OFFLU Swine Influenza virus group annual technical meeting

University of Minnesota, Minneapolis, USA,
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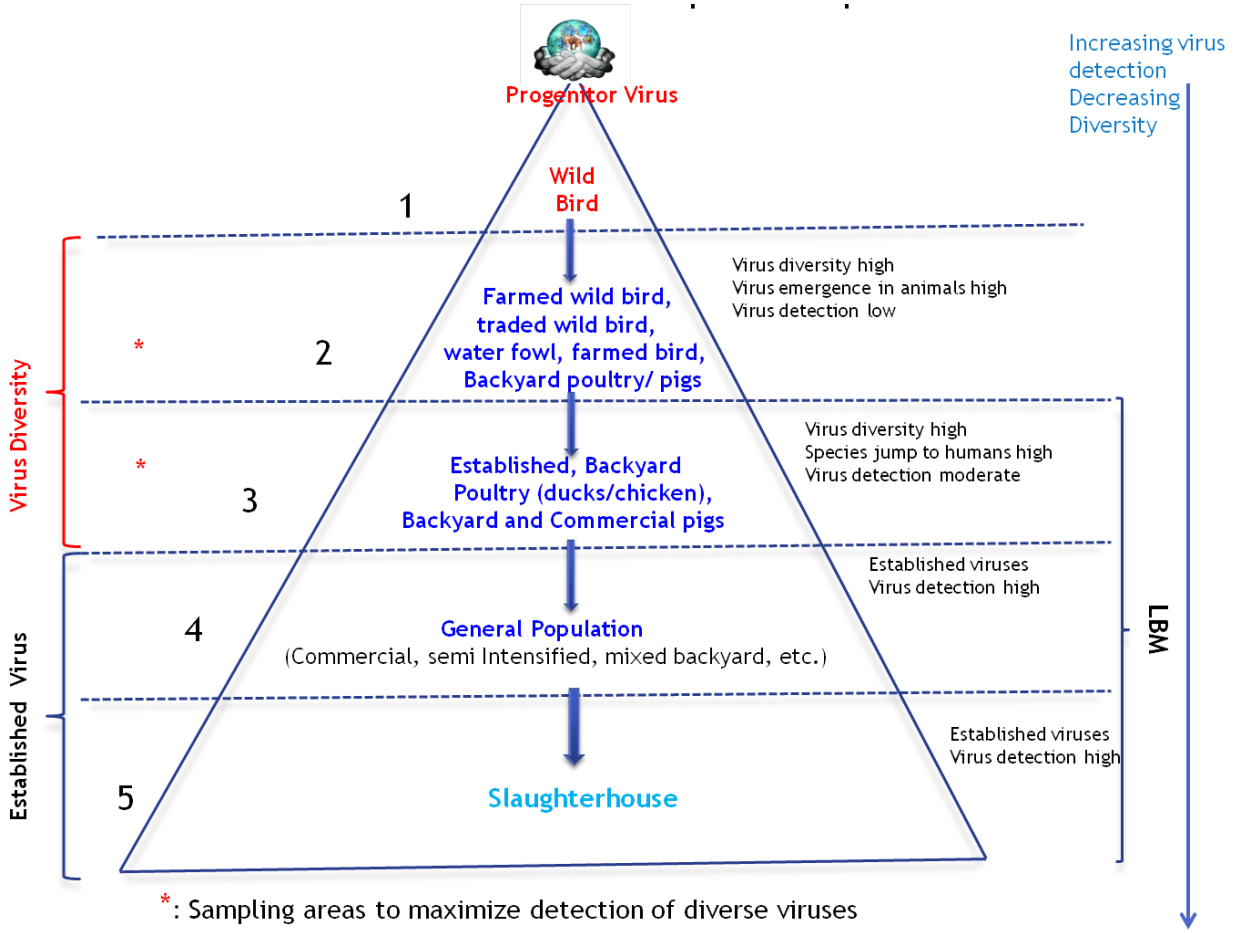
FAO ECTAD RAP, Bangkok, Thailand

The Project: "Characterizing Influenza Viruses Posing Risks as the Next Global Pandemic (FAO's EPT+)"

- **Part of the broader Emerging Pandemic Threat (EPT) Program funded by USAID, coordinated and implemented by FAO.**
- **To improve the understanding of livestock as a reservoir for potential pandemic influenza viruses in SA and SEA.**
- **Aim is to increase the detection of diverse progenitor influenza viruses within targeted agro-ecological systems in countries where the greatest genetic diversity are likely to occur.**
- **Focus activities of the program :** (a) surveillance for influenza viruses, (b) identification of risk factors for virus diversity, and (c) determination of the role of value chains in virus diversity.

Influenza Virus transmission/adaptation pathways



Study Areas

Phase 1 (2011-2013)

Phase 2 (2013-2014)

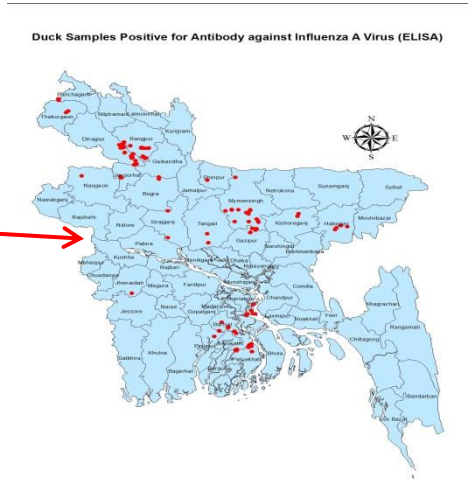
Bangladesh

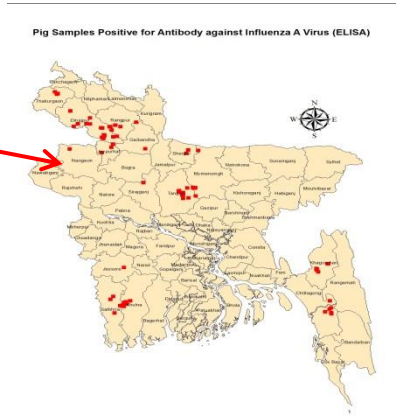
Target species

- **Ducks**

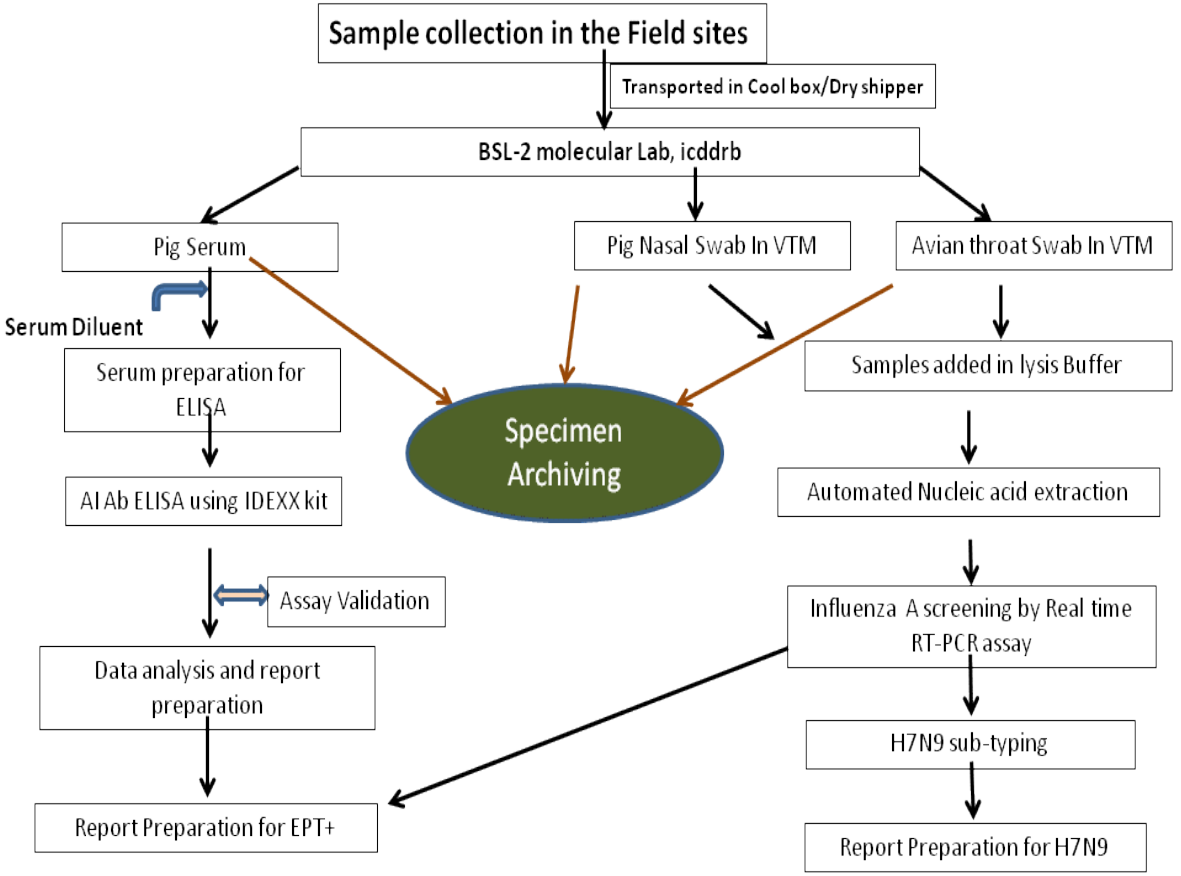
- **Pigs**

Target locations





Bangladesh EPT+ Sample Management and Lab. Testing Flow Chart



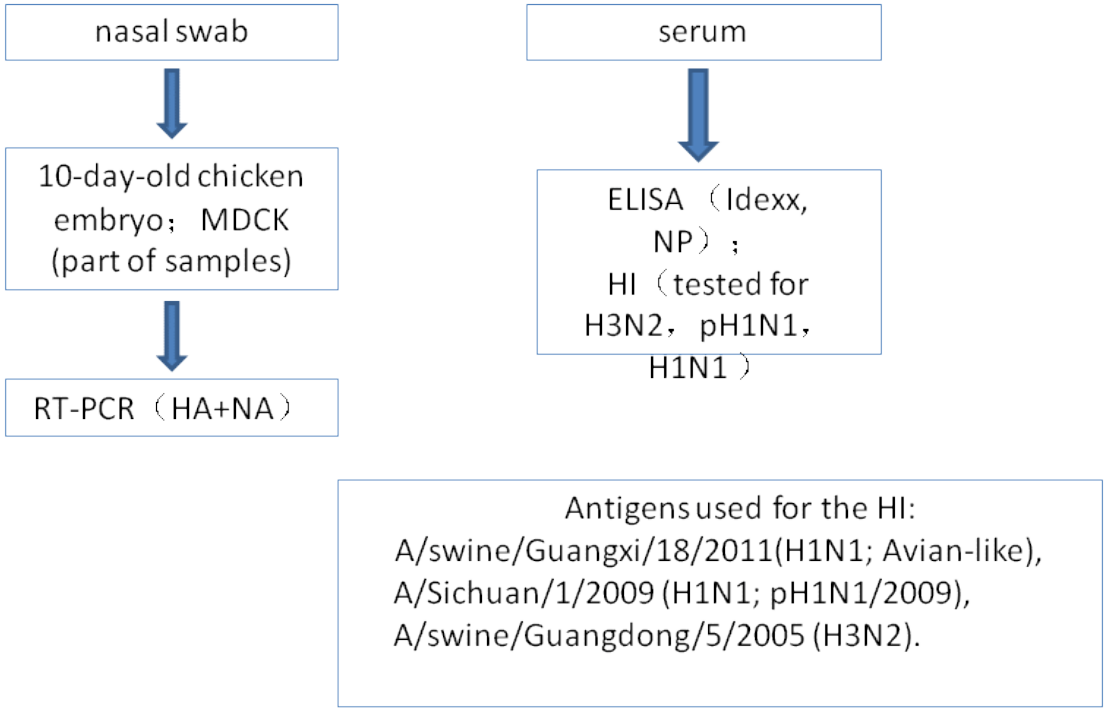
Flow chart: EPT+ and H7N9 Work flow for detection and identification of influenza virus

China sampling sites for Phase 1 and 2

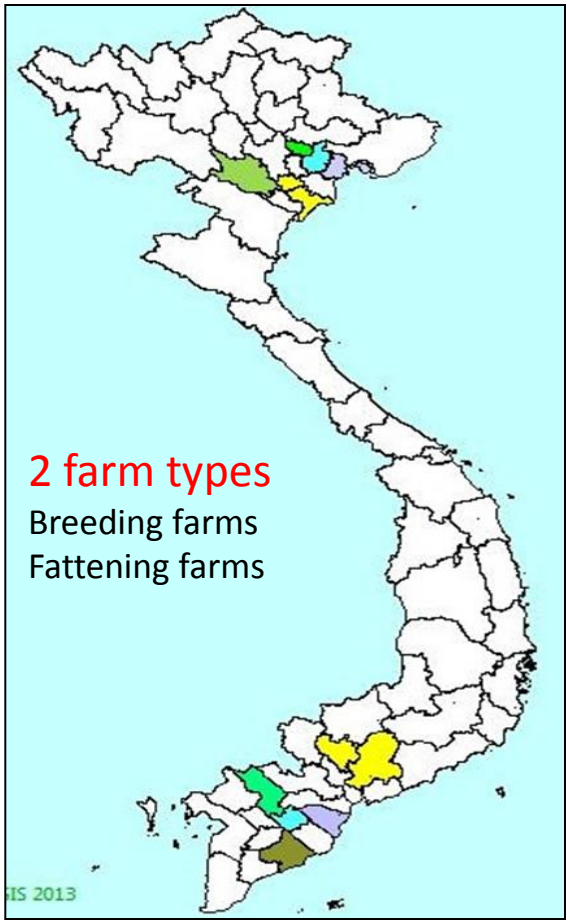
Guangdong and Hunan provinces

China EPT+ Sample Management and Lab. Testing Flow Chart

Flowchart of EPT+ lab.testing



Vietnam Phase 1 sampling sites



Vietnam Phase 2 sampling sites

Six Farm types

1: commercial breeding/fattening farms; previously virus positive

2: commercial breeding/fattening farms with value chain link to virus positive farms

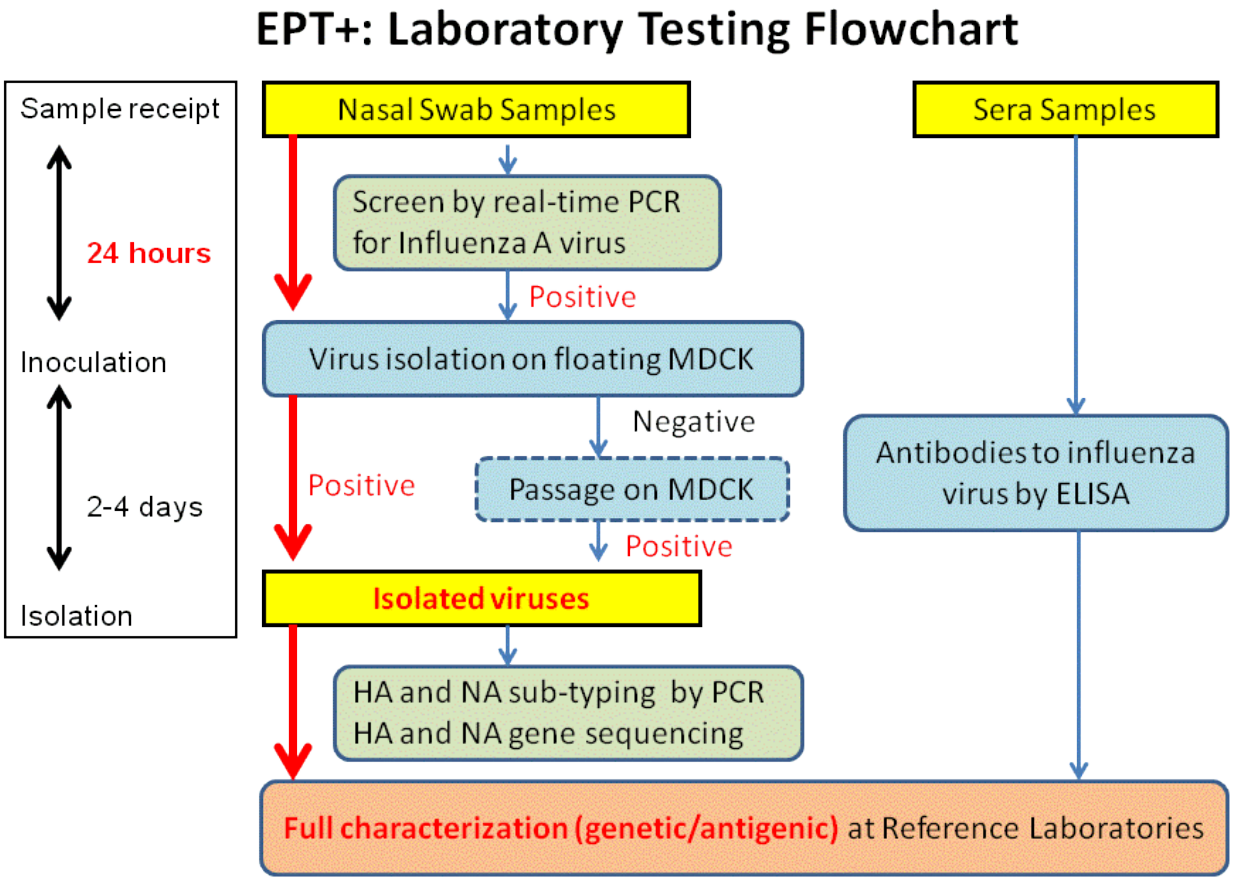
3: commercial breeding farms; newly sampled

4: commercial fattening farms; newly sampled

5: small holders in a village with good size of poultry production

6: slaughter houses with value chain link to virus positive farms/area

Vietnam EPT+ Sample Management and Lab. Testing Flow Chart



EPT+ Initial Results (Phase 1)

Serosurveillance (ELISA)

Bangladesh

- Overall Influenza A sero-positives in ducks (59% of 6323):
  - Backyard flocks - 68%
  - Intensive flocks - 57%
  - Grazed flocks - 52%

- Overall sero-positives in pigs:
  - Slaughterhouses - 50% of 664 sampled pigs
  - Farms - 13%

Virological Surveillance

Bangladesh

- Positive (M-gene) by real time RT-PCR in ducks sampled - 0.29% (18 samples)
- No Positives in pigs
- 18 M-gene positive samples sent to Padova, Italy, for genome sequencing
- Analysis of field questionnaires data on-going (risk factor??).

EPT+ Initial Results (Phase 1)

Serosurveillance (ELISA)

China

- Overall sero-positive (Influenza A) - 35.5%:
  - Hunan Province - 34.9%
  - Guangdong Province - 36.1%

Virological Surveillance

China

- Virus positive: 0.5% (55/10078)
- Fifty five (55) Influenza A virus isolated
- **40** Eurasian avian-like swine (H1N1) viruses [(EA) H1N1]
- **12** 2009 Pandemic H1N1 influenza virus (pH1N1/2009)
- **3** H1N2

EPT+ Initial Results (Phase 1)

China

Results of HI test

Province	Quantity	(EA)H1N1		pH1N1		H3N2	
		+	%	+	%	+	%
Zhongshan Guangdong	965	308	31.9	218	22.6	44	4.6
Jiangmen Guangdong	193	146	75.6	29	15	2	1
Total	**1158**	**444**	**38.3**	**247**	**21.3**	**46**	**4**

Serosurveillance (ELISA)

Vietnam

Period 1 Sampling

- From 60 farms, 39 farms were serology (Influenza A) positive
- Higher seropositive in breeding (95.7%) against fattening units (48.6%)
- Sero-positivity was highest in the South (67%) compared to North (63%)

Virological Surveillance

Vietnam

Period 1 Sampling

- Ten farms (17%) were SIV positive from which 103 SIVs were isolated, with seven farms from the south.
- These latter results indicate wide prevalence of SIV and genetic variation (different subtypes and lineages) of SIVs in Viet Nam during the sampling period

Serosurveillance (ELISA)

Vietnam

Period 2 Sampling

- From 30 farms, 17 were sero-positive with higher seropositive in breeding (67%) versus fattening (50%)
- Sero-positivity was highest in South versus North.

Virological Surveillance

Vietnam

Period 2 Sampling

- Four breeder farms (17%) were SIV positive.
- SIVs H3N2, and H1N2 isolated in Vietnam

Coming Up! ☺☺

EPT+ NEWSLETTER

EMERGING PANDEMICS THREATS

MARCH 2014 • ISSUE 1

INCREASING THE DETECTION OF INFLUENZA VIRUS DIVERSITY IN HIGH ANIMAL-HUMAN-ECOSYSTEM RISK INTERFACES

HIGHLIGHTS

- **China completed laboratory testing of samples**
- **Viet Nam has developed suitable methodology for efficient detection and isolation of Swine Influenza Viruses (SIVs)**
- **Bangladesh conducted surveillance in pig populations and established one health laboratory networking**
- **Review of influenza risk models**

PROJECT BACKGROUND

To improve the understanding of livestock as a reservoir for potential pandemic influenza viruses in South East, East and Southern Asia, the USAID is funding efforts coordinated by FAO to undertake influenza surveillance as part of the broader Emerging Pandemic Threat (EPT) Program in South and South East Asia. The aim of the EPT+ program (a subprogram of the EPT) is to increase the detection of diverse progenitor viruses with zoonotic potential within targeted agro-ecological systems in countries where the greatest genetic diversity are likely to occur. The focus of the program include: (a) surveillance for influenza viruses, (b) identification of risk factors for virus diversity, and (c) determination of the role of value chains in virus diversity.

ACTIVITIES AND FINDINGS- PHASE 1

BANGLADESH

The EPT+ project in Bangladesh facilitated the capacity building of the five diagnostic laboratories, established surveillance in swine population for Influenza virus and, provided an opportunity to improve surveillance including testing of samples for H7N9 retrospectively. Fifty nine percent (59%) of 6323 ducks sampled during phase 1 were Influenza A seropositive by ELISA; sero-positivity was greatest in backyard flocks (68% of 2764) compared to grazed (52% 0f 3464) and intensively reared flocks (57% of 95). Sampling in pigs at slaughterhouses (50% of 664) provided higher sero-positive results compared to sampling on farms (13% of 3573). Using real time RT-PCR assay 0.29% (n=18) samples from ducks were (M-gene) positive whilst no pig samples were positive. Pending from EPT+ phase 1 are the full genome sequences for the 18 M-gene positive samples that were sent to OIE/FAO/EC reference centre/laboratory for AI, IZS Padova, Italy, and the field questionnaires data from Bangladesh.

CHINA

In China, all pig farms (n=20) and slaughterhouses (n=9) sampled were serology (by ELISA) positive. Of the virological samples tested, 0.5% (n=55) were positive. Virus was detected in both types sampled (slaughterhouses and farms). The viruses isolated included types that are commonly found in pigs in these areas and elsewhere in the world including H1N1 Eurasia, H1N1 pandemic, H1N2 and H3N2.These strains are different to those more commonly found in poultry. The study also found that there was diversity among the viruses in some locations and that there were examples of co-existence of more than one virus in the same herd and the introduction of viruses in herds during the study period. How the viruses circulate between pigs and human in the selected area is unknown. For this reason there has been collaboration with health authorities (China and US Centers for Disease Control) where workers on swine farms and slaughterhouses have also been sampled.

EPT+ Phase 2 (Next Steps)

China

- Phase 1 found that there was diversity among the viruses in some locations, co-existence of more than one virus in the same herd, and introduction of viruses in herds during the study period.

- Therefore, further study will be carried out on pig farms and SH in areas with greatest concentration and diversity of influenza viruses.

Vietnam

- Expanded surveillance
  - More number of farms in selected locations
  - Different production type and scale
- Targeted surveillance
  - Longitudinal study of SIV-positive farms for virus evolution
  - Farms along the market chain of SIV-positive farms

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