exposure Characteristics of 11 Patients Infected with Triple-Reassortant Swine Influenza A (H1) Viruses.

Patient No.	Age	Sex	State of Residence	Date of Illness Onset	Estimated Incubation Period	Exposure*	Ill Swine Present
1	17 yr	M	WI	Dec. 2005	3 days	Butchered a pig (direct contact)	Not known
2	7 yr	M	MO	Jan. 2006	Not known	Reported no contact with a pig (unknown contact)	Not known
3	4 yr	F	IA	Nov. 2006	7–10 days	Had contact with patient with suspected case of swine influenza (epidemiologically linked contact)	Yes
4	10 yr	F	OH	Aug. 2007	3–4 days	Exhibited swine at fair, handled pigs (direct contact)	Yes
5	36 yr	M	OH	Aug. 2007	3–4 days	Exhibited swine at fair, handled pigs (direct contact)	Yes
6	48 yr	F	IL	Aug. 2007	7 days	Visited fair, did not stop at pigpen (near vicinity)	Yes
7	16 mo	M	MI	Aug. 2007	7 days	Visited fair, came within 1 m of pigs (close proximity)	Yes
8	2 yr	M	IA	Nov. 2007	1–10 days	Lived on swine farm, came within 1 m of pigs (close proximity)	Yes
9	26 yr	F	MN	Jan. 2008	9 days	Visited live-animal market, came within 1 m of pigpen (close proximity)	Not known
10	14 yr	M	TX	Oct. 2008	3 days	Visited a swine farm, brought home and handled a pig (direct contact)	Yes
11	3 yr	M	IA	Feb. 2009	1–10 days	Visited swine farm owned by his family, touched pigs (direct contact)	Yes

* Direct contact refers to touching or handling a pig; close proximity refers to standing within 1.83 m (6 ft) of a pig, without known direct contact; near vicinity refers to presence of pigs on the premises but not in close proximity; epidemiologically linked refers to a person who is epidemiologically linked to another person with a confirmed or suspected infection; and unknown refers to unknown contact or unavailable contact information.

N Engl J Med 2009;360:2616-25.

MMWR April 24, 2009

Swine Influenza A (H1N1) Infection in Two Children — Southern California, March–April 2009

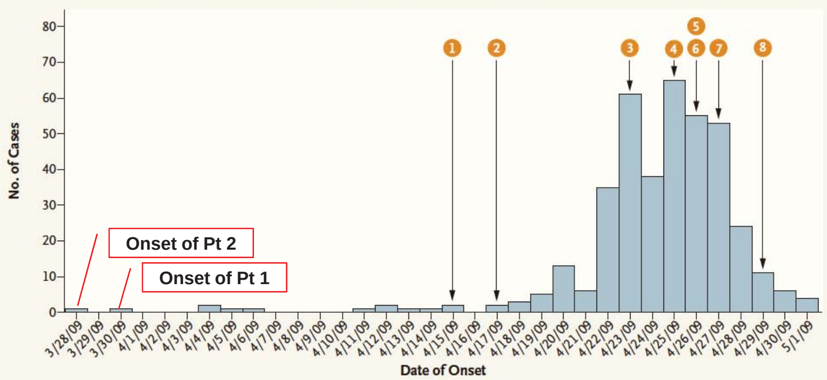
On April 21, this report was posted as an MMWR *Early Release on the* MMWR *website* (http://www.cdc.gov/mmwr).

On April 17, 2009, CDC determined that two cases of febrile respiratory illness occurring in children who resided in adjacent counties in southern California were caused by infection with a swine influenza A (H1N1) virus. The viruses from the two cases are closely related genetically, resistant to amantadine and rimantadine, and contain a unique combination of gene segments that previously has not been reported among swine or human influenza viruses in the United States or elsewhere. Neither child had contact with pigs; the source of the infection is unknown. Investigations to identify the source of infection and to determine whether additional persons have been ill from infection with similar swine influenza viruses are ongoing. This

two genes coding for the neuraminidase (NA) and matrix (M) proteins are similar to corresponding genes of swine influenza viruses of the Eurasian lineage

Emergence of a Novel Swine-Origin Influenza A (H1N1) Virus in Humans

Novel Swine-Origin Influenza A (H1N1) Virus Investigation Team*

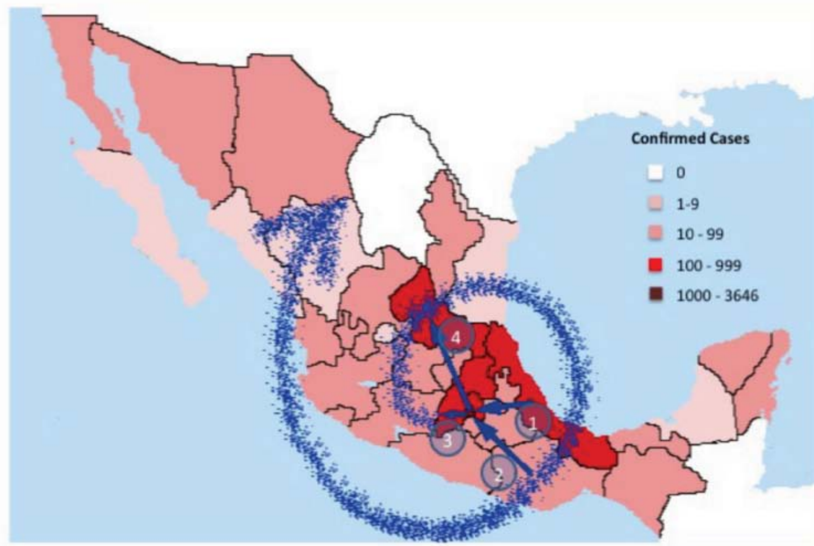


1. April 15, 2009 — CDC identifies S-OIV from specimen taken from Patient 1.
2. April 17, 2009 — CDC identifies S-OIV from specimen taken from Patient 2 and the U.S. government notifies World Health Organization (WHO) of Patients 1 and 2 per International Health Regulations.
3. April 23, 2009 — CDC conducts first press briefing related to outbreak.
4. April 25, 2009 — WHO declares public health emergency of international concern.
5. April 26, 2009 — WHO raises global pandemic alert to phase 3, characterized by sporadic cases or small clusters of disease caused by human–animal transmission of an influenza reassortant virus.
6. April 26, 2009 — United States declares public health emergency.
7. April 27, 2009 — WHO raises global pandemic alert to phase 4, characterized by human-to-human transmission of an animal or human–animal influenza reassortant virus able to cause "community-level outbreaks."
8. April 29, 2009 — WHO raises global pandemic alert to phase 5, characterized by human-to-human transmission of the virus in at least two countries in one WHO region.

Figure 1. Epidemiologic Curve of Confirmed Cases of Human Infection with Swine-Origin Influenza A (H1N1) Virus with Known Date of Illness Onset in the United States (March 28–May 5, 2009).
Data regarding the date of onset of illness were available for 394 patients. This epidemiologic curve does not reflect all cases of infection with S-OIV from March 28 through May 5, 2009, because of the lag in case reporting and laboratory confirmation.

N Engl J Med 2009;360:2605-15.

Figure 1. Geographical distribution of all confirmed cases of influenza A H1N1 detected in Mexico from March 11-June 9, 2009. The colors refer to the number of confirmed cases of influenza A H1N1 in the States of the Mexican Republic. Source: Current situation of the influenza epidemic in Mexico. Minister of Health, Mexico. June 9, 2009.

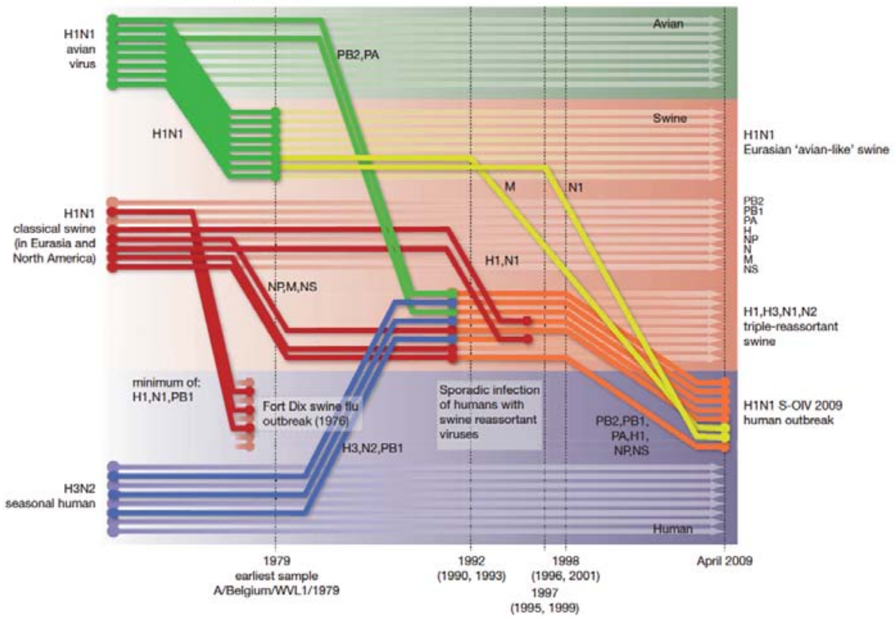


NATURE|Vol 459|25 June 2009

LETTERS

Origins and evolutionary genomics of the 2009 swine-origin H1N1 influenza A epidemic

Gavin J. D. Smith[1], Dhanasekaran Vijaykrishna[1], Justin Bahl[1], Samantha J. Lycett[2], Michael Worobey[3], Oliver G. Pybus[4], Siu Kit Ma[1], Chung Lam Cheung[1], Jayna Raghwani[2], Samir Bhatt[4], J. S. Malik Peiris[1], Yi Guan[1] & Andrew Rambaut[2]



DOI:10.1111/irv.12193
www.influenzajournal.com

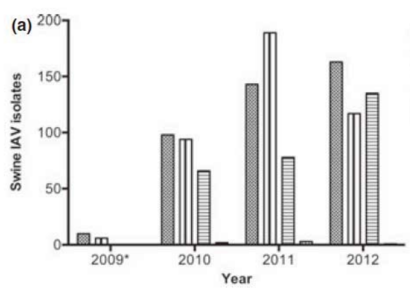
Original Article

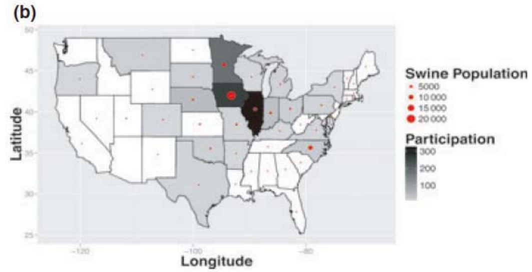
Population dynamics of cocirculating swine influenza A viruses in the United States from 2009 to 2012

Tavis K. Anderson,[a] Martha I. Nelson,[b] Pravina Kitikoon,[a] Sabrina L. Swenson,[c] John A. Korslund,[d] Amy L. Vincent[a]

[a]Virus and Prion Research Unit, National Animal Disease Center, USDA-ARS, Ames, IA, USA. [b]Fogarty International Center, National Institutes of Health, Bethesda, MD, USA. [c]National Veterinary Services Laboratories, USDA-APHIS, Ames, IA, USA. [d]Centers for Epidemiology and Animal Health, USDA-APHIS, Riverdale, MD, USA.

Correspondence: Amy L. Vincent, Virus and Prion Research Unit, NADC, USDA-ARS, 1920 Dayton Avenue, PO Box 70, Ames, IA 50010, USA.
E-mail: amy.vincent@ars.usda.gov





RESEARCH

Active Surveillance for Influenza A Virus among Swine, Midwestern United States, 2009–2011

Cesar A. Corzo, Marie Culhane, Kevin Juleen, Evelyn Stigger-Rosser, Mariette F. Ducatez, Richard J. Webby, and James F. Lowe

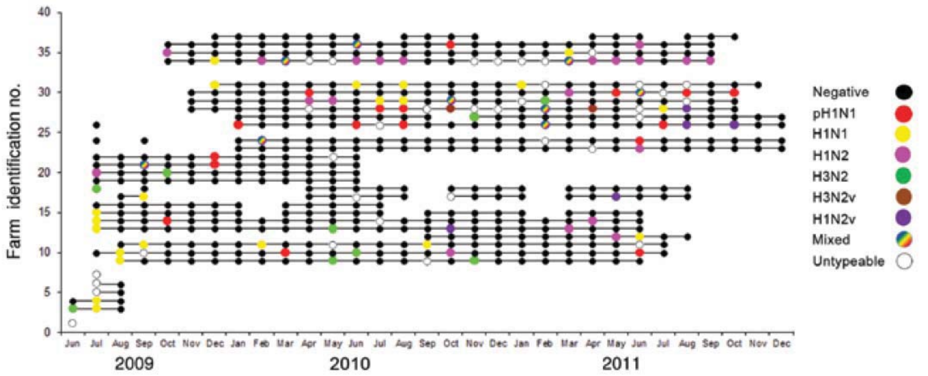


Figure 1. Swine influenza virus group status for 32 pig farms participating in an active surveillance project, midwestern United States, June 2009–December 2011. Each horizontal line represents a farm, each dot represents a sampling event, and colors indicate virus status of the group.

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 19, No. 6, June 2013

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Early Release / Vol. 61
August 10, 2012

Evaluation of Rapid Influenza Diagnostic Tests for Influenza A (H3N2)v Virus and Updated Case Count — United States, 2012

A total of 153 cases of H3N2v from July 12 to Aug 9, 2012

- Indiana (120 cases), Ohio (31), Hawaii (one), Illinois (one)

Of the 138 reported cases with demographic information

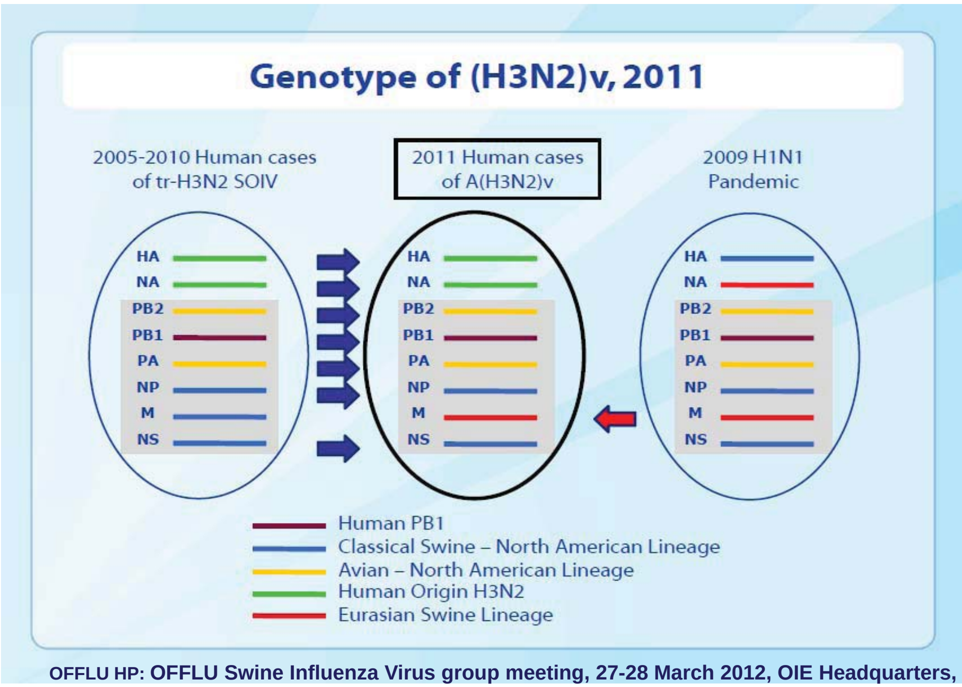
- <18 years: 128 (93%)
- Adults: 10 (7%)
- The median age: 7 years.
- Hospitalization: 2
- No deaths

All directly/indirectly exposed to pigs

The H3N2v viruses identified since July 12, 2012, are similar to the 13 H3N2v viruses identified during July 2011–April 2012

- All sequenced viruses have the M gene from the ifluenza A(H1N1)pdm09 virus

MMWR / August 17, 2012 / Vol. 61 / No. 32



OFFLU HP: **OFFLU Swine Influenza Virus group meeting, 27-28 March 2012, OIE Headquarters, Paris**

http://www.offlu.net/fileadmin/home/en/meeting-reports/pdf/

Journal of General Virology (2013), 94, 1236–1241 DOI 10.1099/vir.0.051839-0

Short Communication

Genotype patterns of contemporary reassorted H3N2 virus in US swine

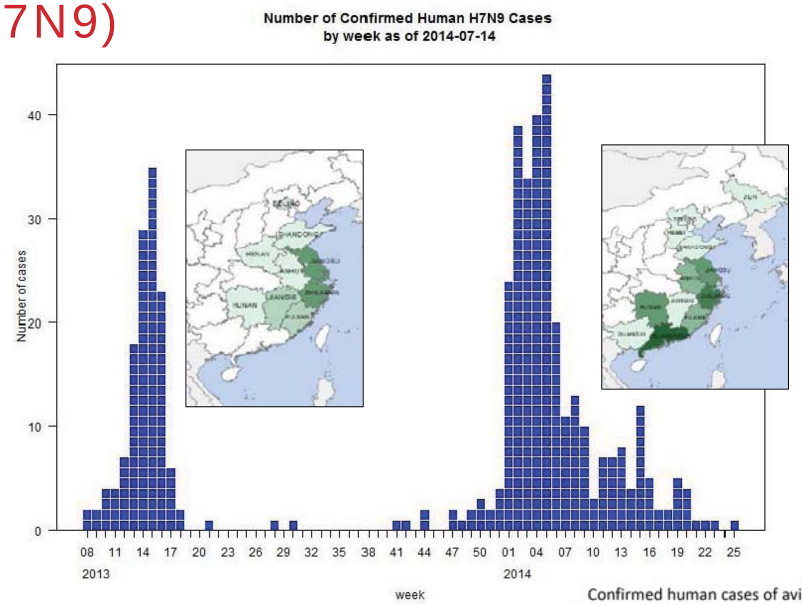
Table 1. Genome constellations identified in contemporary H3N2 viruses isolated from swine in the USA

Origin of each gene segment is colour-coded according to the gene lineage: blue, H3 and N2 of the TRIG human seasonal lineage; green, TRIG avian lineage; pink, TRIG swine lineage; lime green, 2009 pandemic H1N1 lineage. Genotypes 1–10 of reassorted rH3N2p and H3N2-TRIG viruses are colour-coded in the first column by the pattern of gene constellation. Similar colour-coding of genotypes is used in Fig. 1. The H3 subcluster A–F and N2 gene lineage is indicated in the HA and NA (neuraminidase) columns as denoted in Figs 1 and S6, respectively.

Genotype	PB2	PB1	PA	HA	NP	NA	M	NS	No. of isolates
1				A, E		2002			23
2				A, E, F		1998			5*
3				B, D		2002			2
4				F		1998			14*
5				E		2002			1
6				D, F		1998			5*
7				C, E		2002			3
8				D		1998			1
9				D		2002			7
10				C, D		2002			3
TRIG				A		2002			55

*2 of 5 isolates, 1 of 14 isolates, and 1 of 5 isolates from G2, G4 and G6, respectively, have N2-2002 gene lineage.

AVIAN INFLUENZA A(H7N9)



Confirmed human cases of avian influenza A(H7N9) reported to WHO

World Health Organization

Report 18 - data in WHO/HQ as of 14 July 2014

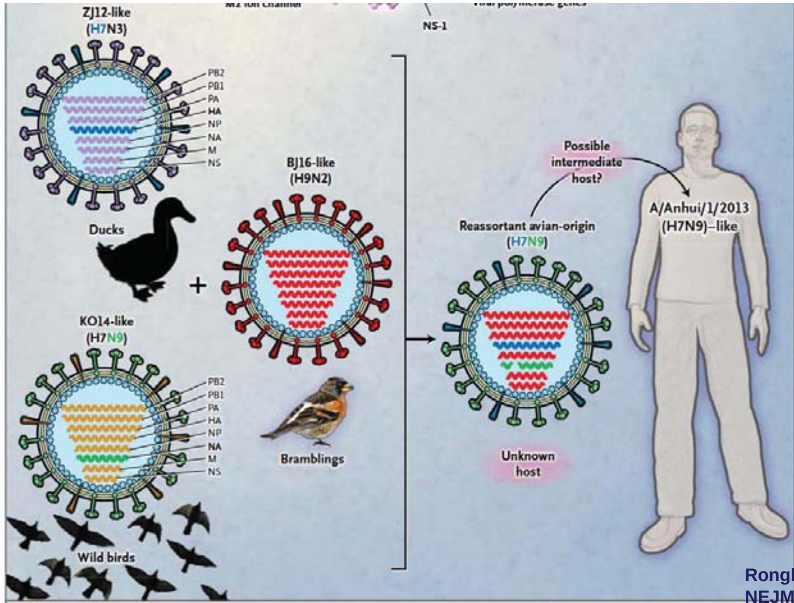


Figure 2. Hypothetical Host and Lineage Origins of the Gene Segments of the Novel Reassortant Human Influenza A (H7N9) Viruses.
The colors of the gene segments in the ovals indicate their origin. BJ16 denotes A/brambling/Beijing/16/2012, KO14 A/wild bird/Korea/A14/2011, and ZJ12 A/duck/Zhejiang/12/2011.

Rongbao Gao et.al. NEJM 2013

LIMITED H-H TRANSMISSION

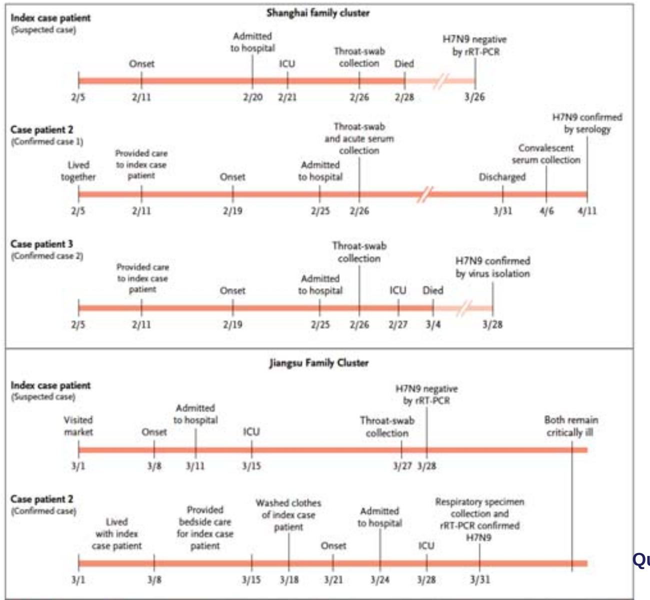


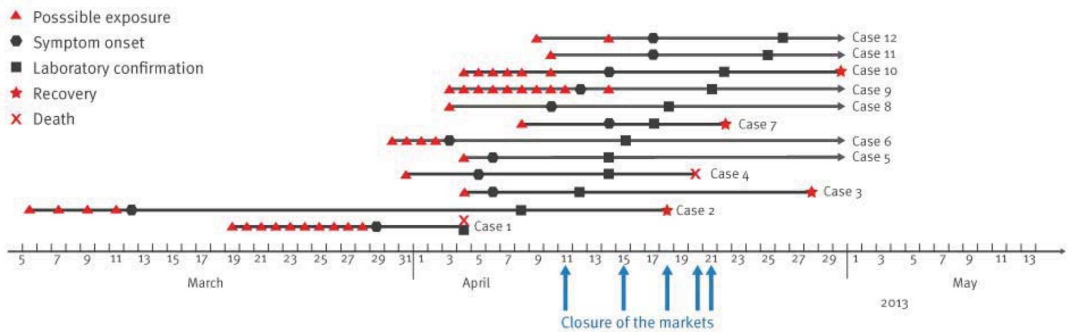
Figure 3. Timeline of Pertinent Exposures and Dates of Illness Onset in Two Family Clusters of Cases of H7N9 Virus Infection in China.
ICU denotes intensive care unit, and rRT-PCR real-time reverse-transcriptase–polymerase-chain-reaction assay.

Qun Li, et.al NEJM 2013

EXPOSURE TO BIRDS

FIGURE 2

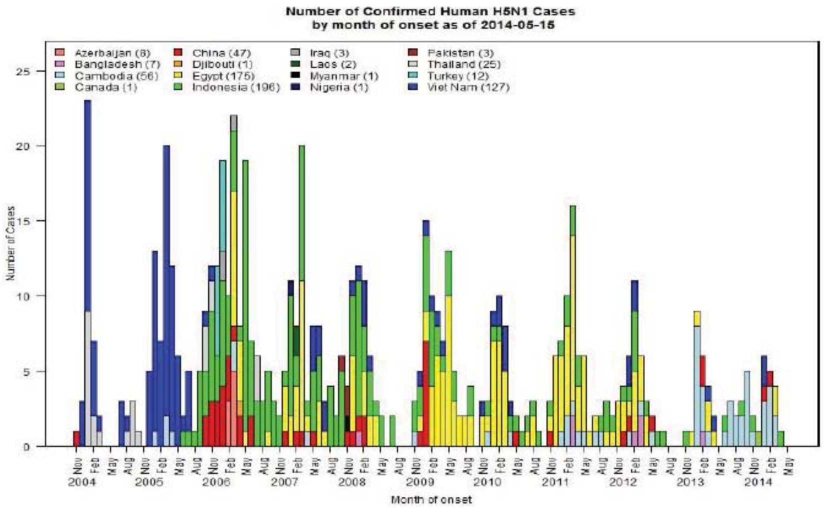
Timeline of laboratory-confirmed influenza A(H7N9) cases in Huzhou city, China, March–May 2013 (n=12)



J Han et.al, Eurosurveillance 1013

H5N1（2014.5.5）

Figure 1: Epidemiological curve of avian influenza A(H5N1) cases in humans by reporting country and month of onset.



Summary and assessment as of 5 May 2014, WHO

Influenza A surveillance under One Health

- **Inter-sectoral collaboration: Avian, Swine, Human, etc**
- **Epidemiology: Trend, Endemicity, Infectiousness(transmissibility), Virulence, Risk factors, etc**
- **Viral analysis: Phenotypic and Genetic analysis**
- **Transparency**
- **Timely analysis**

- **Surveillance for Action**

Participatory surveillance and epidemiology for HPAI

OIE Regional Workshop
on
Enhancing Influenza A viruses National Surveillance Systems
Tokyo, Japan, 27th August 2014

Participatory surveillance and epidemiology

- Participatory epidemiology (PE) is the use of participatory approaches and methods to improve our understanding of the patterns of diseases in populations
- Participatory surveillance (PS) is the application of PE to on-going surveillance programs, and seeks to strengthen the gathering of epidemiological intelligence to inform decision-making and action
- Participatory surveillance(PS) includes active outreach to stakeholders to enhance the access of stakeholders to the health system

Why applying Participatory surveillance?

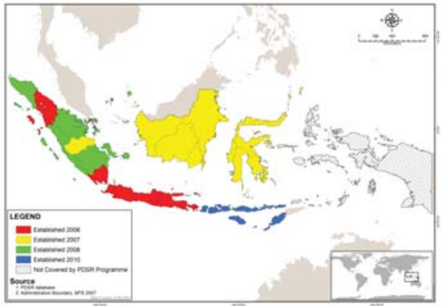
- PS generally leads to an increase in the cases detected where disease is present and more accurate perception of the epidemiological situation on the ground
- Participatory processes built trust and can enhance community–based reporting increasing sensitivity, representativeness and timeliness of the surveillance system
- PS can also be used as a tool to contribute to the validation of absence of disease

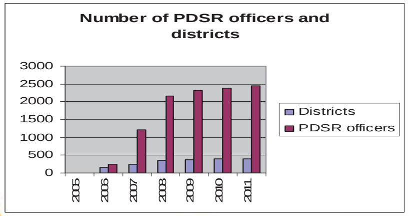
Participatory surveillance

- PS is a surveillance method which is usually used in high-risk areas for a specific disease and combines livestock keeper disease descriptions, observations of livestock and sample collection from animals that fit the case definition

Participatory surveillance for HPAI 'the Indonesia example'

- H5N1 HPAI was first detected in Indonesia in December 2003
- Indonesia has >300 million backyard poultry + commercial poultry industry with an annualized population of 900 million.
- Veterinary system is highly decentralized with more than 400 districts in 33 provinces
- PS for HPAI program started in 2006 as a pilot in 12 districts with 48 staff. It was rapidly scaled up resulting in more than 2,000 Participatory Disease Surveillance and Response (PDSR) practitioners in 31 provinces by 2009.





PDSR system

- Public district animal health staff (veterinarians and para-veterinarians) were trained for 10 days
- A case definition to identify and confirm HPAI outbreaks was designed collaboratively with PS practitioners based on their experience as well as based on PE outbreak investigations
- Outbreaks that fitted case definition were tested using Influenza A rapid antigen test (Anigen®)
- Communication materials for disease response were developed

PDSR training

All PDSR staff were trained on:

- Participatory data collection, including semi-structured interviews, proportional piling, timeline and mapping
- Interview and community engagement skills
- Field diagnosis of HPAI in poultry
- Outbreak control in village environment
- Poultry disease prevention strategies

HPAI outbreak case definition

- Initial case definition (2006)
  - Sudden death (less than 4 hours) of poultry in more than one household
- Revised case definition (2008)
  - Unvaccinated backyard poultry: Death of one or more birds in a household flock, with or without clinical signs.
  - Unvaccinated commercial poultry: unexplained mortality over 1% for 2 days in a row.
  - Vaccinated commercial poultry: Death, severe illness, or decrease in production

Anigen® and HPAI outbreak diagnosis

- Anigen® should only to be used on sick or dead chicken
- HPAI outbreak diagnosis for chickens: Case definition + Rapid test positive
- The sensitivity and specificity of the PDSR diagnostic procedure (clinical case definition integrated with an Anigen® rapid test) was 84% and 100%, respectively. (*Robyn et al. 2012*)
- Sensitivity of the Anigen® test low in ducks and geese

note: Anigen® in ducks more sensitive if young feather are used. *(recent publication + Indonesia (unpublished))*

PDSR functioning 1

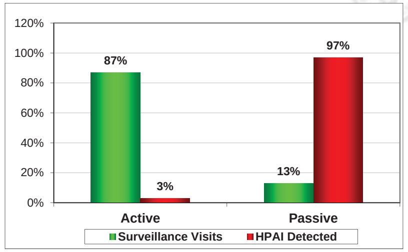
- PDSR staff carried out active HPAI surveillance, trained communities on HPAI prevention, and followed up outbreak reports
- Participatory methods like semi-structured interviews, proportional piling, timeline and mapping were used
- Control activities were initiated if HPAI was diagnosed

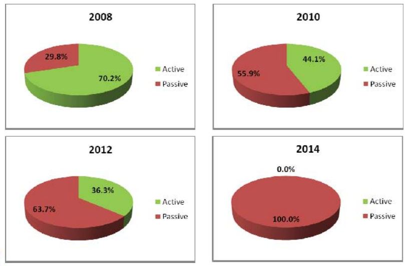
PDSR functioning 2

- PDSR worked closely together with human health staff when outbreaks were identified (One Health)
- GPS or village code and centroid were used for geo positioning of outbreak
- Standard data collection formats were used and were analyzed centrally
- IEC materials were used to educate the community on HPAI prevention and control

Changes made to the PDSR system over time

- The epidemiological unit changed from household to village (2008)
- A SMS gateway system was introduced to report HPAI outbreaks in addition to paper reporting (2010)
- The PDSR surveillance shifted from a mainly active - to passive surveillance system, as most of the detected outbreaks resulted from reports from the community



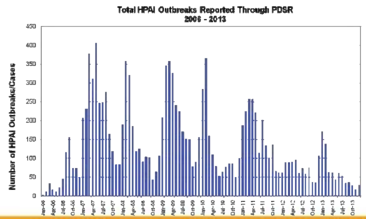


Achievements of the PDSR system

- From a relatively poor understood disease situation in 2005, PDSR showed that HPAI was widespread. HPAI had been confirmed in 31 of the countries 33 provinces, although 86,3 % of the villages searched were free.
- The sensitivity of HPAI's surveillance program was greatly enhanced, and the response time was reduced to 1,5 days
- Communities became actively involved in reporting and response activities
- Critical epidemiological characteristics such as geographic distribution and seasonal fluctuations, were determined

Outputs from the PDSR system

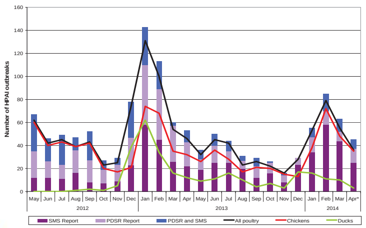
- >8,000 village HPAI outbreaks were recorded through PDSR since 2006
- The PDSR system mainly reports outbreaks from sector 4
- Most HPAI outbreaks have been reported from Java, Sumatra and Bali



- Outbreaks show a clear seasonal pattern especially in Sumatra and Java,
- The number of outbreaks reported through PDSR has been steadily decreasing since 2009.

Outputs from the PDSR system 2

- Capacity was developed at Central level to analyze PDSR data and use this information for policy development
- Monthly HPAI status reports were prepared for distribution within Indonesia and for reporting to International Organizations



Other applications of PS/PE for HPAI in Indonesia

- Estimating prevalence of HPAI infected villages in Java and Bali
- Freedom of HPAI surveillance in South Kalimantan
- Qualitative risk assessment for the transmission of HPAI though illegally imported birds
- Value chain assessment/ poultry movements through Live Bird Markets in Java
- HPAI related research:
  - Study on 'The role of ducks in endemicity of HPAI in Indonesia'
  - Participatory Impact Assessment (PIA) of preventative vaccination against HPAI in back yard and semi-intensive farms (Operational Research 2008/09)

Lessons learned Indonesia

- In the first years most of the PE tools were used, but this reduced over the years
- PDSR practitioners built trust which lead to increased community reporting of HPAI outbreaks
- Control measures were implemented for detected HPAI outbreaks , but control activities were difficult due, in part, to the lack of compensation for culling
- A PDSR system only for HPAI is not cost-efficient, and other (priority) diseases should be included
- The PDSR strengthened the animal disease surveillance system in Indonesia
- The GoI recognized the value of PE approaches and used it also for other priority diseases, to collect data to estimate incidence, mortality and morbidity. (e.g. Bali rabies control)

Future PDSR in Indonesia

- PDSR is now fully integrated in the National Veterinary Service in Indonesia
- Operational support for PDSR from FAO came to an end in 2012 and is now provided by the local government
- PDSR will include all priority diseases and not only HPAI
- Syndromic surveillance will be an important part of the surveillance system
- The PDSR reporting system will be integrated in the national animal disease reporting system (iSIKHNAS) which is a SMS based reporting system.
- Participatory approaches are used by the PDSR to built better relations with the commercial poultry sector (sector 3) for HPAI and other poultry diseases control

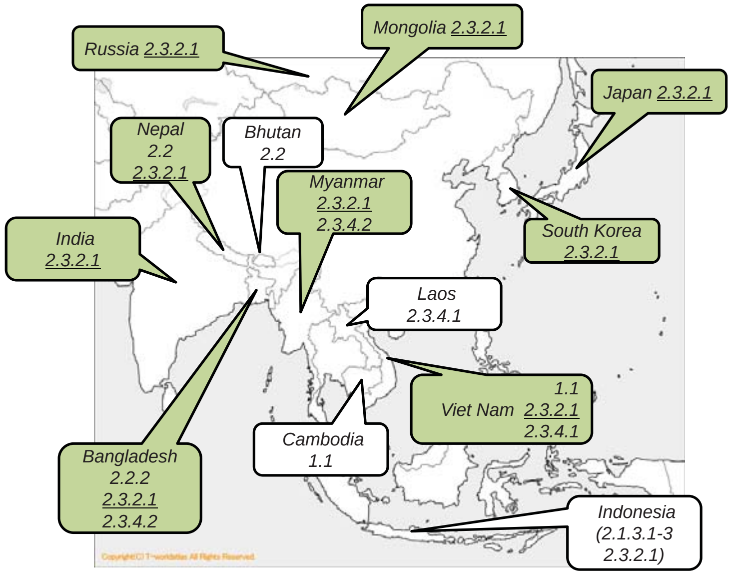
Conclusions participatory PS/PE for HPAI

- PE tools were useful to get a better understanding of HPAI in Indonesia. The use of the full toolbox of PE for HPAI has been reduced over the years, but some tools have been used for other diseases
- PS has strengthened the surveillance for HPAI in Indonesia. Community, passive, reporting increased by building trust. The sensitivity and timeliness of the system improved
- PS is best used as a time-bound, focused activity to meet certain objectives
- PS only for HPAI is not cost efficient and over time other priority diseases should be included to increase cost efficiency

Updates on the epidemiology of avian influenza viruses

Takehiko SAITO, DVM, PhD
Influenza and Prion Disease Research Center
National Institute of Animal Health, JAPAN

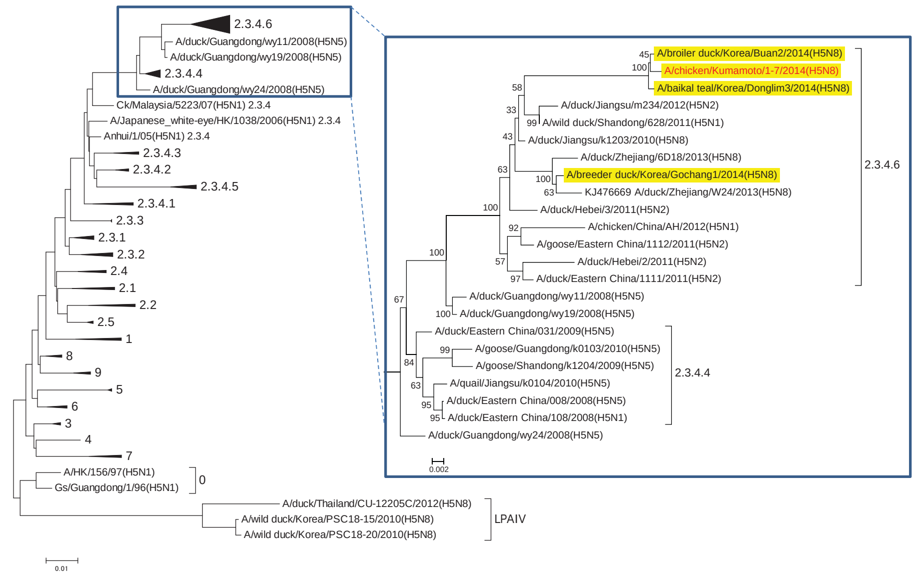
Dissemination of H5N1 HAPIV defined by HA clade nomenclature during 2010-2012 in Asia



HPAI outbreaks reported to OIE in 2014

Countries (regions)	Subtype	Date of start of the event	Date of last occurrence	Total Outbreaks
Cambodia	H5N1	07/02/2014	20/03/2014	5
China (People's Rep. of)	H5N1	27/12/2013		4
	H5N2	21/12/2013		2
	H5N6	23/04/2014	04/05/2014	1
India	H5N1	31/01/2014	21/02/2014	1
Japan	H5N8	11/04/2014	16/04/2014	1
Korea (Dem. People's Rep.)	H5N1	21/03/2014		3
Korea (Rep. of)	H5N8	16/01/2014		29
Laos	H5N6	13/03/2014	31/03/2014	1
Libya	H5N1	04/03/2014	06/03/2014	1
Nepal	H5N1	13/02/2014	22/05/2014	1
Vietnam	H5N1	07/10/2013	11/04/2014	39
	H5N6	22/04/2014		2
Australia	H7N2	08/10/2013	21/02/2014	2
Chinese Taipei	H5N2	15/04/2014	23/07/2014	1

Phylogenetic analysis of Hemagglutinin (HA) gene of clade 2.3.4.6



*sequence data from NCBI database and GISAID database.

Assessment of pathogenicity of A/chicken/Kumamoto/1-7/2014(H5N8)

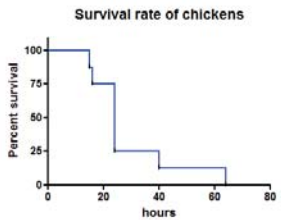
1. Putative amino acid sequence adjacent to the cleavage site of HA protein:

cleavage site
↓
PLRERRRKR/GLF

2. Experimental infection by intravenously inoculation

Any influenza virus that is lethal for six, seven or eight of eight 4- to 8 week-old susceptible chickens within 10 days following intravenous inoculation with 0.2 ml of a 1/10 dilution of a bacteria-free, infective allantoic fluid is classified highly pathogenic avian influenza virus. (Ref: Chapter 2.3.4 of OIE manual)

Above mentioned volume(0.2 ml) of a 1/10 dilution of the allantoic fluid of eggs (64HA) was intravenously inoculated into eight 5-week-old chickens and lethality was observed for 10 days.



hpi	survival	
	rate(%)	number
0	100	8
15	87.5	7
16	75	6
24	25	2
40	12.5	1
64	0	0

Pathogenicity of Ck/Kumamoto/1-7/2014 (H5N8) by intranasal inoculation

Chickens

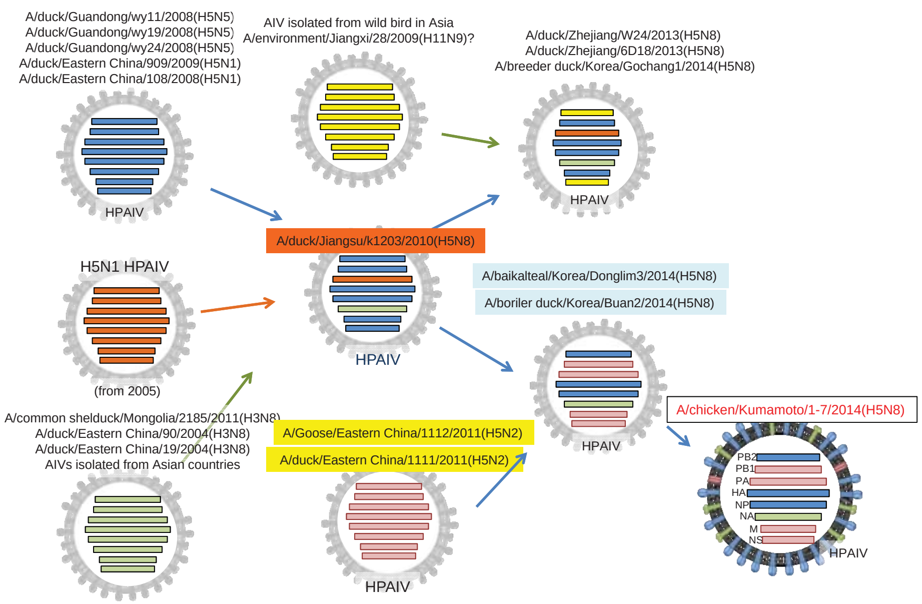
	inoculum EID_{50}/head	Dead/Total	Time to death	Virus isolation from trachea	Virus isolation from cloaca	Anti-NP antibody (16dpi)
10 wks old	10^6	6/6	308h	6/6	6/6	NT
	10^4	0/3	-	0/3	0/3	0/3
	10^2	0/3	-	0/3	0/3	0/3
5 wks old	10^6	3/3	120h	3/3	3/3	NT
	10^4	0/3	-	0/3	0/3	0/3
	10^2	0/3	-	0/3	0/3	0/3

Ducks

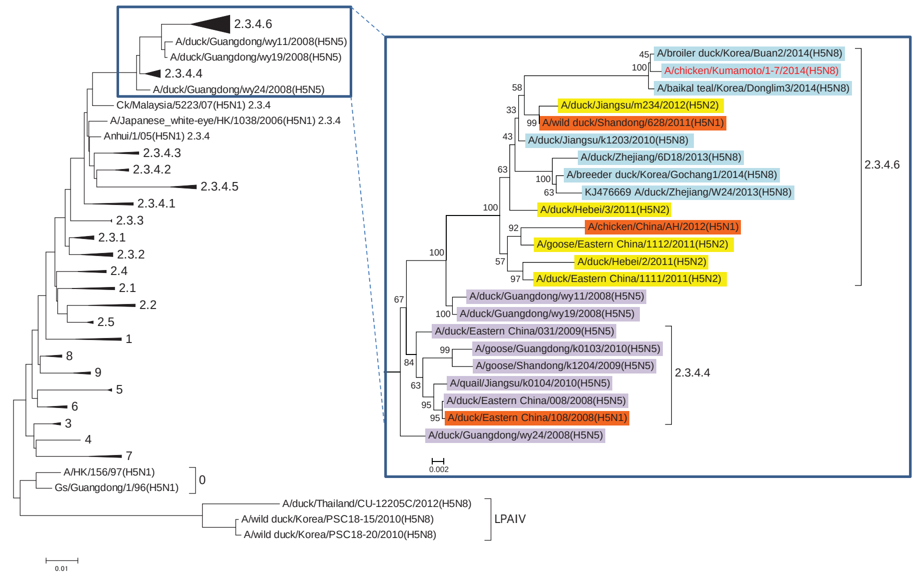
	inoculum EID_{50}/head	Dead/Total	Time to death	Virus isolation from trachea	Virus isolation from cloaca	Anti-NP antibody (14dpi)
4 wks old	10^6	0/4	-	4/4	4/4	4/4
	10^4	0/4	-	4/4	4/4	4/4
	10^2	0/4	-	0/4	3/4*	0/4

*<0.5 log10 EID_{50}/ml

Genetic constellation of A/chicken/Kumamoto/1-7/2014(H5N8)

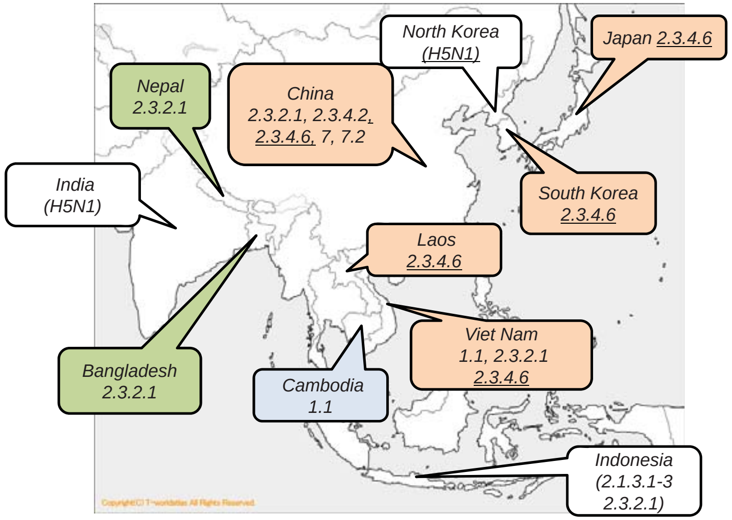


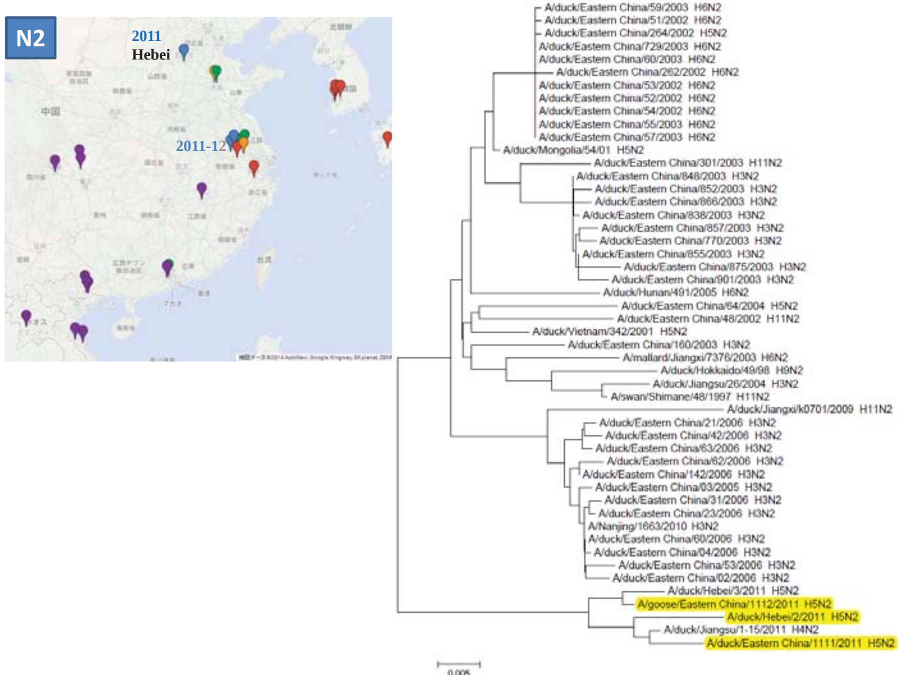
Phylogenetic analysis of Hemagglutinin (HA) gene of clade 2.3.4.6

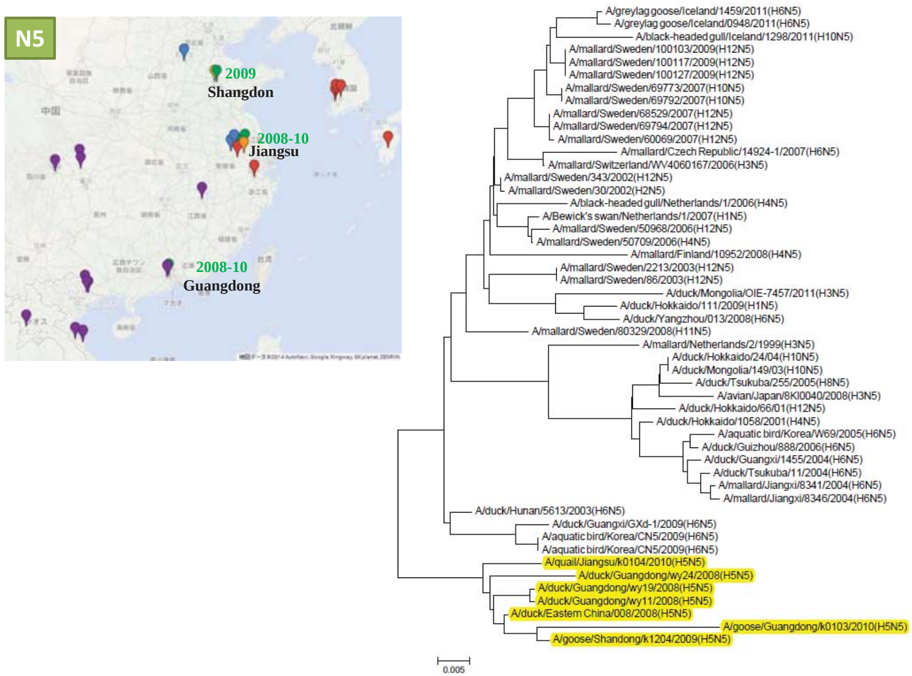


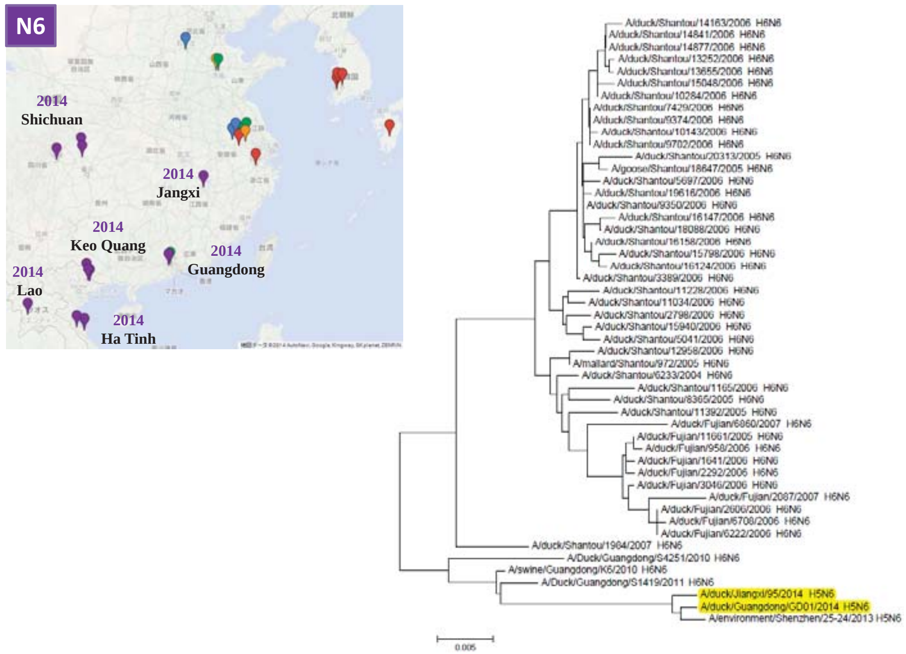
*sequence data from NCBI database and GISAID database.

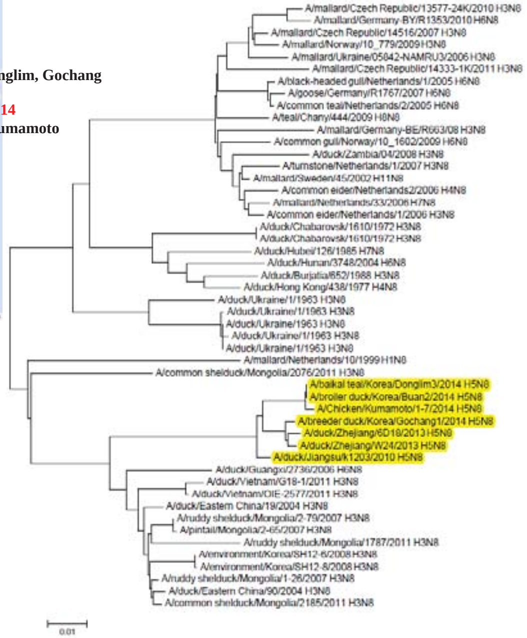
Dissemination of H5 HAPIV defined by HA clade nomenclature during 2013-2014 in Asia

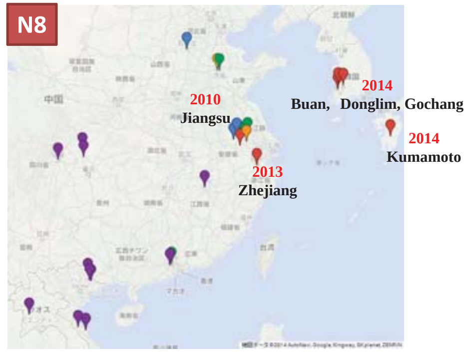




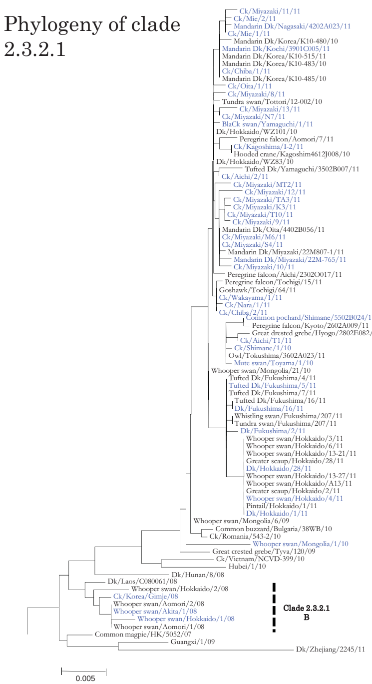




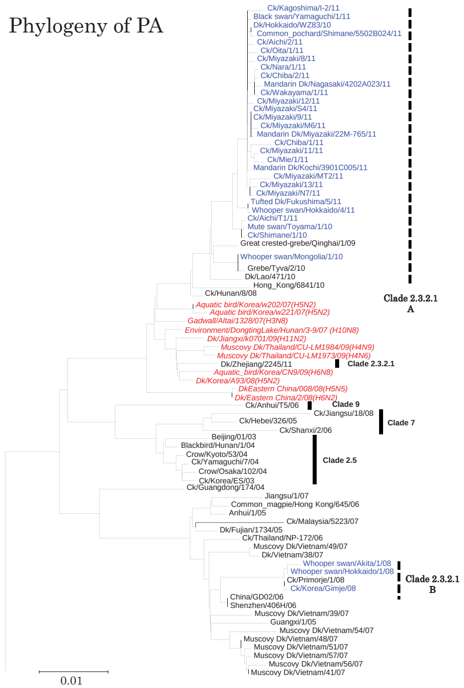




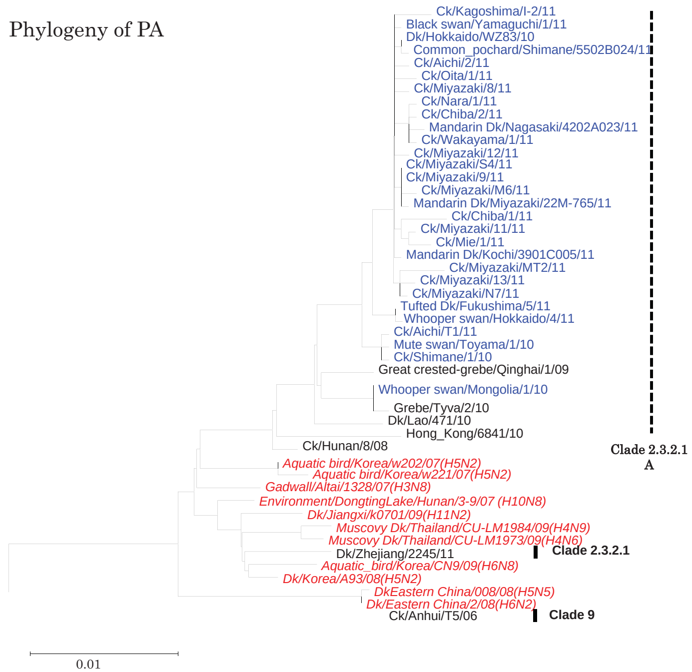
Phylogeny of clade 2.3.2.1

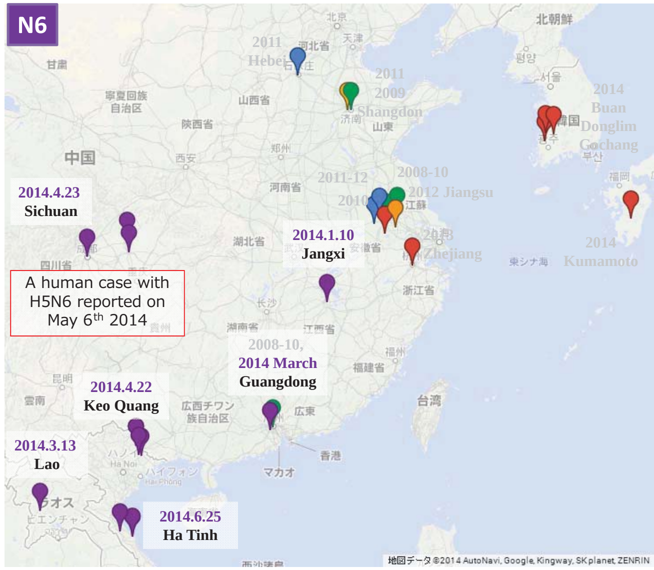


Phylogeny of PA



Phylogeny of PA





H5N1 infection in humans in 2014

Country	Province	Age	Sex	Date of onset	Date of Hospitalization	Date of Death	Exposure to
Canada	Alberta			27-Dec-13	1-Jan-14	3-Jan-14	unknown
Cambodia	Kampong Thom	5	M	24-Jan-14	30-Jan-14		Dead chicken in neighbourhood., was around while family prepared chicken
	Kratie	8	M	31-Jan-14	6-Feb-14	7-Feb-14	Dead chicken in neighbourhood, helped preparing chicken.
	Kratie	4	M	8-Feb-14	13-Feb-14		Dead chicken in neighborhood
	Kampong Cham	10	F	26-Jan-14	20 Feb 2014 after confirmation	recovered	Dead and sick ducks in village; helped preparing duck.
	Kampong Cham	11	F	9-Feb-14	20 Feb 2014 after confirmation	recovered	Dead chickens in neighborhood
	Phnom Penh	3	M	22-Feb-14	28-Feb-14	2-Mar-14	Dead poultry in the neighborhood
	Kandal	8	M	24-Feb-14	4-Mar-14	NA	Dead poultry in the neighbourhood
	Kampong Chhnang	11	M	3-Mar-14	5-Mar-14	6-Mar-14	Helped prepare dead chickens and ducks for food and was exposed to dead poultry in neighborhood
	Kampot	2	F	8-Mar-14	13-Mar-14	14-Mar-14	Dead poultry in the neighborhood.
China	Guangxi	75	M	NA	29-Jan-14		Exposure to poultry
	Hunan	5	F	17-Feb-14	NA	recovered	NA
Egypt	Behaira Governorate	56	F	6-Mar-14	9-Mar-14	NA	Dead and sick poultry (ducks and chickens)
	Demitta Governorate	4	M	7-Mar-14	12-Mar-14	NA	Dead and sick poultry (ducks and chickens)
	Menia	34	M	15-Jun-14	22-Jun-14	NA	Poultry market near home
Indonesia	Central Java	2	M	10-Apr-14	13-Apr-14	20-Apr-14	Sick and dead backyard poultry
Vietnam	Binh Phuoc	52	M	11-Jan-14	16-Jan-14	18-Jan-14	Slaughter and consumption of duck
	Dong Thap	60	F	22-Jan-14	27-Jan-14	28-Jan-14	Slaughter and consumption of duck, poultry deaths at son- in-law's residence

Thank you for your attention

Acknowledgement
Michiyo Harada
Katsushi Kanehira
Yuko Uchida
Nobuhiro Takemae
Ryota Tsunekuni
Hirokazu Hikono

SCIENTIFIC NETWORKS ON AVIAN INFLUENZA INCLUDING REGIONAL VIRUS BANKS

WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

Dr Gounalan Pavade
OIE regional workshop, Tokyo, 26-28 August 2014

OIE Standards, Guidelines and recommendations

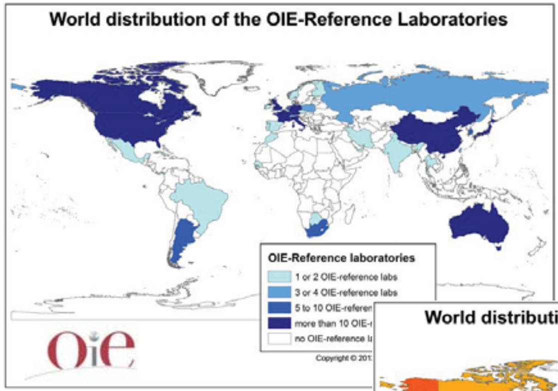
- **Founded on:**
  - Objective criteria
  - Scientifically valid evaluations provided by independent experts
- **It was and is necessary to strengthen the OIE's expertise capabilities to respond even more effectively to the requirements of its Members**

1991: a network is born

- **In response to a questionnaire, the Biological Standards Commission selected 75 laboratories to be proposed for designation by the International Committee as OIE Reference Laboratories and one to be proposed as OIE Collaborating Centre**
- **Laboratories for diseases of aquatic animals were designated later**
- **In 1993 official mandates and rules were formally adopted**

1991: a network is born

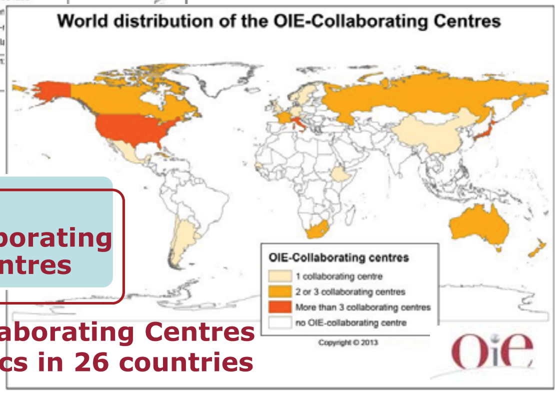
- **A network of expertise that could provide advice and aid on, for example:**
  - technical and scientific matters
  - the basis for the setting of international standards
- **International points of reference for disease diagnosis, prevention and control**
- **Constitutes the central core of the OIE's scientific excellence**



Reference Laboratories

247 laboratories,
117 diseases/topics
in 38 countries

OIE Reference Centers May 2014



Collaborating Centres

49 Collaborating Centres
46 topics in 26 countries

Reference Centres: evolution

- ❑ Reference Laboratories:

160 in 2006 ➔ 247 in May 2014

- ❑ Collaborating Centres:

20 in 2006 ➔ 49 in May 2014

OIE Reference Laboratories and Experts

- **Must fulfil the role of centres of expertise and standardisation of methodology in their particular disease**
- **Centres for data processing, standardisation of diagnostic protocols, preparation and distribution of reference reagents, research, technical consultation and training**
- **The Expert should be a leading and active researcher**

The OIE's scientific network

Reference Laboratories

- Develop, perform and validate diagnostic tests
- Store and distribute reference reagents
- Organise laboratory proficiency testing of other Members' laboratories
- Coordinate scientific and technical studies
- Provide scientific and technical training to Members
- Are under the responsibility of an expert of reference
- The list of Reference Laboratories is validated by the World Assembly of Delegates annually

OIE Collaborating Centres

- Cover a specialised sphere of activities rather than a given animal disease
- Activities are global in coverage
- A large part of their work is of particular help to developing countries
- Not necessarily laboratory based

The OIE's scientific network

Collaborating Centres

- Assist in the development of procedures to update and promote international standards and guidelines on animal health and welfare
- Coordinate scientific studies
- Organise training seminars
- Organise and host technical meetings in collaboration with the OIE

The OIE Network of Reference Laboratories and Collaborating Centres

Crucial role for OIE and its Members

- Worldwide expertise
- Essential role in prevention, detection and control of animal diseases
- Supports OIE in the establishment of standards
- Strengthens OIE capability to respond to the new challenges

➔ international solidarity

HPAI and LPAI OIE Reference Laboratories

1. Dr Frank Wong, CSIRO, Geelong, Australia
2. Dr John Pasick, Winnipeg, Canada
3. Dr Hualan Chen, Harbin, China
4. Dr Timm C. Harder, Riems, Germany
5. Dr Chakradhar Tosh, Bhopal, India
6. Dr Ilaria Capua, Padova, Italy
7. Prof. Hiroshi Kida, Sapporo, Japan
8. Prof. Ian Brown, AHVLA, Weybridge, UK
9. Dr Mia Torchetti, Ames, USA

Collaborating Centres

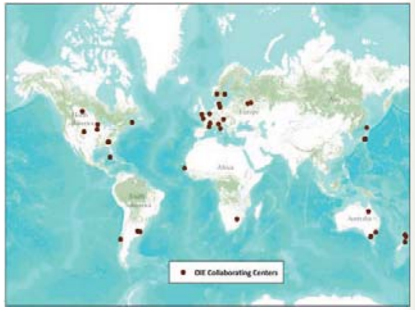
1. Centers for Epidemiology and Animal Health, USDA-APHIS-VS-CEAH, USA (Animal Disease Surveillance Systems, Risk Analysis and Epidemiological Modelling)

2. Istituto Zooprofilattico Sperimentale delle Venezie, Italy (Diseases at the Human-Animal interface)

3. Southeast Poultry Research Laboratory, USA (Research on Emerging Avian Diseases)

4. Harbin Veterinary Research Institute, China (Zoonoses of Asia-Pacific)

5. Australian Animal Health Laboratory (New and emerging diseases)



OIE Reference Centres

- **OIE is committed to:**
  - expanding and strengthening this network of expertise
  - creating synergy so as to continue to meet the emerging challenges in a globalising world
- **All participating institutions in the network must share a common vision and regularly communicate**

TWINNING LABORATORIES

Aims and objectives

- **Extend the OIE network of expertise to provide better global geographical coverage**
- **Strengthen scientific networks (national and international)**
- **Improved access to high quality diagnostics and technical assistance for more OIE Member**
- **Support PVS objectives**

Status May 2014

- 19 projects completed
- 30 projects underway
- 17 projects approved and waiting to start ('in the pipeline')
- 3 Most popular topics
  - Avian influenza and Newcastle disease (10)
  - Brucellosis (8)
  - Rabies (6)

Projects completed (19)

MAY 2012 (7)

AVIAN INFLUENZA & NEWCASTLE DISEASE
- Italy - Cuba
- Italy - Russia
- USA – Brazil

BRUCELLOSIS
- UK-Turkey

CBPP
- Italy-Botswana
- Italy – Cuba (also epidemiology)

RABIES
- South Africa - Nigeria

MAY 2013 (5)

AVIAN INFLUENZA & NEWCASTLE DISEASE
- Australia - Malaysia

BRUCELLOSIS
- Italy - Eritrea

BLUE TONGUE & AFRICAN HORSE SICKNESS
- UK – Morocco

AFRICAN SWINE FEVER
- Spain – Russia

INFECTIOUS SALMON ANEMIA
- Canada - Chile

MAY 2014 (7)

AVIAN INFLUENZA & NEWCASTLE DISEASE
- Germany - Egypt

CLASSICAL SWINE FEVER
- Germany - Cuba

CLASSICAL SWINE FEVER & RABIES
- UK – China

EQUINE PIROPLASMOSIS
- Japan – India

VETERINARY MEDICINAL PRODUCTS
- France – Senegal

IMPROVED DIAGNOSTIC CAPACITY
- UK - Uganda

FOOD SAFETY
- Italy - Namibia

Projects underway (30)

AVIAN INFLUENZA & NEWCASTLE DISEASE
- Canada – Colombia
- Italy – Iran
- UK – Botswana
- UK – South Africa
- USA – Chile

AFRICAN TRYPANOSOMIASIS
- France – Burkina Faso

BLUE TONGUE
- Italy – Tunisia

EPIDEMIOLOGY
- USA – China

ANIMAL WELFARE
- Australia – Malaysia

EQUINE INFLUENZA
- Ireland – China
- UK – India

WEST NILE VIRUS
- Italy – Turkey

BRUCELLOSIS
- France – Thailand
- Germany – UAE
- UK – Sudan
- UK – Afghanistan (also mycoplasma)

FOOT AND MOUTH DISEASE
- Argentina - Paraguay

RABIES
- Germany – Turkey

AFRICAN SWINE FEVER
- Spain – Kenya

GLANDERS
- Germany – India

SALMONELLOSIS
- Italy – Vietnam

OVINE CHLAMYDIOSIS
- Switzerland – Namibia

SINCE JUNE 2013 (8)

BRUCELLOSIS
- Italy – Zimbabwe
- Italy & USA – Kazakhstan

INFECTIOUS BURSAL DISEASE
- France – China

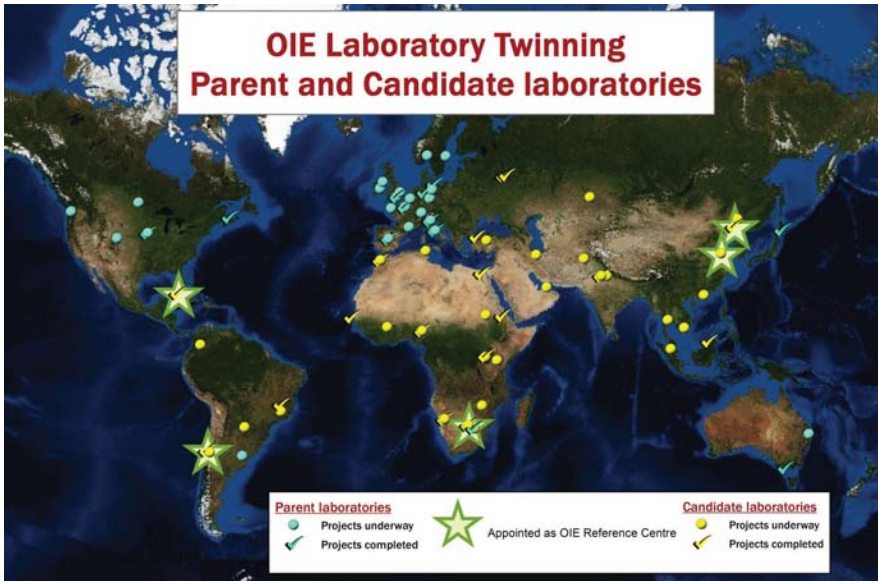
INFECTIOUS HAEMATOPOIETIC NECROSIS
- USA – China

LEPTOSPIROSIS
- Northern Ireland – India

PESTE DES PETITS RUMINANTS
- France – Morocco

AFRICAN SWINE FEVER & FMD
- Sweden – Uganda

FOOD SAFETY
- Italy – Tunisia



Contribution of twinning to OIE Reference Centre network

Adopted (May 2012)

- RABIES - Changchun Veterinary Research Institute, P. R. China
- AVIAN MYCOPLASMOSIS - National Centre for Animal and Plant Health, Cuba
- CONTAGIOUS BOVINE PLEUROPNEUMONIA (CBPP) - National Veterinary Laboratory, Botswana

Adopted (May 2014)

- OIE Reference Laboratory for infectious salmon anaemia - Aquaculture Pathology Laboratory, Chile
- OIE Collaborating Centre for Veterinary Epidemiology and Public Health - China Animal Health and Epidemiology Centre (CAHEC), P.R. China

Outputs from twinning

- Stronger global disease surveillance networks
- Improved access to rapid and accurate detection and characterisation of pathogens
- Putting biosafety, biosecurity and bioethics on the agenda
- Stronger scientific networks
- Capability to respond to disease events

First international conference

- **To enhance the scientific cooperation and to facilitate future interactions and networking OIE organised two meetings:**

The first International Conference of OIE Reference Laboratories and Collaborating Centres, Florianopolis (Brazil), 3-5 December 2006

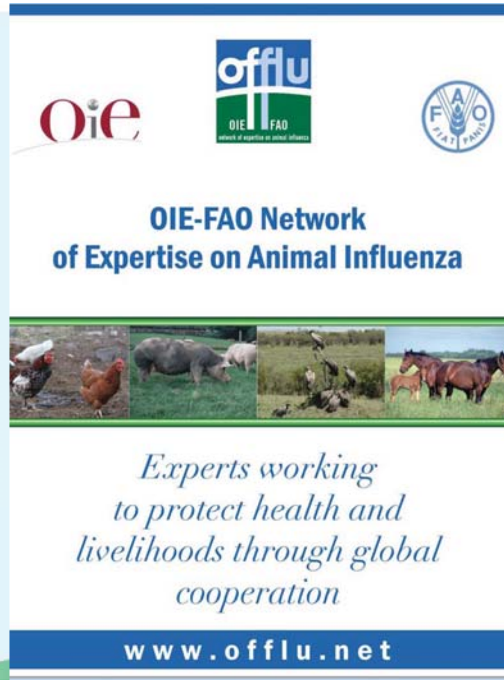
Second international conference

- **Second Global Conference of OIE Reference Laboratories and Collaborating Centres OIE Headquarters, Paris, France, 21–23 June 2010**

Third international conference

- **Third Global Conference of OIE Reference Centres -** ***Challenges and expectations for the future***

Incheon (Seoul), Korea (Rep. of), 14 – 16 October 2014



OFFLU's vision

The animal health community will provide early recognition and characterisation of emerging influenza viral strains in animal populations, and effective management of known infections, thereby better managing the risk to human health and promoting global food security, animal health and welfare, and other community benefits derived from domestic animals and wildlife.

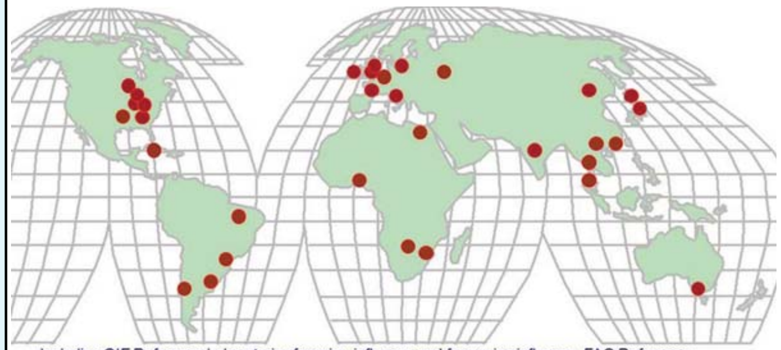
OFFLU's objectives

- To exchange scientific data and biological materials (including virus strains) within the network, to analyse such data, and to share such information with the wider scientific community.
- To offer technical advice, training and veterinary expertise to Member Countries to assist in the prevention, diagnosis, surveillance and control of animal influenza.
- To collaborate with the WHO influenza network on issues relating to the animal-human interface, including early preparation of human vaccine.
- To highlight influenza research needs, promote their development and ensure co-ordination

Global OFFLU expertise

- Avian influenza
- Swine influenza
- Equine influenza
- Links with other animal species influenza experts

OFFLU network animal influenza experts



Including OIE Reference Laboratories for avian influenza and for equine influenza, FAO Reference Centres for avian influenza, and OFFLU regional laboratory contacts for avian influenza, and current members of OFFLU SIV group

OFFLU's contribution to animal influenza surveillance and research

OFFLU Technical Activities

- Applied epidemiology group
- Biosafety
- OFFLU research agenda
- Vaccination group
- Proficiency testing/Ring trial
- Development of standardized reference materials
- RNA standard
- OFFLU Swine influenza group
- Code of conduct group
- Training

OFFLU Surveillance strategy

http://www.offlu.net/fileadmin/home/en/publications/pdf/OFFLUsurveillance.pdf

- Highlight
  - Objectives and benefits for surveillance in each animal species
  - Influenza in Poultry, wild birds, pigs, horses
  - Pandemic H1N1 2009 in pigs and poultry
  - approaches and options to surveillance
  - Options for appropriate actions
- Provide high level strategic guidance
- Coordinate and harmonise approaches to animal influenza surveillance
- World – wide relevance

OFFLU Research Agenda

- Comprehensive list of research priorities on avian influenza (poultry and wild birds), swine influenza and equine influenza
- Enumerates research priorities on
- ❑ Control and education
- ❑ **Diagnostics and surveillance**
- ❑ Ecology and epidemiology
- ❑ Immunology an immune responses
- ❑ Pathogenesis
- ❑ Transmission
- ❑ Vaccines and vaccination
- ❑ Virus characteristics and evolution

OFFLU evaluation of AI control measures

- OFFLU conducted a comprehensive evaluation of AI control measures especially the vaccine and vaccination component of the control measures applied in 69 countries
- David Swayne deputed to OFFLU to complete this project. Information collected through questionnaire and official visits
- Highlights AI vaccines and vaccination from 2002-2010; vaccine bank; vaccine usage; conditions for use and non-use of vaccines; exit strategy; several recommendations for more effective HPAI and LPNAI control programmes
- Two manuscripts published in the OIE Scientific and Technical Review
  - Assessment of national strategies for control of HPAI and LPNAI in poultry with emphasis on vaccines and vaccination
  - *Rev. sci. tech. Off. int. Epiz., 2011, 30 (3), 839-870*
  - The influence of economic indicators, poultry density and the performance of Veterinary Services on the control of HPAI in poultry
  - *Rev. sci. tech. Off. int. Epiz., 2011, 30 (3), 661-671*

OFFLU ring trial

- Two OFFLU global proficiency test completed. Third in progress.
- Reference labs and 11 regional labs participated.
- Brasil, Colombia, Chile, South Africa, Bostwana, Ethiopa, Nigeria, Vietnam, Thailand, Senegal, Malaysia
- Real time PCR detection of AI strains using a panel of inactivated influenza viruses from different geographical regions
- Helps in consistency in diagnostic testing by labs worldwide

OFFLU collaboration with WHO

- A great success!
- Ongoing 2-way exchange of information (both official and non official)
- Technical collaboration at all levels
- Tested by pandemic H1N1 2009
- LPAI H7N9 outbreaks in China

Technical collaboration with WHO

- Several joint WHO-OFFLU technical initiatives
- OFFLU participation in WHO vaccine strain selection meetings
- WHO participation in OFFLU working groups and meetings
- Exchange of viruses and diagnostic reagents
- Exchange of virological and epidemiological information

OFFLU sources of information for VCM

Genetic data
•OFFLU avian influenza laboratories Publicly available databases
•FAO national and regional offices

Antigenic data
•HI data in collaboration with WHO CC St Jude's Children's Hospital

Epidemiological data
•FAO (empres i) and OIE (WAHID) databases

•Year 2013 - 200 H5 and H9 virus genetic sequences shared
•Year 2012 - 274 H5 and H9 virus genetic sequences shared
•Year 2011 – 262 H5 sequences shared

OFFLU Swine Influenza Virus group

- ❑ Experts on swine influenza engaged in research and surveillance
- ❑ Represents both animal and public health
- ❑ Meets annually
- ❑ Four annual technical meetings completed so far

OFFLU SIV group objectives

- Provide expert opinion and technical advice to international organizations and other relevant stakeholders
- Gather, exchange, and disseminate global knowledge of SIV and keep under continuous review
- Identify and define gaps in knowledge in surveillance and research
- Evaluate and communicate information regarding viruses posing potential risk to veterinary and public health

Scientific networking through OFFLU technical meetings

▪OFFLU annual technical meeting, April 2012, London
▪OFFLU technical meeting, November 2010, Rome
▪OFFLU technical meeting, September 2009, Paris
▪OFFLU applied epidemiology technical activities meeting, 2008, Paris

▪OFFLU fourth SIV group meeting, March 2013, USA
▪OFFLU third SIV group meeting, April 2013, Rome
▪OFFLU second SIV group meeting, March 2012, Paris
▪OFFLU first SIV group meeting, April 2011, Paris

OFFLU response to H7N9

▪OFFLU compiled laboratory algorithms, protocols and validation data for detection and characterisation of H7N9

▪Rapid data exchange mediated through OFFLU

▪Information directly informed global preparedness

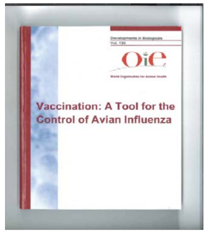
OFFLU vaccination technical meeting Beijing, China (Dec. 2013)

OFFLU-STAR IDAZ Global animal influenza research agenda meeting, Paris (April 2014)

OIE avian influenza vaccine bank

- 2006 – Regional vaccine bank for avian influenza vaccines in Africa
- 2007 – Global vaccine bank for AI
- 62, 017 million H5N2 doses were delivered: Mauritania, Senegal, Egypt, Mauritius, Ghana, Togo and Vietnam
- Egypt : 28 million
- Vietnam: 26.7 million

- EU funded HPED vaccine bank programme to asia
- 40 % for Avian influenza



OIE avian influenza vaccine bank

- 2006 – Regional vaccine bank for avian influenza vaccines in Africa
- 2007 – Global vaccine bank for AI
- 62, 017 million H5N2 doses were delivered: Mauritania, Senegal, Egypt, Mauritius, Ghana, Togo and Vietnam
- Egypt : 28 million
- Vietnam: 26.7 million

- EU funded HPED vaccine bank programme to asia
- 40 % for Avian influenza

Thank you for your attention!

WORLD ORGANISATION FOR ANIMAL HEALTH

Protecting animals, preserving our future