Swine Influenza Surveillance: Hong Kong / China & Sri Lanka

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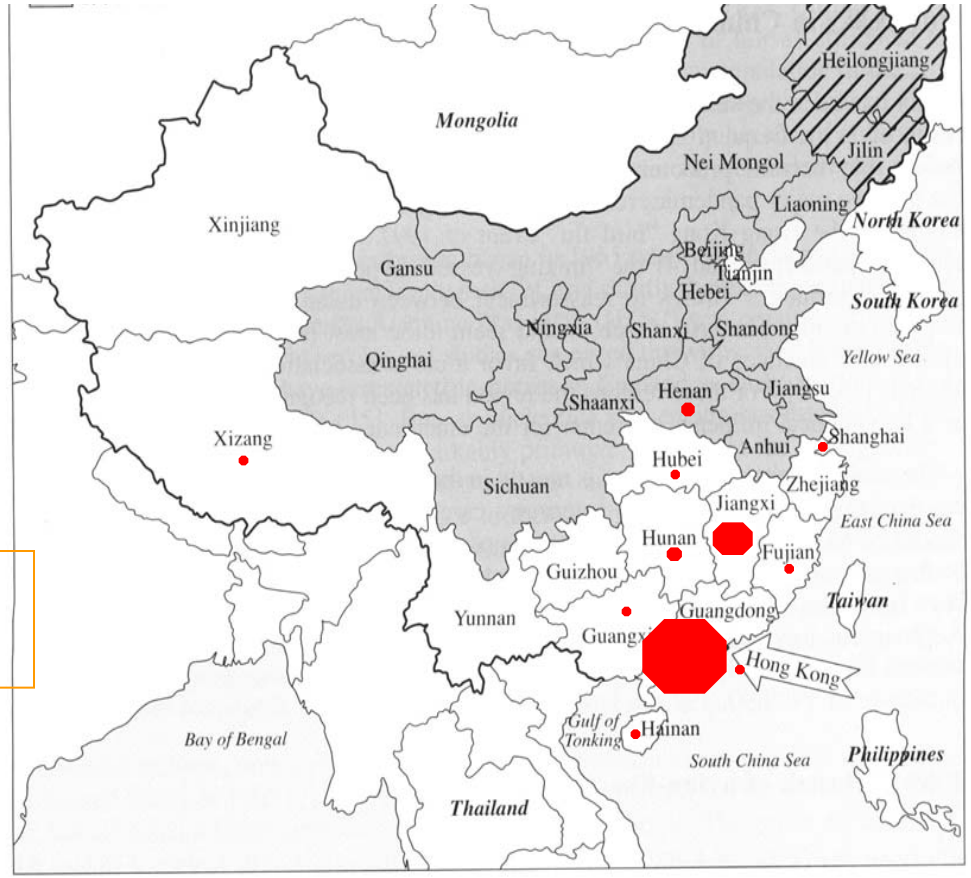
Abattoir surveillance in Hong Kong/China

Hong Kong

- **4000–5000 pigs are slaughtered each day.**
- **Only 5-20% of pigs are from Hong Kong.**

•May 2009 to date:

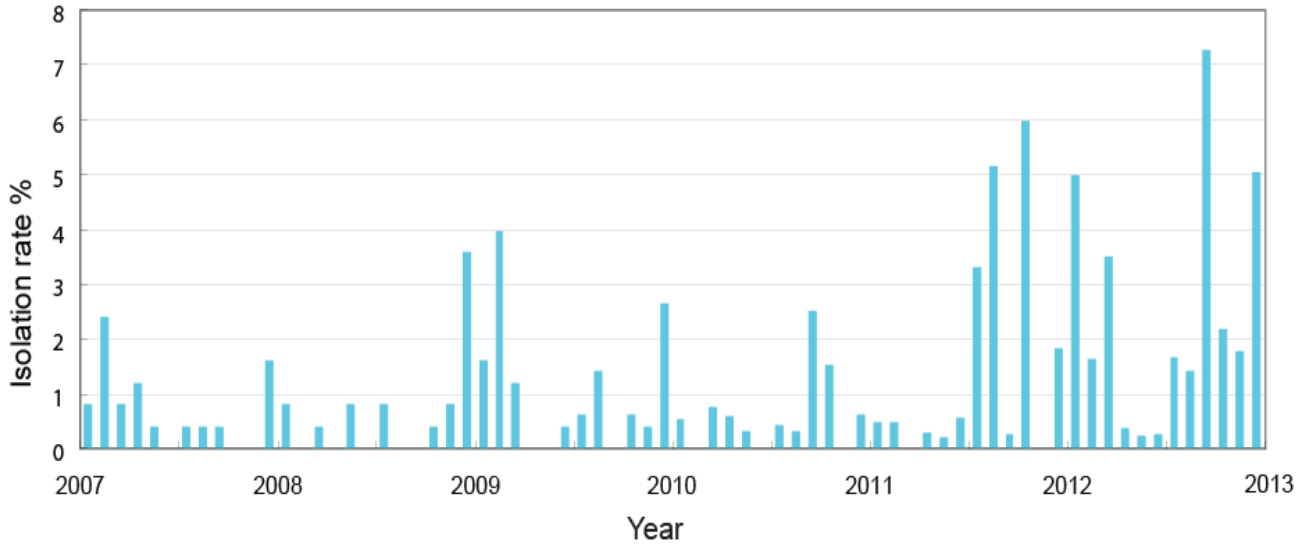
• 504 swabs collected monthly, 100 sera



Abattoir surveillance in Hong Kong: Isolation rates increased over recent years

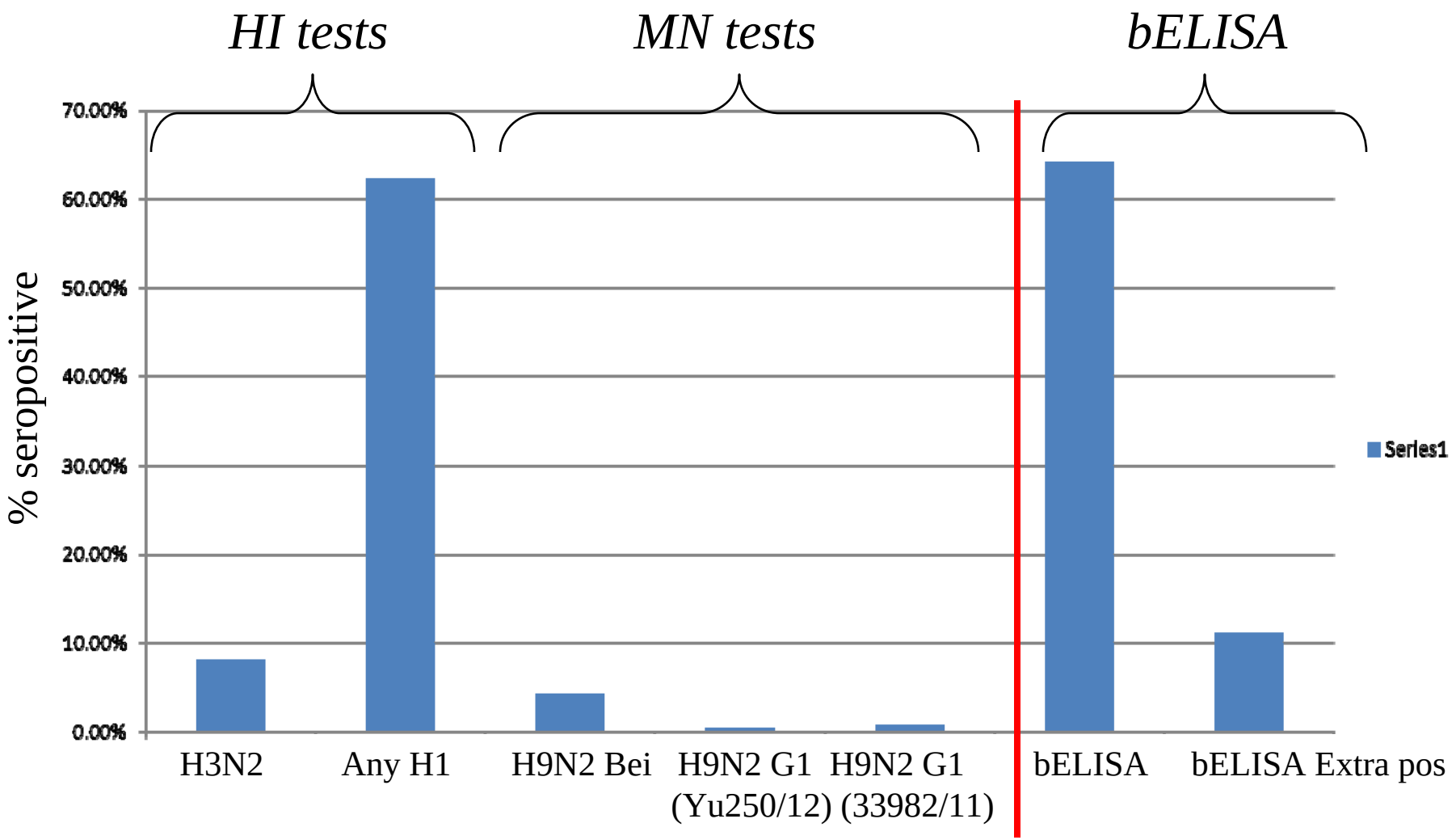
Hong Kong

2007-2012

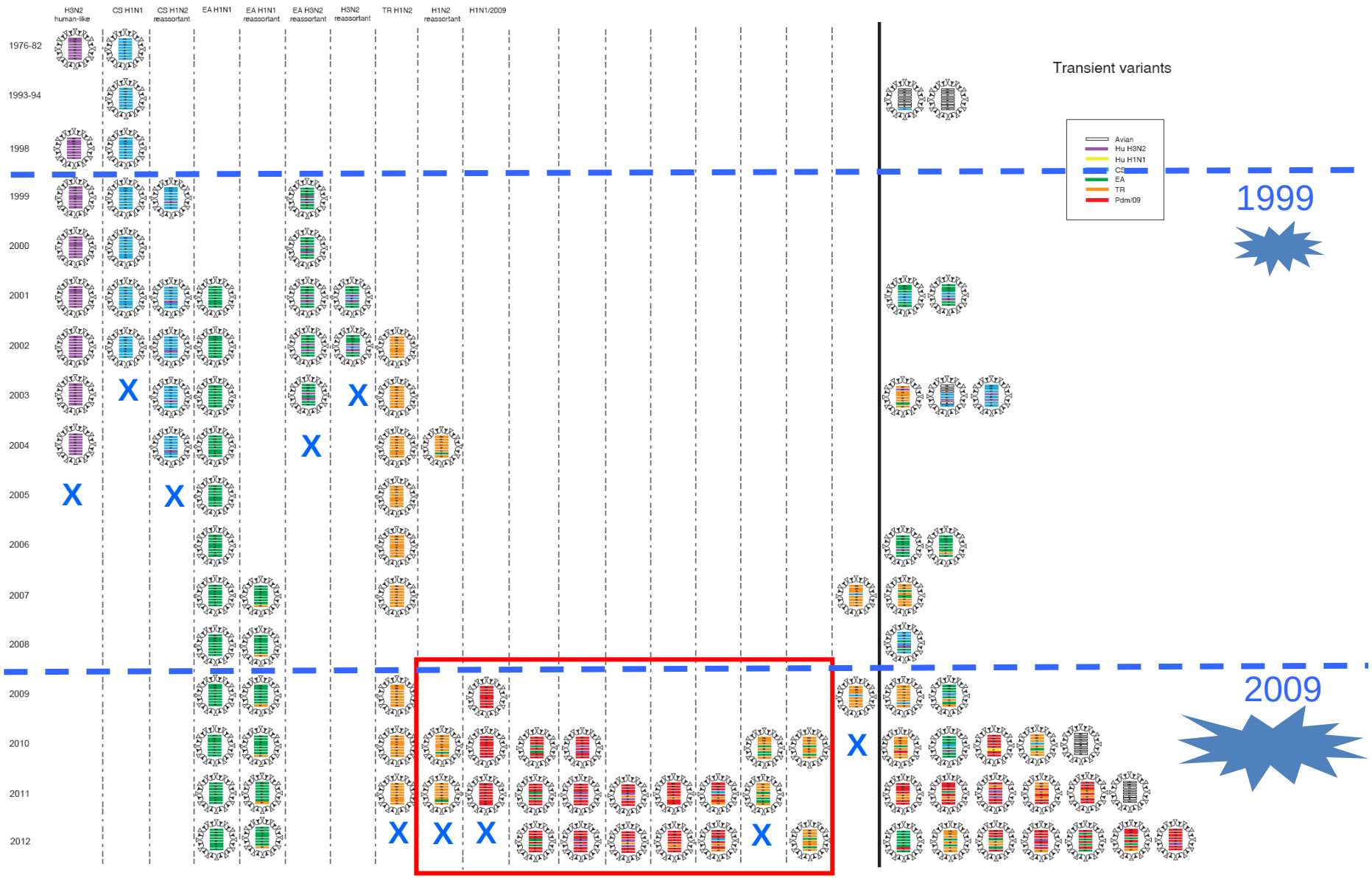


Year	2007	2008	2009	2010	2011	2012	Total
Isolates	21	19	47	25	78	124	314
Samples	3024	3024	5027	3960	5067	4908	25010
%	0.69%	0.63%	0.93%	0.63%	1.54%	2.53%	**1.26%**

Influenza sero-prevalence in swine sera collected April 2011-12 (n=260)



Swine Influenza Genotypes after 2009

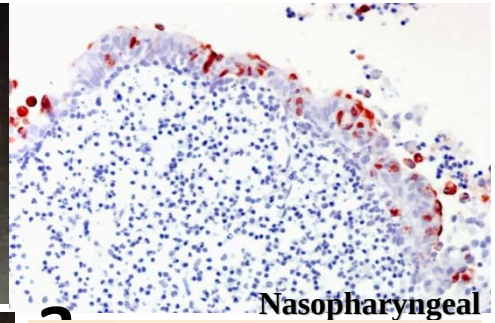


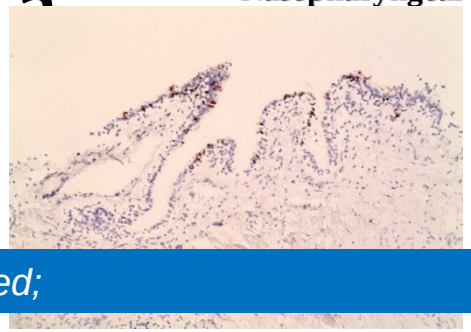
Increase of swine influenza viruses with pandemic H1N1 genes

	% genotypes			
	2009 (n=47)	**2010 (n=25)**	**2011 (n=78)**	**2012 (n=124)**
EA or TGIG swine No Pdm genes	80.9	68.0	23.1	25.0
Pure Pdm viruses	19.1	28.0	6.4	0.0
Pdm Reasssortants	0.0	4.0	70.5	75.0

Risk-assessing swine viruses

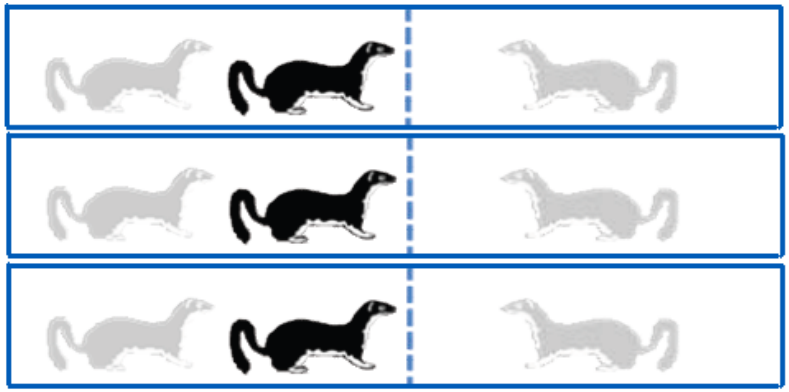
Tropism for human upper respiratory tract
Ex vivo cultures





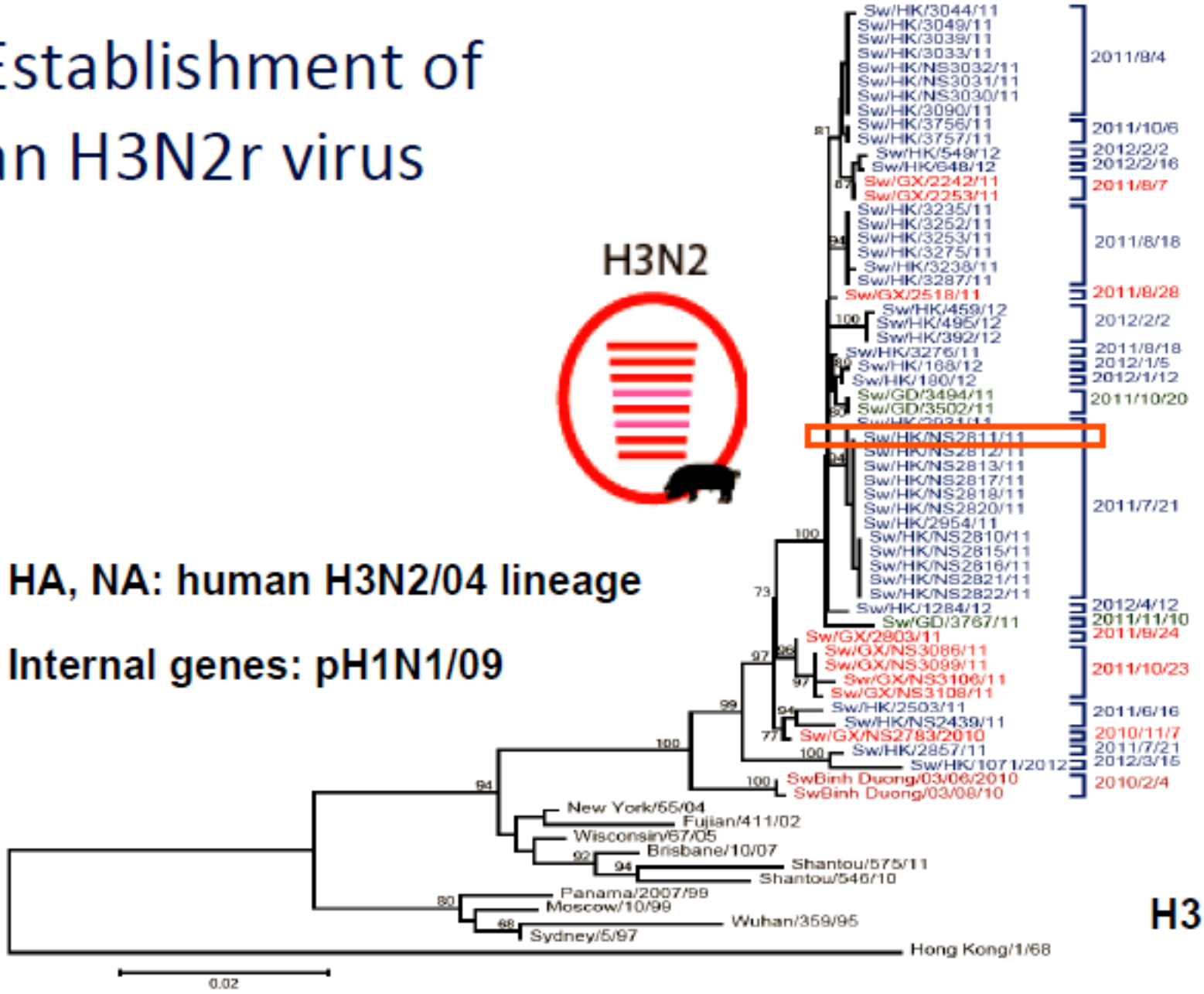
Nicholls et al., 2007 Nat Med;

Transmission in ferrets



Human infection
Serological herd immunity

Establishment of an H3N2r virus

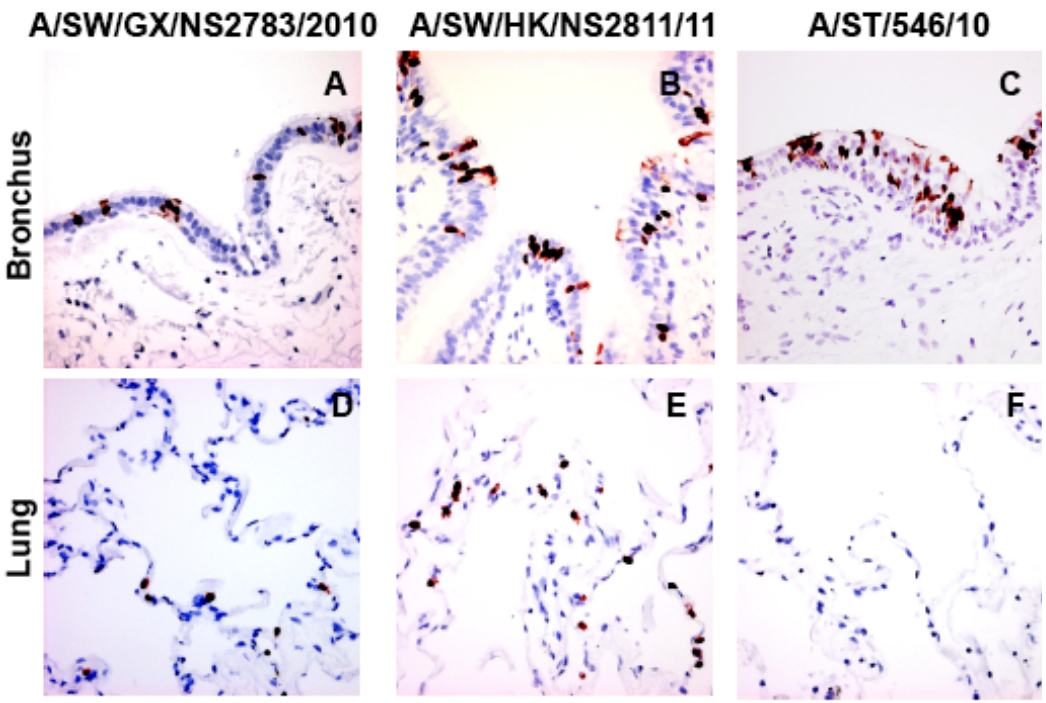


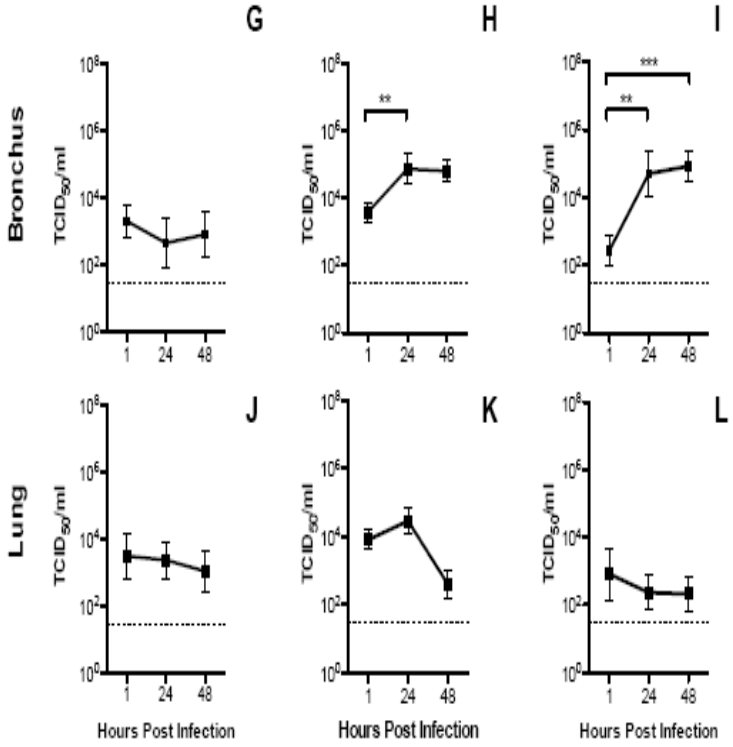
HA, NA: human H3N2/04 lineage

Internal genes: pH1N1/09

H3 HA

H3N2v infection in *ex vivo* human respiratory cultures





Pandemic reassortant H3N2 virus

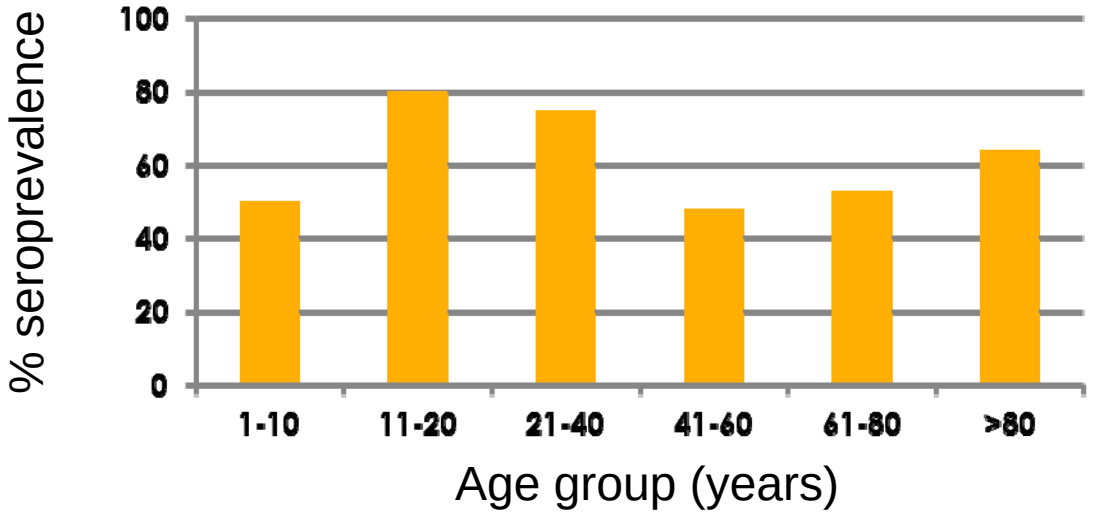
Airborne transmission in ferrets

	CA7-pH1N1/09	NS2811-H3N2r
detection of virus shedding (dpc)	4,7,11,25	(-)
virus shedding/detected period (days)	4,6,8,5	(-)
seroconversion (15 dpc)	2/4	1/4
seroconversion (35 dpc)	4/4	1/4

Population sero-prevalence (Hong Kong)

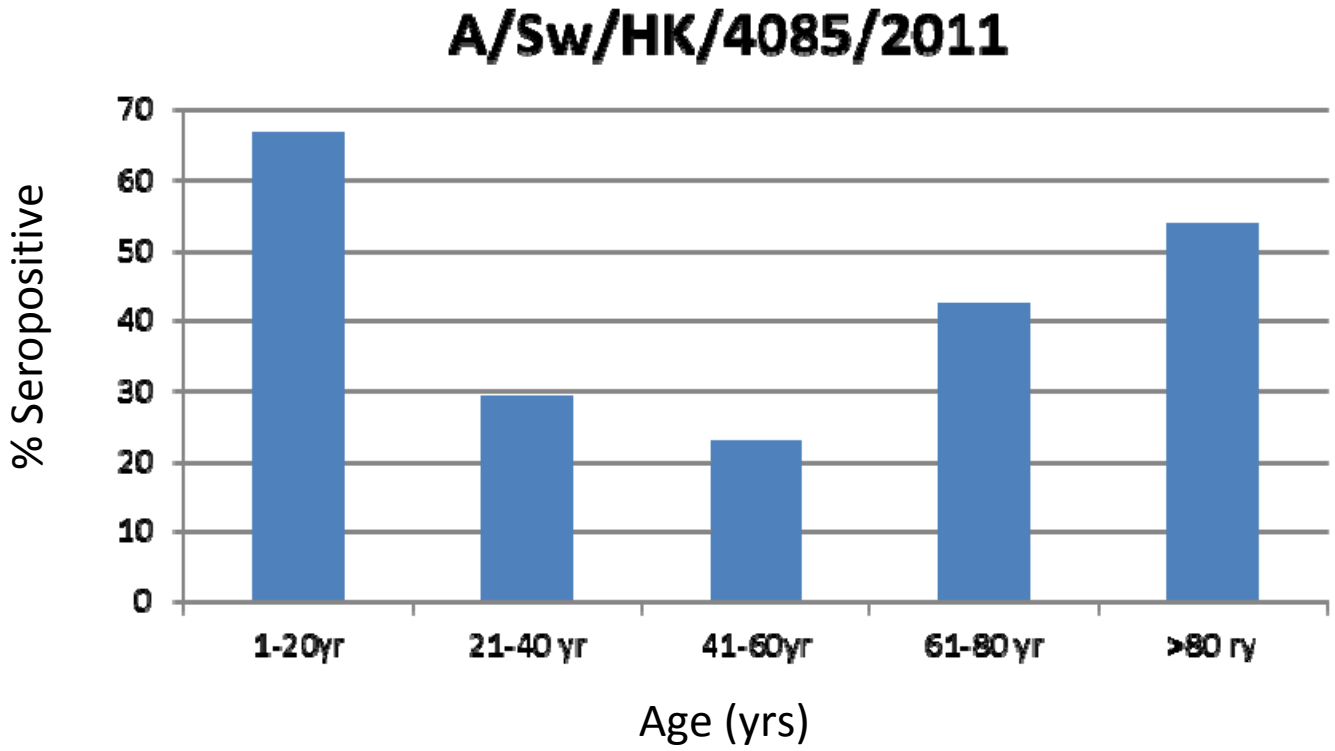
A/sw/Guangxi/NS2783/10 (H3N2)

HI titres ⩾40



Risk assessing swine influenza viruses

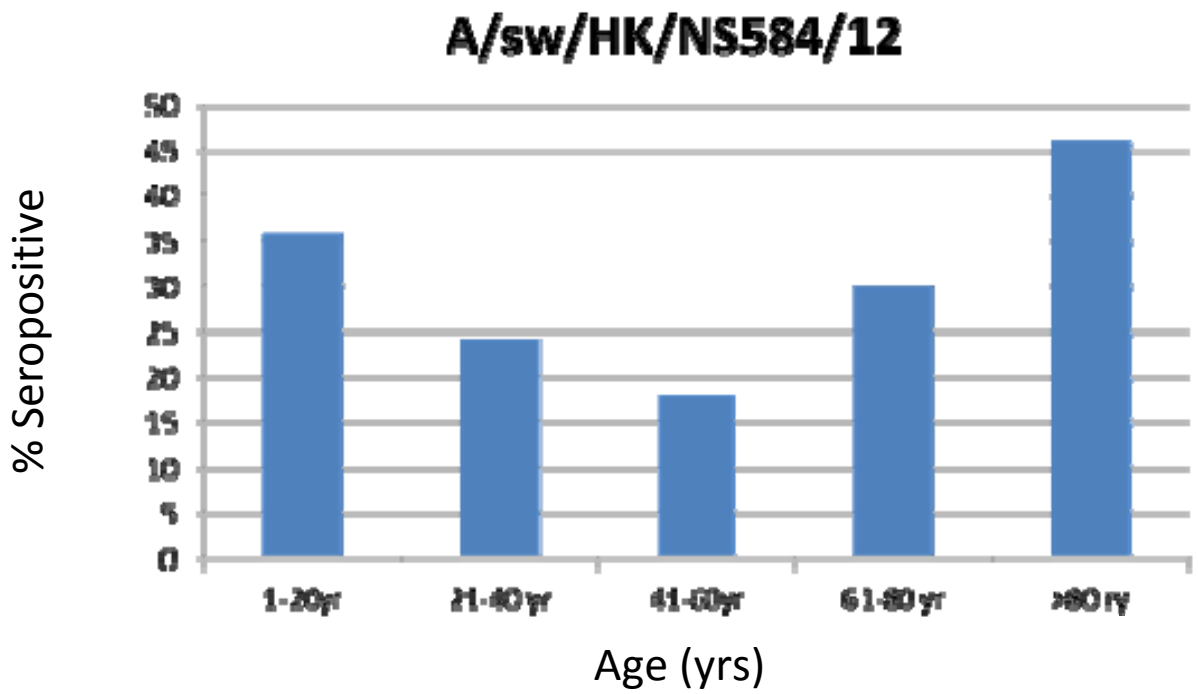
Age-stratified cross-reactive antibody in human population



Virus	Isolation date	Subtype	PB2	PB1	PA	HA	NP	NA	M	NS
A/Swine/HongKong/4085/2011	20-Oct-11	H1N2	TR	TR	TR	TR-H1	TR	TR-N2	TR	TR

Risk assessing swine influenza viruses

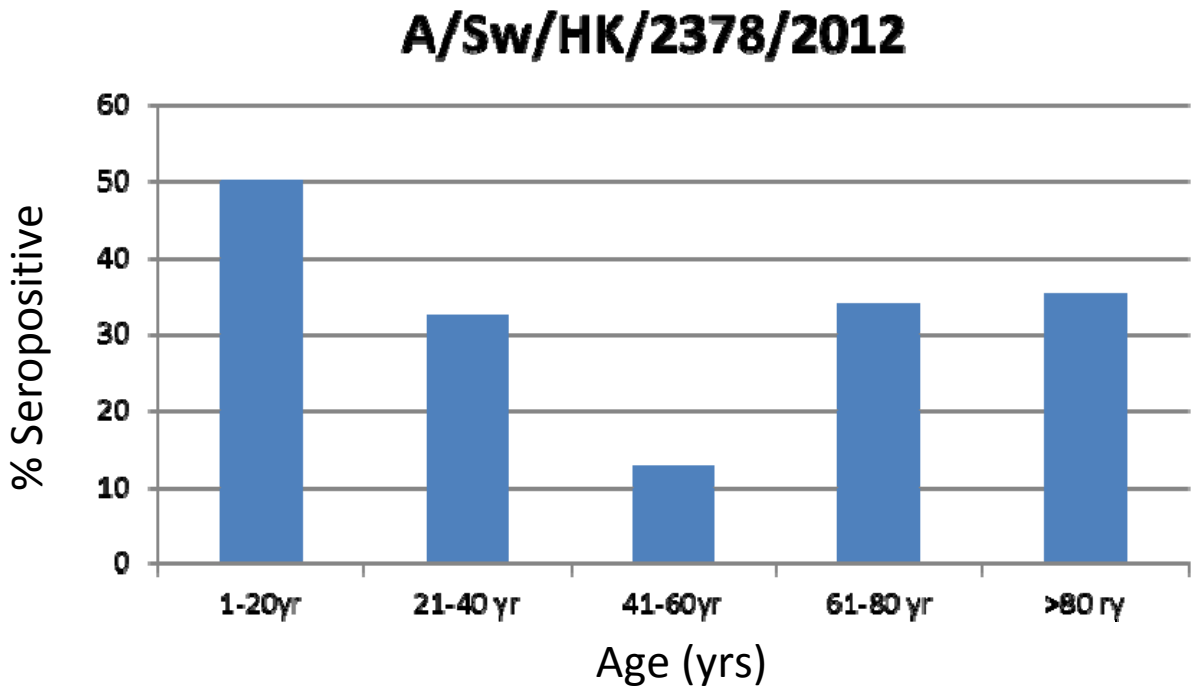
Age-stratified cross-reactive antibody in human population



Virus	Isolation date	Subtype	PB2	PB1	PA	HA	NP	NA	M	NS
A/Swine/HongKong/NS584/2012	16/Feb/12	H1N2	pH1N1	pH1N1	pH1N1	EA	TR	TR-N2	EA	pH1N1

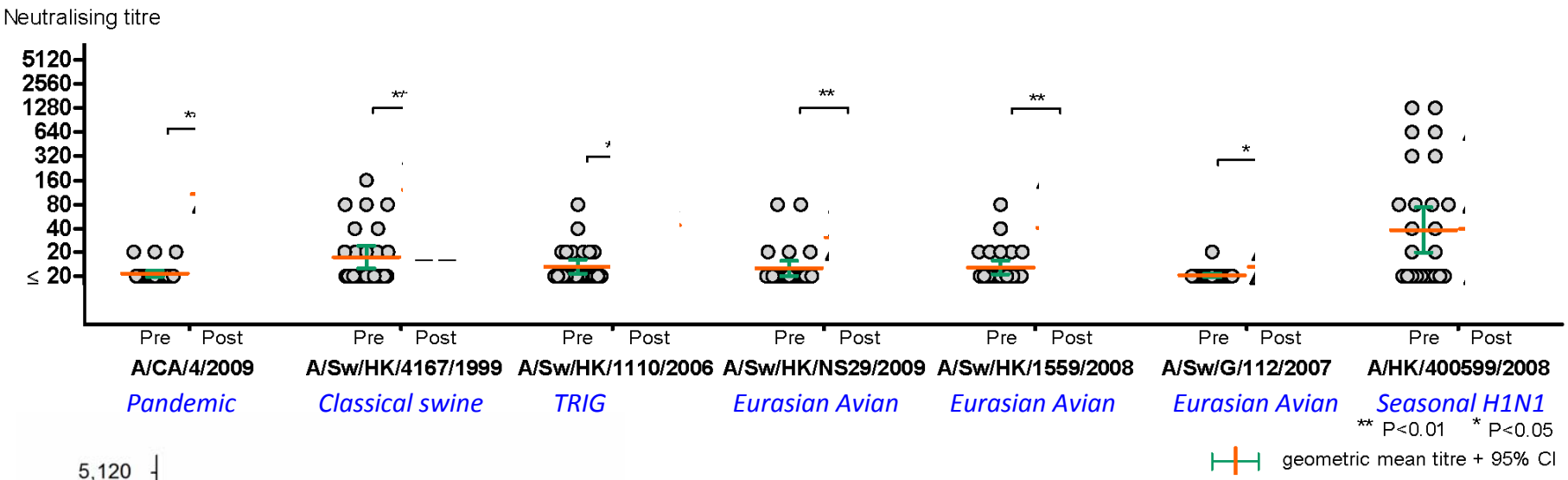
Risk assessing swine influenza viruses

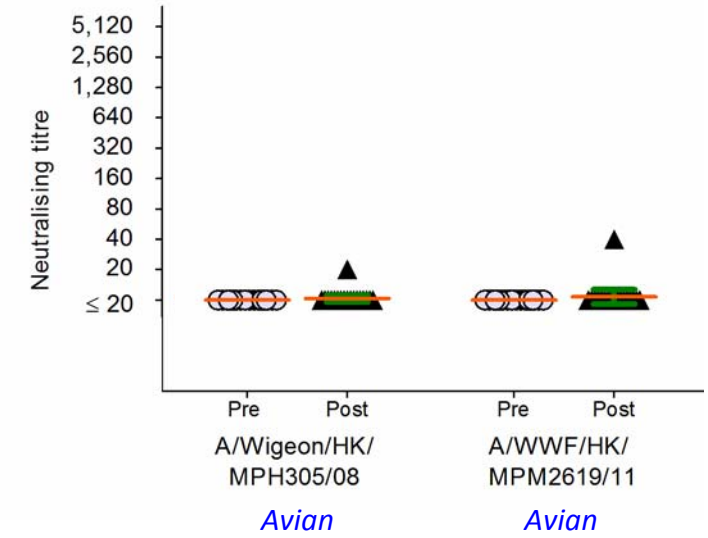
Age-stratified cross-reactive antibody in human population



Virus	Isolation date	Subtype	PB2	PB1	PA	HA	NP	NA	M	NS
A/Swine/HongKong/NS2378/12	5-Jul-12	H1N1	EA	EA	EA	EA	EA	EA	pH1N1	EA

Sero-conversion to pandemic H1N1 is associated with broadened MN cross-reactivity to other swine H1N1 viruses, but not to avian H1N1 viruses





Perera et al EID 2011

Swine surveillance in Sri-Lanka (2009-2012)

Demography

Swine Population - ~100000; Density - (7.7 per square Km)

Not imported on regular basis

Study: 2009 August - 2012 May

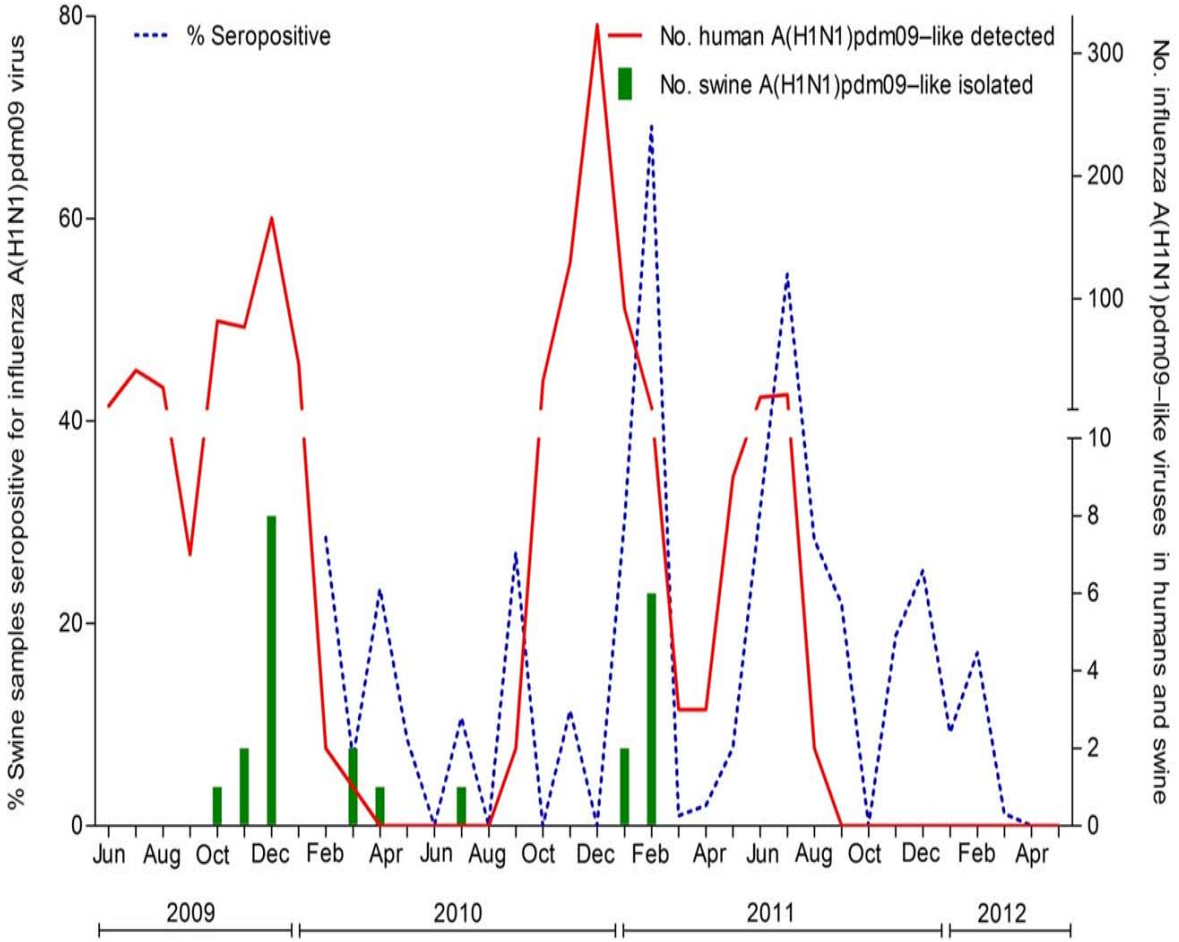
Nasal and Tracheal swab - 5420

Serum samples - 1773

- **Results: Viral isolation**
- 26 H1N1pdm-like (26/5420, 0.5%) viruses isolated
- 12 sampling occasions; 7 different swine farms
- No other swine influenza viruses were detected by virus isolation or serology
- Previously a "human-like" H3N2 was in widespread circulation in swine in period 2004 till 2009

Perera et al Emerg Infect Dis 2013; 19 (3); 481-484

H1N1pdm 2009 influenza virus activity in humans and swine in Sri Lanka (2009-2012) indicated repeated spill over from humans to swine without long-term establishment in swine



Perera et al Emerg Infect Dis 2013; 19 (3); 481-484

Thank you