

Animal H5N1 Highly Pathogenic Avian Influenza (HPAI)

Global and regional perspective
Special focus on Asia

GRIPAVI conference
22-24 November 2011

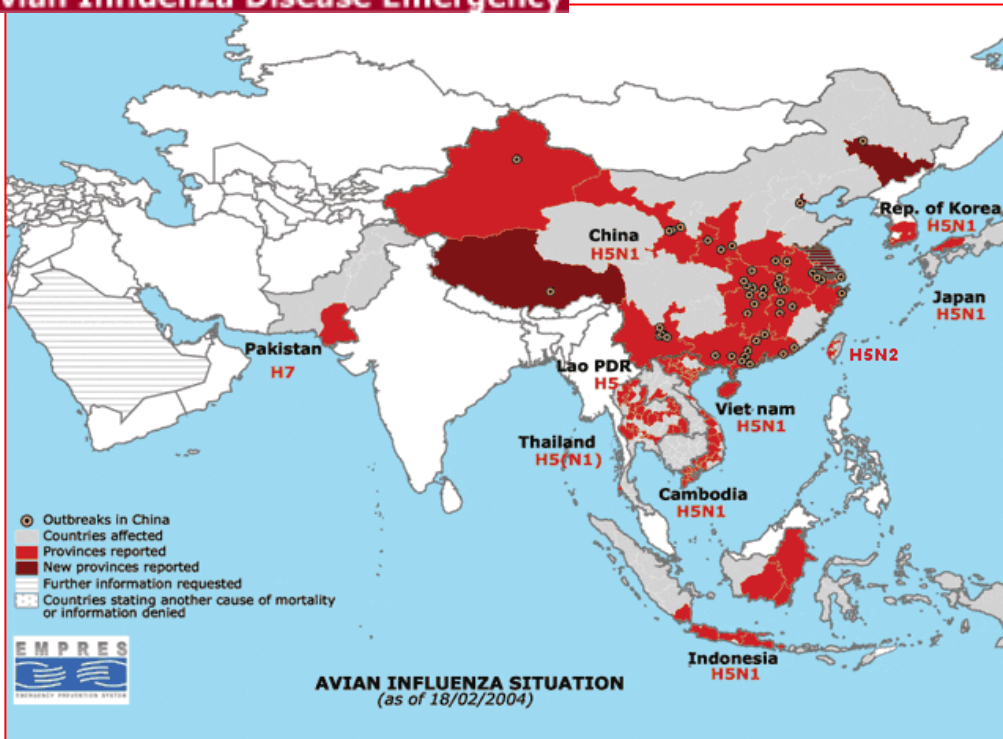
Vincent Martin, FAO ECTAD China

1

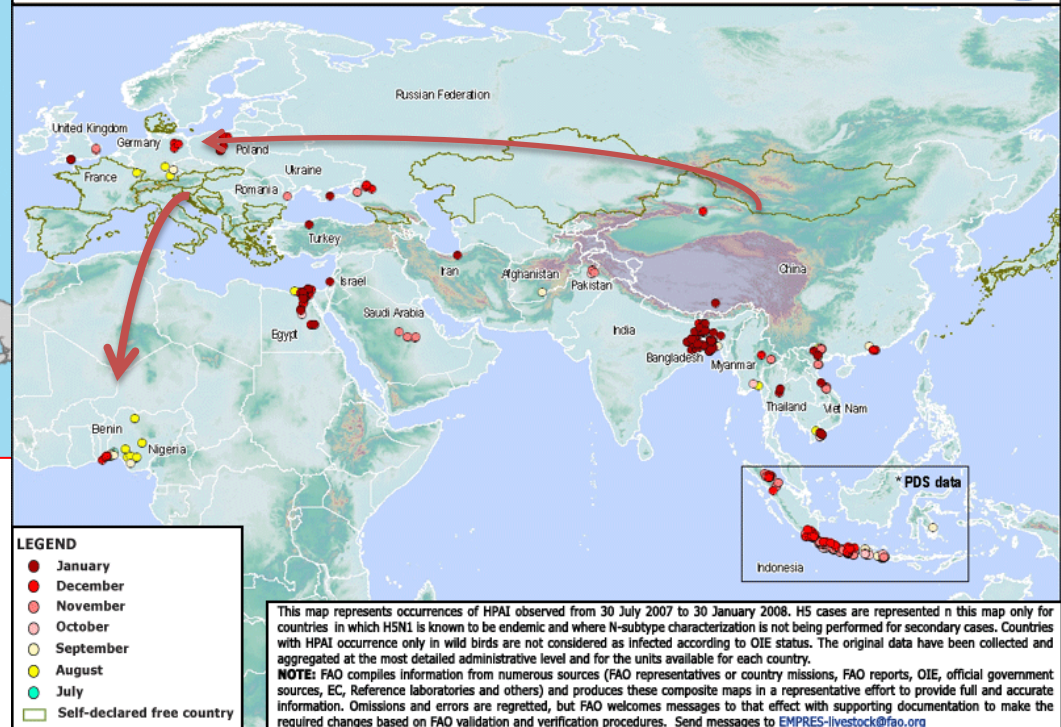
WHERE HAVE WE COME FROM... ?

2004:

10 countries affected, more than 120 million dead or culled birds - Huge social and economical impacts



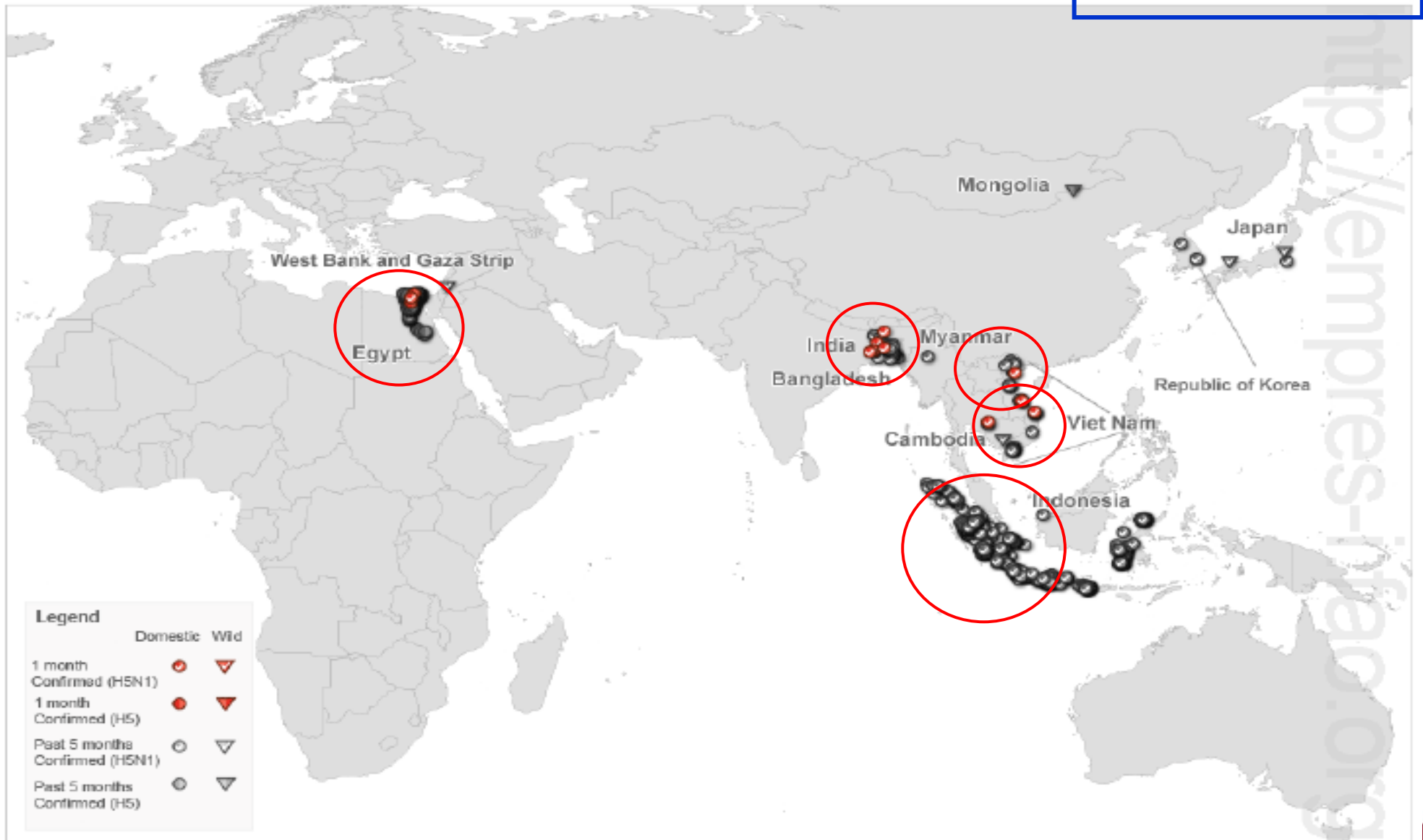
HPAI outbreaks: Outbreaks reported in poultry and cases in wild birds
Six months period (30 July 2007 - 30 January 2008)



...And now

Highly Pathogenic Avian Influenza H5 confirmed outbreaks

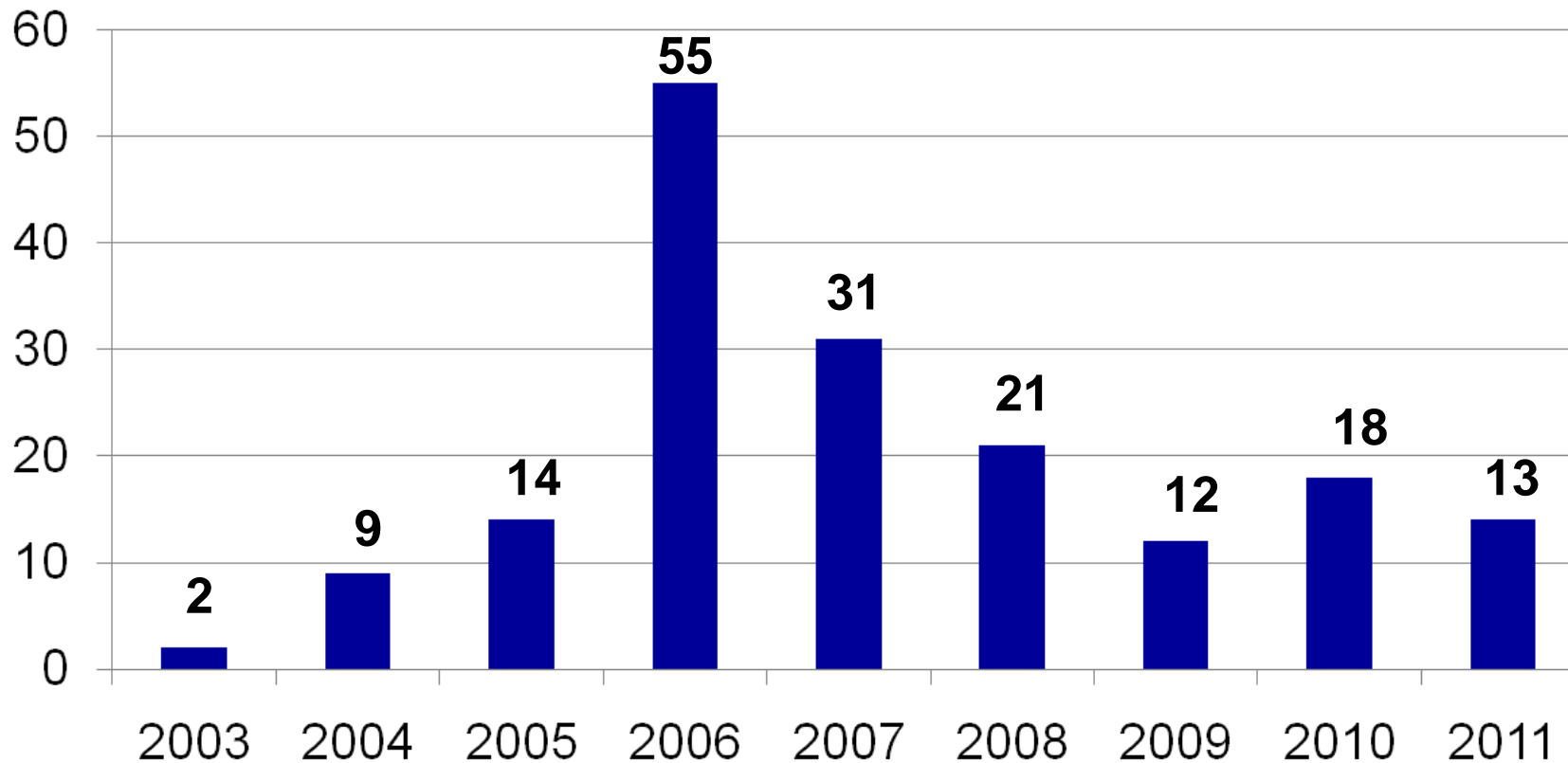
22 March - 22 September 2011



Decrease in Countries Reporting H5N1 Outbreaks

Numbers of HPAI H5N1 infected countries over time

13 countries in 2011:

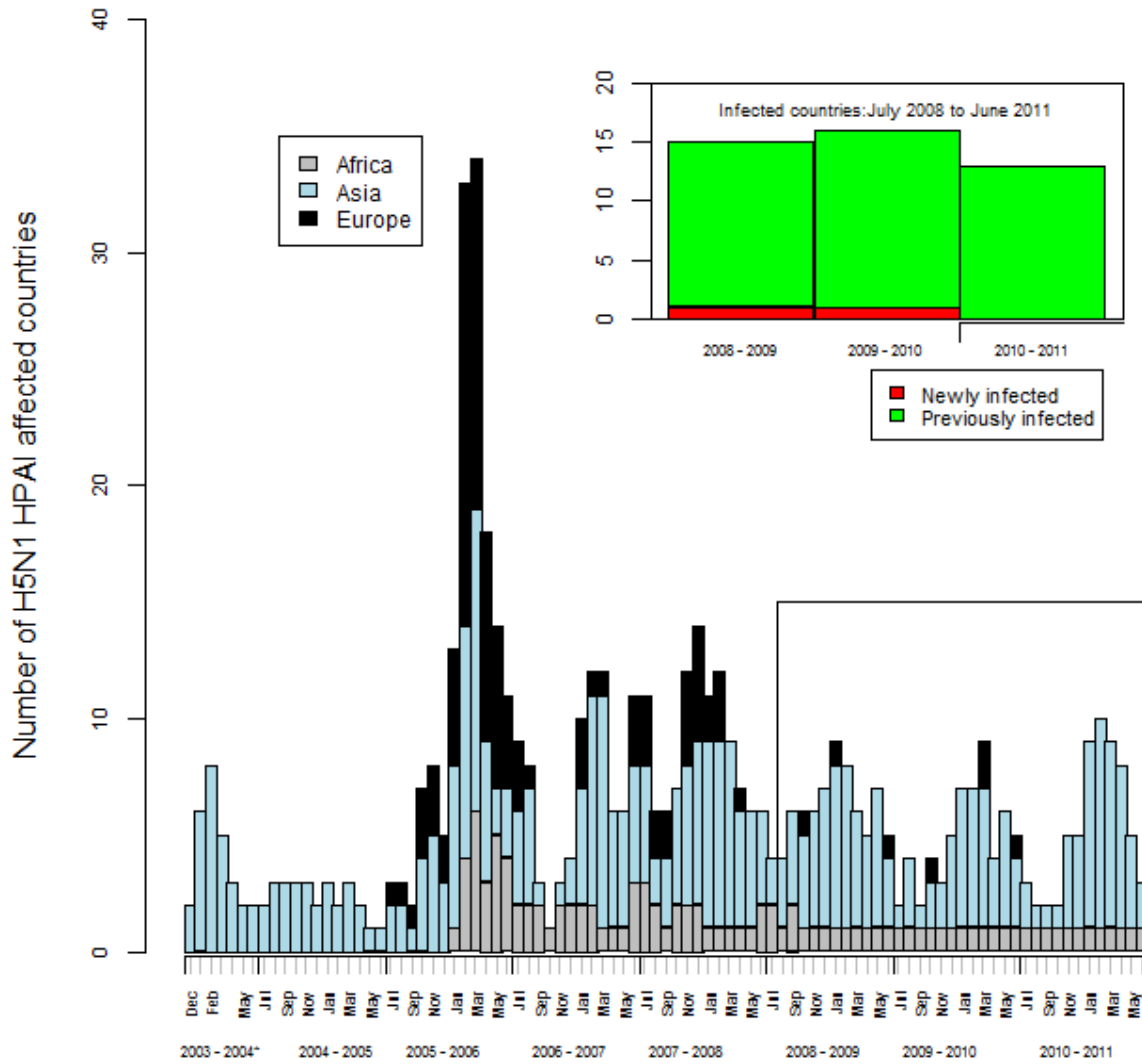


- Bangladesh
- Burma
- Cambodia
- Egypt
- China (HK)
- India
- Indonesia
- Israel
- Japan
- Rep. of Korea
- Mongolia
- Palestinian Auton. Teri.
- Vietnam

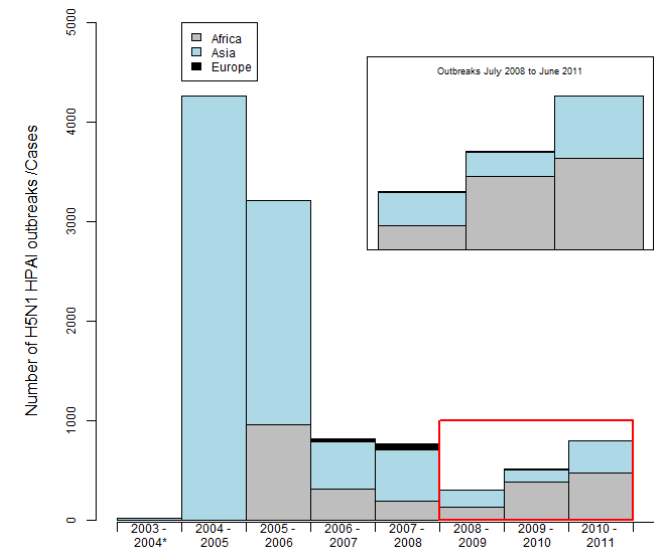
Source : FAO EMPRES-i; OIE WAHID

Global Disease Trend

October 2010 – September 2011



- No newly infected country
- 12 countries/territories reported outbreaks (11 in Asia)
- Seasonal trend with peak during January – March
- Increasing trend of annual reported outbreaks from 2008

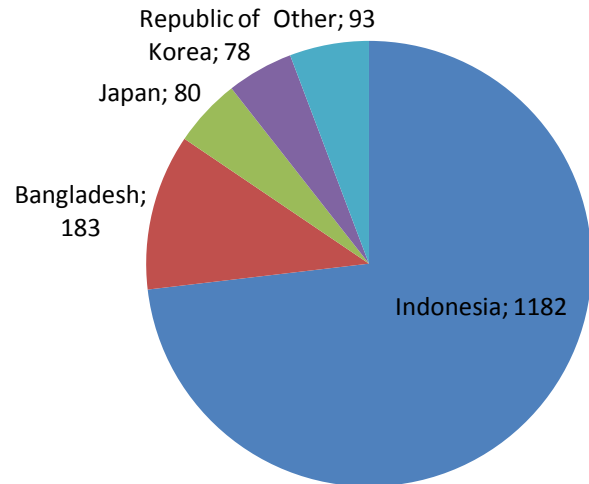


Regional Context – 2011

- Poultry:
 - 80% of poultry outbreaks since 2003 in East/SE Asia
 - 3/5 endemic countries (China, Indonesia, Vietnam) in East/SE Asia
 - Conditions (free ranging ducks, poultry density, market chain dynamics) conducive to endemicity
- Human:
 - 68% of human cases since 2003 in East/SE Asia (WHO reports)
 - 80% CFR in GMS countries during Nov 2010 – March 2011 period (WHO reports)

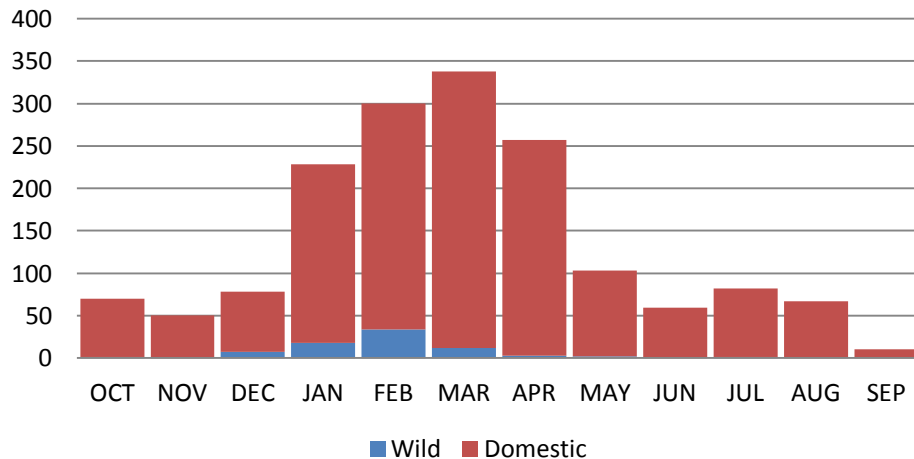
Disease Situation in Asia

October 2010 – September 2011

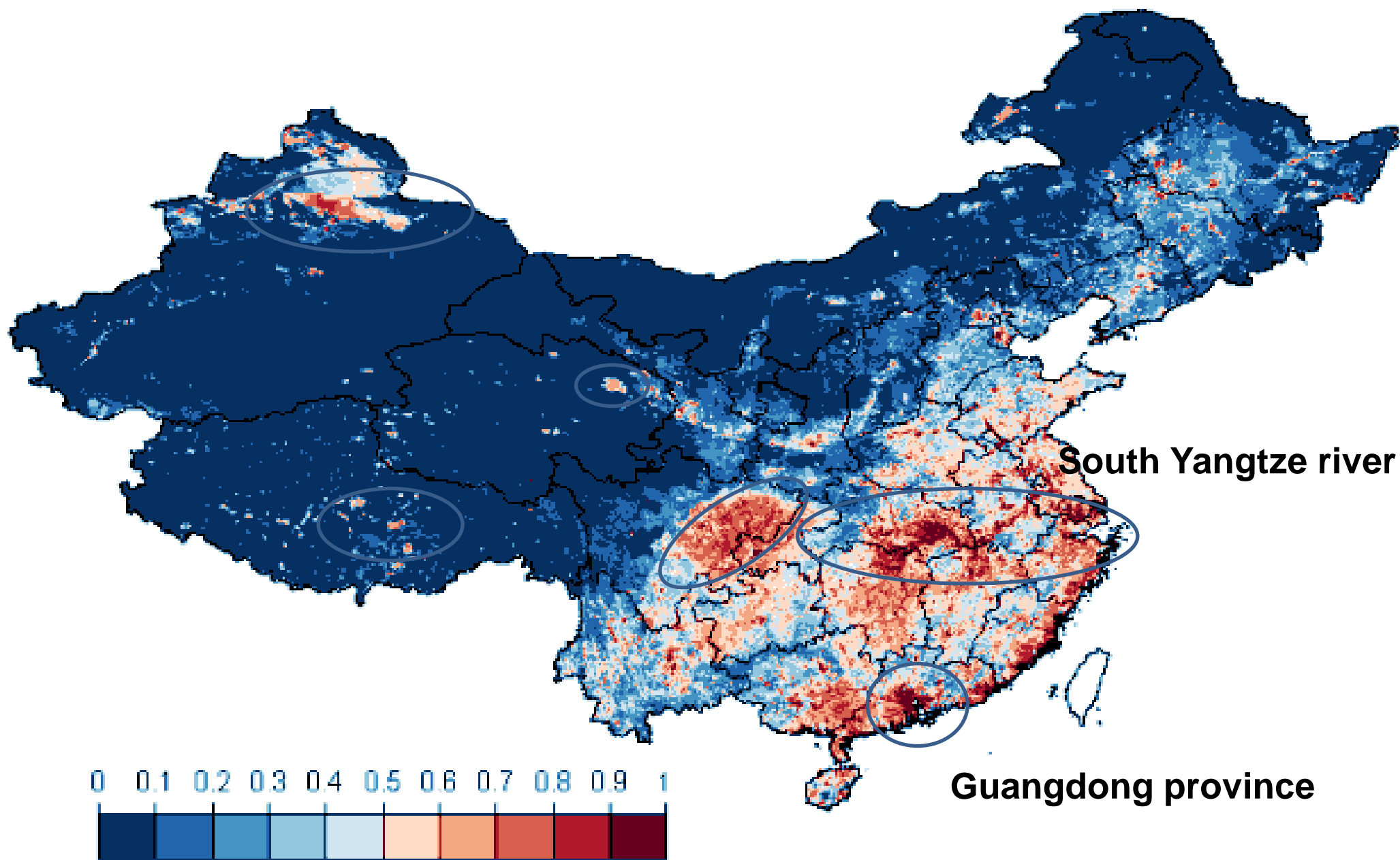


- 1,616 outbreaks reported in 11 countries
 - Bangladesh*, Cambodia*, Egypt*, India, Indonesia*, Israel, Japan, Myanmar, RO Korea, Viet Nam and West bank of Gaza
- 78 outbreaks in wild animals (~5%)
 - Japan (61), Hong Kong (7), RO Korea (6), West Bank (1), Bangladesh* (1), Cambodia* (1) and Mongolia (1)

Number of HPAI Outbreak/case in Asia

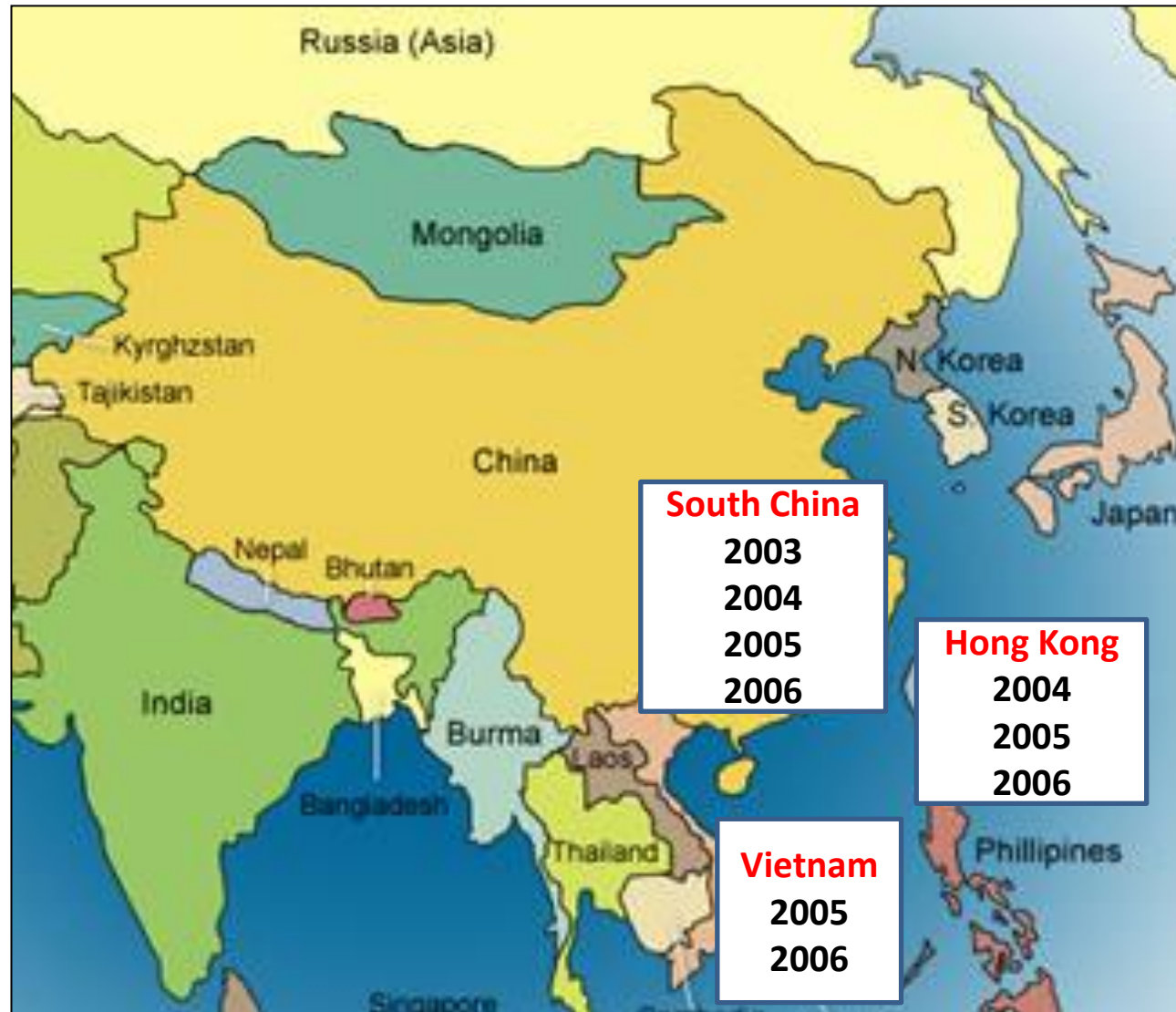


* Also reported human cases



HA clade 2-3-2 viruses **2003-2006**

Limited to South China and Vietnam



HA clade 2-3-2 viruses **2007-2008**

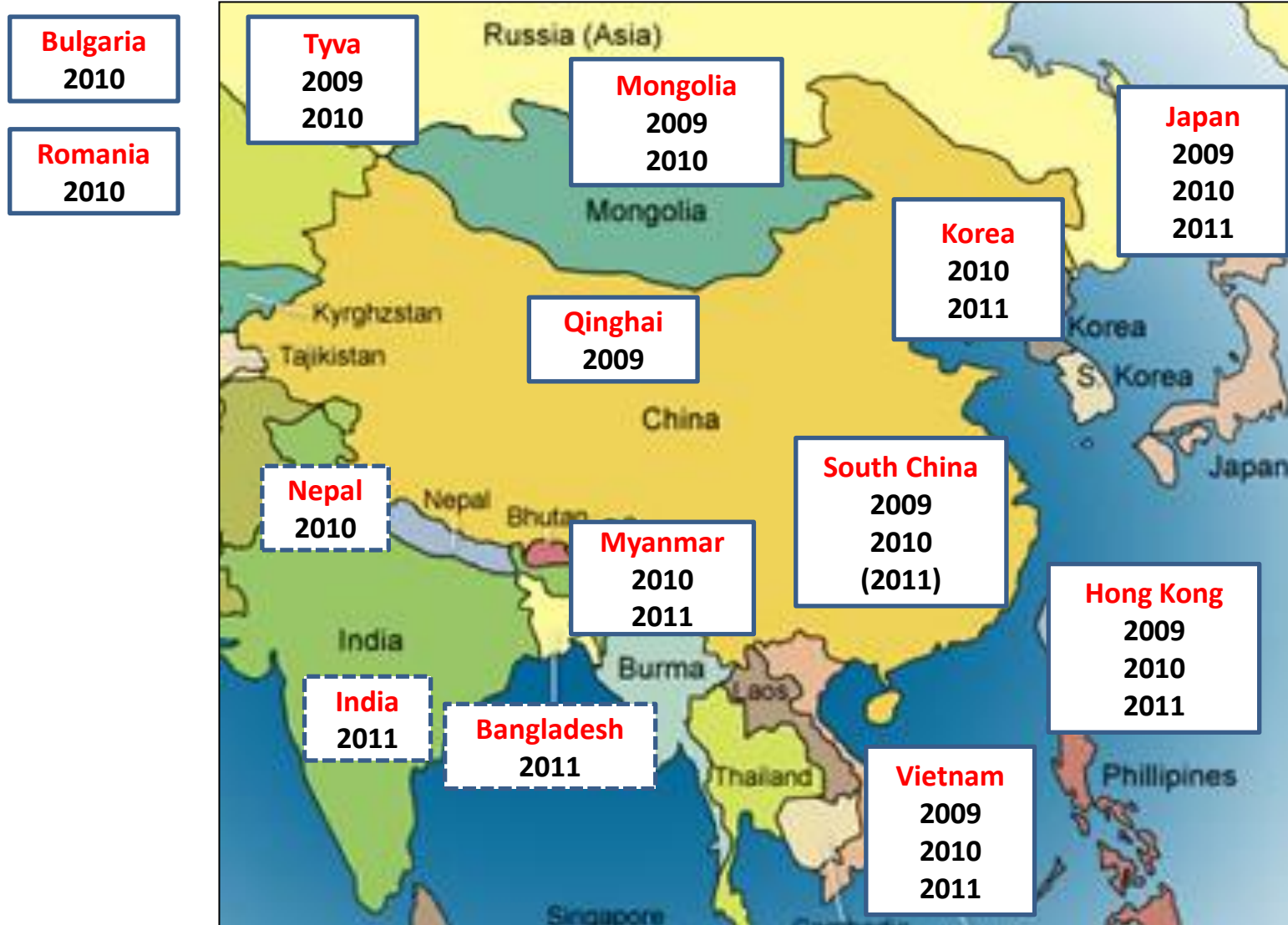
Spread to East Asia and rooted in wild birds



52% detected in wild birds

HA clade 2-3-2 viruses 2009-2011

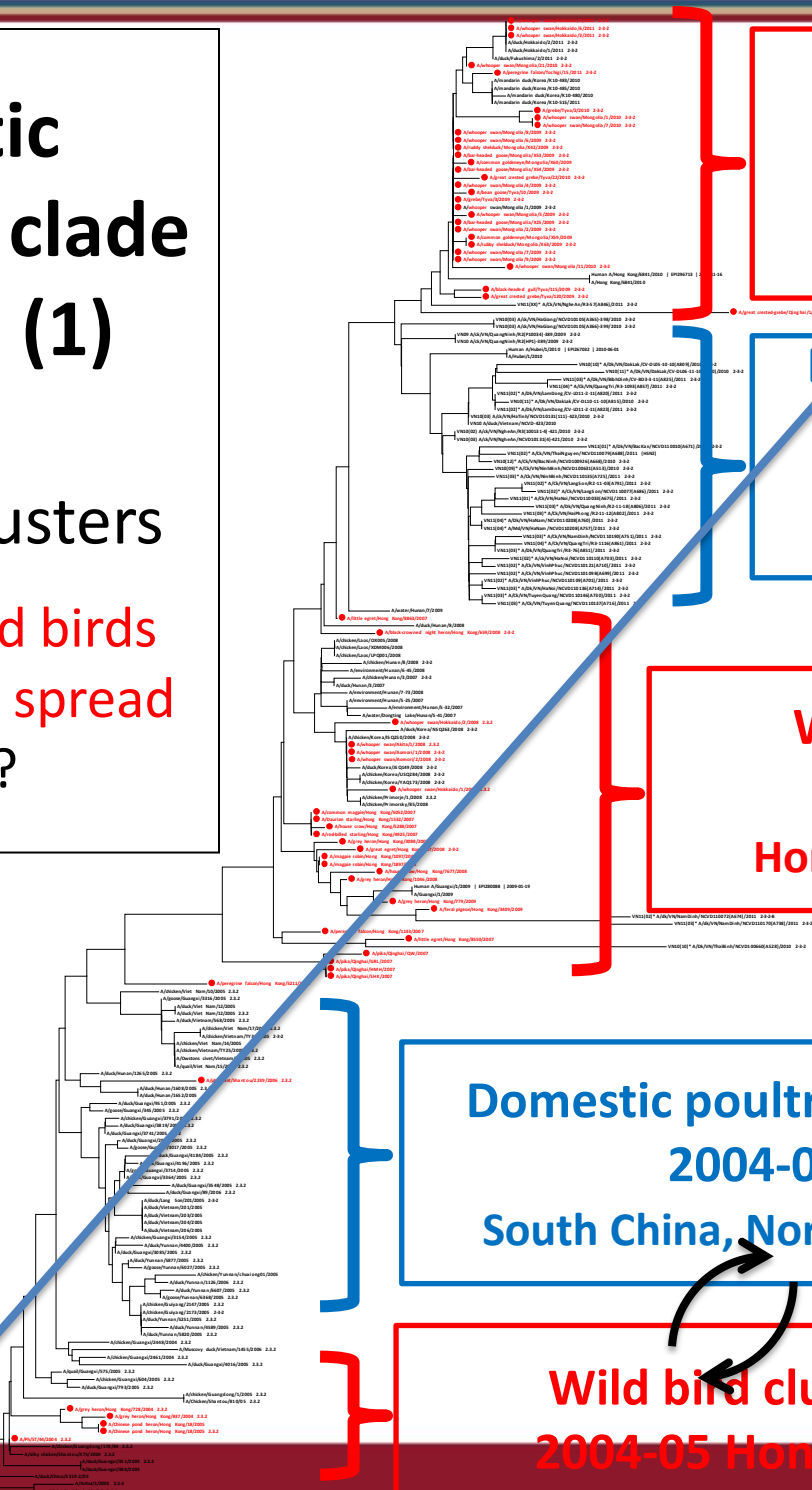
Expansion to South Asia and Europe



Phylogenetic relationship of clade 2-3-2 viruses (1)

Divided into 5 clusters

Is there a role of **wild birds** for maintenance and **spread** of clade 2-3-2?



Wild bird cluster 3
2009-11
Mongolia, Qinghai, Tyva, Japan, Korea, Bulgaria

Domestic poultry cluster 2
2010-11
Vietnam (2.3.2A, 2.3.2B), Myanmar, (China)

Wild bird cluster 2
2007-09
Hong Kong, Japan, Korea

Domestic poultry cluster 1
2004-05
South China, North Vietnam

Wild bird cluster 1
2004-05 Hong Kong

(Wild bird in red)

Vaccine efficacy test in chicken against H5N1 viruses

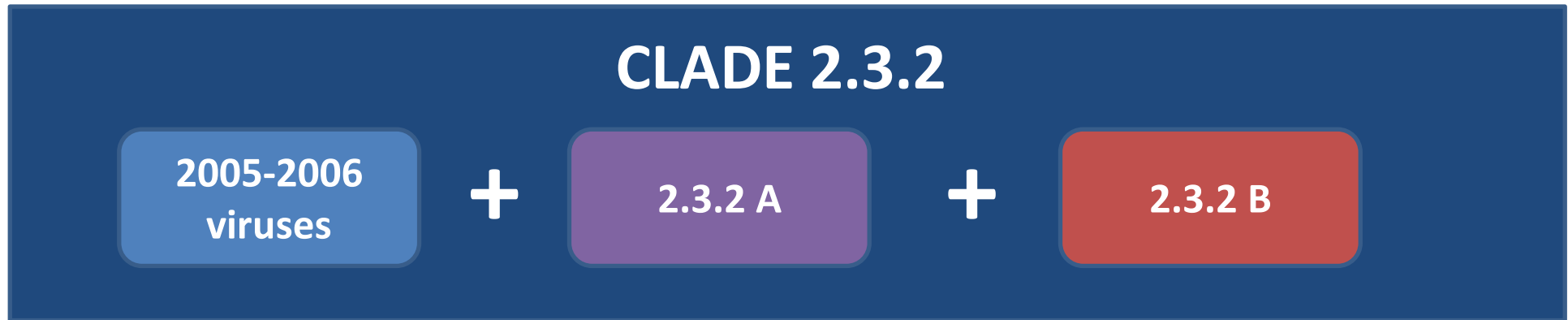
2010-2011

Vaccines		Re-1 (2shots)				Re-5 (2shots)			
Challenge virus (HA clade)		1	2.3.4	2.3.2	2.3.2	1	2.3.4	2.3.2	2.3.2
				A	B			A	B
Mortality of vaccinated birds after challenge		0%	0%	0%	50%	10%	10%	0%	80%
HI antibody titer before challenge (log2)	HI antigen= Vaccine-like virus	7.4	7.9	6.5	6.9	7.4	8.1	7.7	8.0
	HI antigen= Challenge virus							6.8	2.8
Virus excretion in dead birds		NA	NA	NA	+++	+++	+++	NA	+++
Virus excretion in survived birds		+	+	+	+	+	+	+	+

For each experiment 5 non-vaccinated control were included for challenge, and 100% of them died in all experiments.

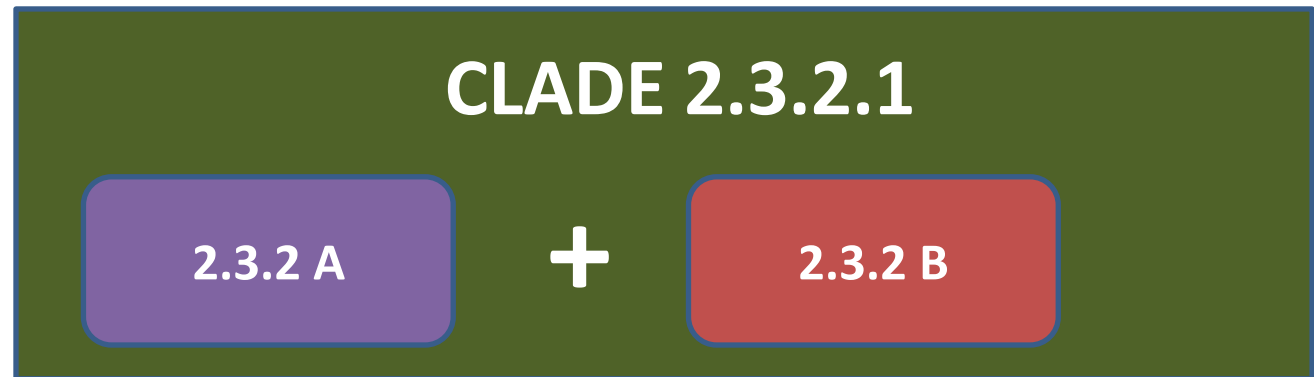
(Ken Inui; FAO – VN)

OLD Nomenclature



NEW Nomenclature

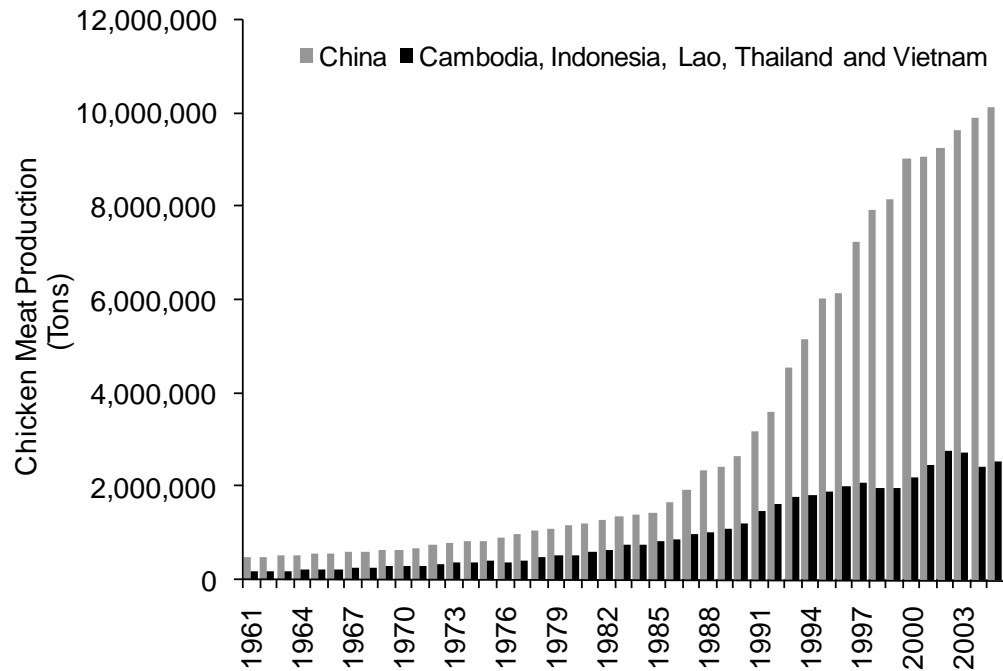
(still to be endorsed)



(Filip Claes; FAO Rome)

... And Where Are We Going?

Regional context



Annual production of chicken meat for China and cumulated values for Cambodia, Indonesia, Lao, Thailand and Vietnam (FAOSTAT 2006)

- **Livestock production**

China: National statistics indicate that while the human population less than doubled between the end of the 1960s and 2005, an even more significant increase took place in pig population that was multiplied by ten in the same period, a growth path that tests our capacity for superlatives (FAOSTAT 2011, Wallace, 2010)

- **Economic Growth and Urbanization**

- **Encroachment livestock and wildlife habitat**

- **Ecotones:**

The boundary or transition zone between two adjacent ecological systems

The extent and types of ecotones potentially contributing to disease emergence tend to increase exponentially with natural habitat loss and economic development in the absence of sound urban and regional planning.

Regional context

Drivers for emergence

- Demographic and social changes, along with associated environmental alterations, and even the efforts to control disease, have contributed to the severity of the problem (Wilcox and Gubler, 2005)

Disease Situation in Asia

Determinants for disease persistence



... a paradigm shift

Holistic or system perspective

Capture the richness and depth and interaction of society and natural systems (Colwell, 1998)

Eco-epidemiology expressing the need for a broadened concept of causality in epidemiology (Kaufman and Poole, 2000):

- **Fast variables** with periodicities on the scale of days, weeks (pathogen life cycles, human infection events)
- **Slow variables** with periodicities on the scale of decades or longer (climate change)

Summary

- Virus is still circulating, evolving and entrenched in some countries, more specifically in Asia
- Wide spread of H5N1 clade 2.3.2 in wild and domestic species in 2011
- As of now, no significant change related to virulence characteristic
 - Virulence gene, receptor binding and antiviral resistance
- Need to revisit control and surveillance strategy
- Need to capture all the experience gained so far
 - To address EIDs in general
 - Strengthened opportunities for integrated research

Thank you for your attention

Acknowledgement

- Pawin Padungtod, ECTAD Regional Office
- Daniel Schar, USAID
- FAO teams at country, regional and HQ levels
- Colleagues from national authorities
- National and international experts
- USAID