OFFLU Technical Meeting for Head of Avian Influenza Reference Institutions and Swine Influenza Experts

OIE, Paris, 15th and 16th September 2009, Salon Ramon

Activity of the Reference Laboratory, Hokkaido University, on swine Influenza

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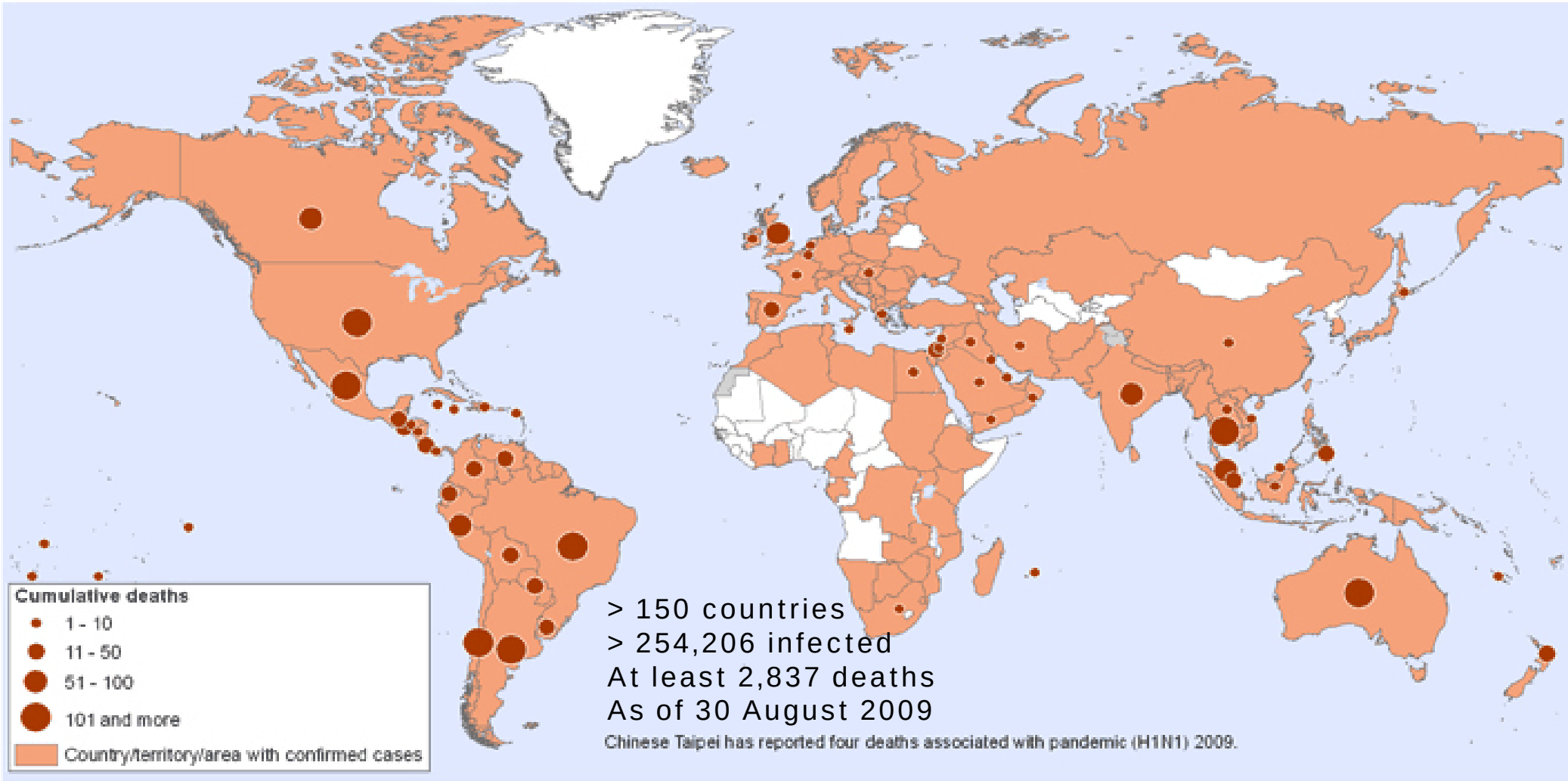
World Health Organization

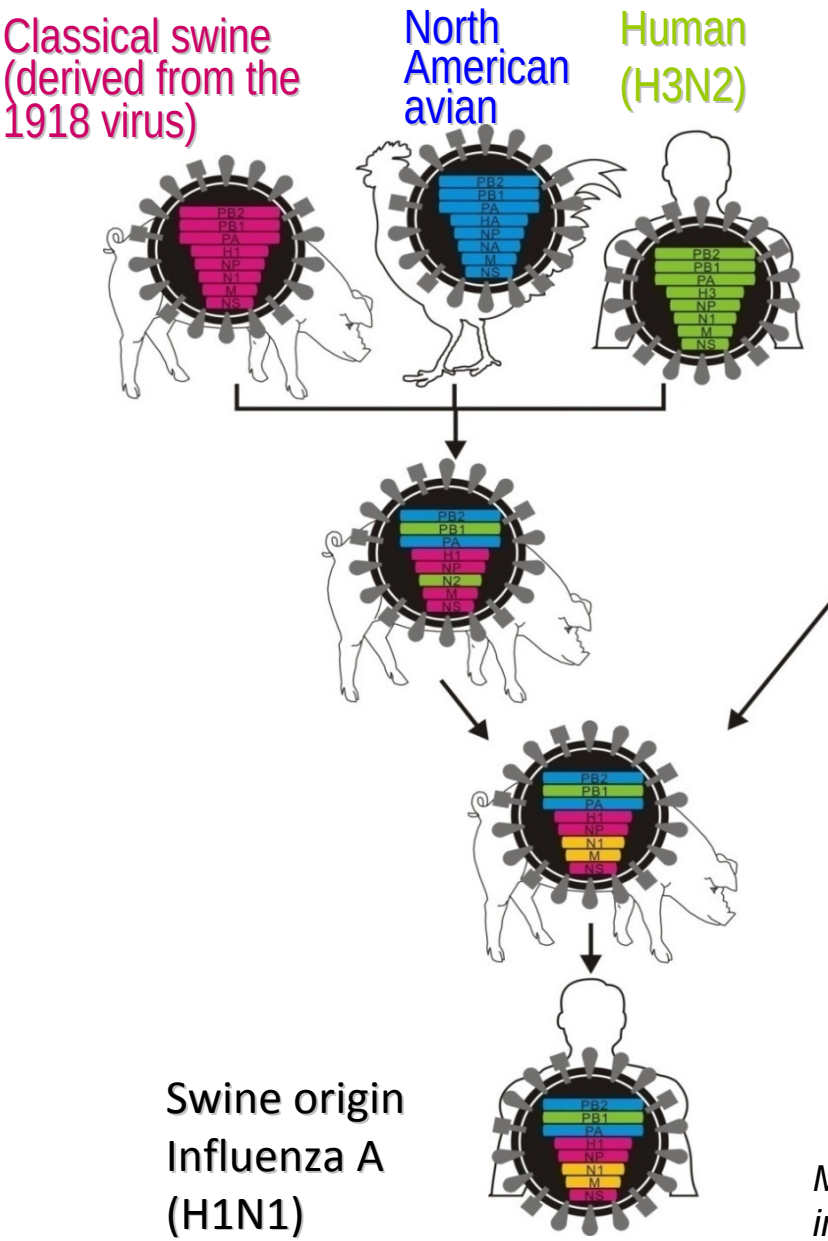
Timeline (22 July 2009 onwards)
Pandemic (H1N1) 2009 laboratory confirmed cases
And number of deaths as reported to WHO

Status as of: 30 August 2009

Previous



Gene derivation of the swine-origin influenza A (H1N1) virus



PB2 - North American avian
PB1 - Human H3N2
PA - North American avian
H1 - Classical swine
NP - Classical swine
N1 - Eurasian avian-like swine
M - Eurasian avian-like swine
NS - Classical swine

Modified from Novel Swine-Origin Influenza A (H1N1) Virus investigation Team, N engl J Med, 2009

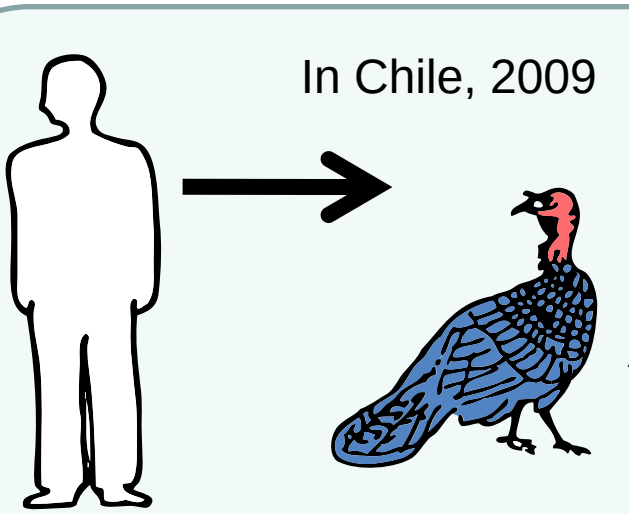
Influenza A H1N1, Chile

Print Close

Information received on 21/08/2009 from Dr Ternicier Claudio, Jefe División Protección Pecuaria, Servicio Agrícola y Ganadero Ministerio de Agricultura , Santiago , Chile

Summary

Report type	Immediate notification
Start date	23/07/2009
Date of first confirmation of the event	20/08/2009
Report date	21/08/2009
Date submitted to OIE	21/08/2009
Reason for notification	Emerging disease
Morbidity	61.4 %
Mortality	0 %
Zoonotic impact	No
Causal agent	Influenza A Virus
This event pertains to	the whole country
Related reports	• Immediate notification (21/08/2009) • Follow-up report No. 1 (31/08/2009)



A/H1N1 2009 pandemic influenza virus was detected from appalently healty turkeys

New outbreaks

Outbreak 1 (Foco 1)	**Las Palmas, Quilpue, Valparaiso, VALPARAISO**
Date of start of the outbreak	23/07/2009
Outbreak status	Continuing (or date resolved not provided)
Epidemiological unit	Farm

Affected animals

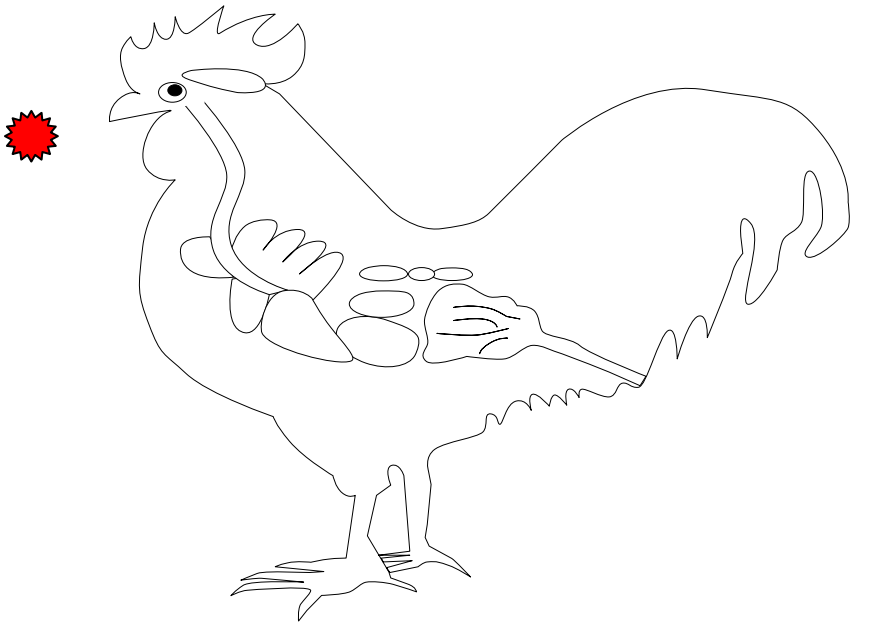
Species	*Susceptible*	*Cases*	*Deaths*	*Destroyed*	*Slaughtered*
Birds	29782	24337	0	0	0

Affected Population

The birds are breeding turkeys which presented a drop from 70% to an average of 31%, and a reduction in the quality of the shell. Neither respiratory signs nor increased mortality were observed. Necroscopy of the affected birds showed salpingitis, peritonitis and an interruption of the follicular development. No other lesions were observed. Samples of embryonated eggs collected from the incubation building gave negative results with real time PCR. Twenty days after the beginning of the

Experimental infection of A/2009 (H1N1) virus to chickens

Intra nasal inoculation of 10^6 PFU A/Narita/1/2009 (H1N1) influenza virus



No virus was recovered from the trachea and cloaca swabs, nor any tissues on 3dpi.

Virus recovery from the nasal swabs of pigs intranasally inoculated with swine influenza viruses

Pig No.	Strain	Days p. i.									
		0	1	2	3	4	5	6	7	8	9
1	Sw/Hok/2/81 (H1N1)	-	3.3[a]	4.0	5.7	5.0	5.3	6.7	2.7	-	-
2	Sw/Miyagi/5/03 (H1N2)	-	3.7	6.5	5.0	4.7	3.5	4.3	2.5	2.5	-
3	Sw/N. P./02 (H3N2)	-	4.5	5.0	6.5	4.5	4.5	4.3	3.7	-	-

[a]Virus titers（$\log_{10}TCID_{50}$/ml for swabs）in MDCK cells.

Virus recovery from nasal swabs of pigs intranasally inoculated with swine origin influenza viruses

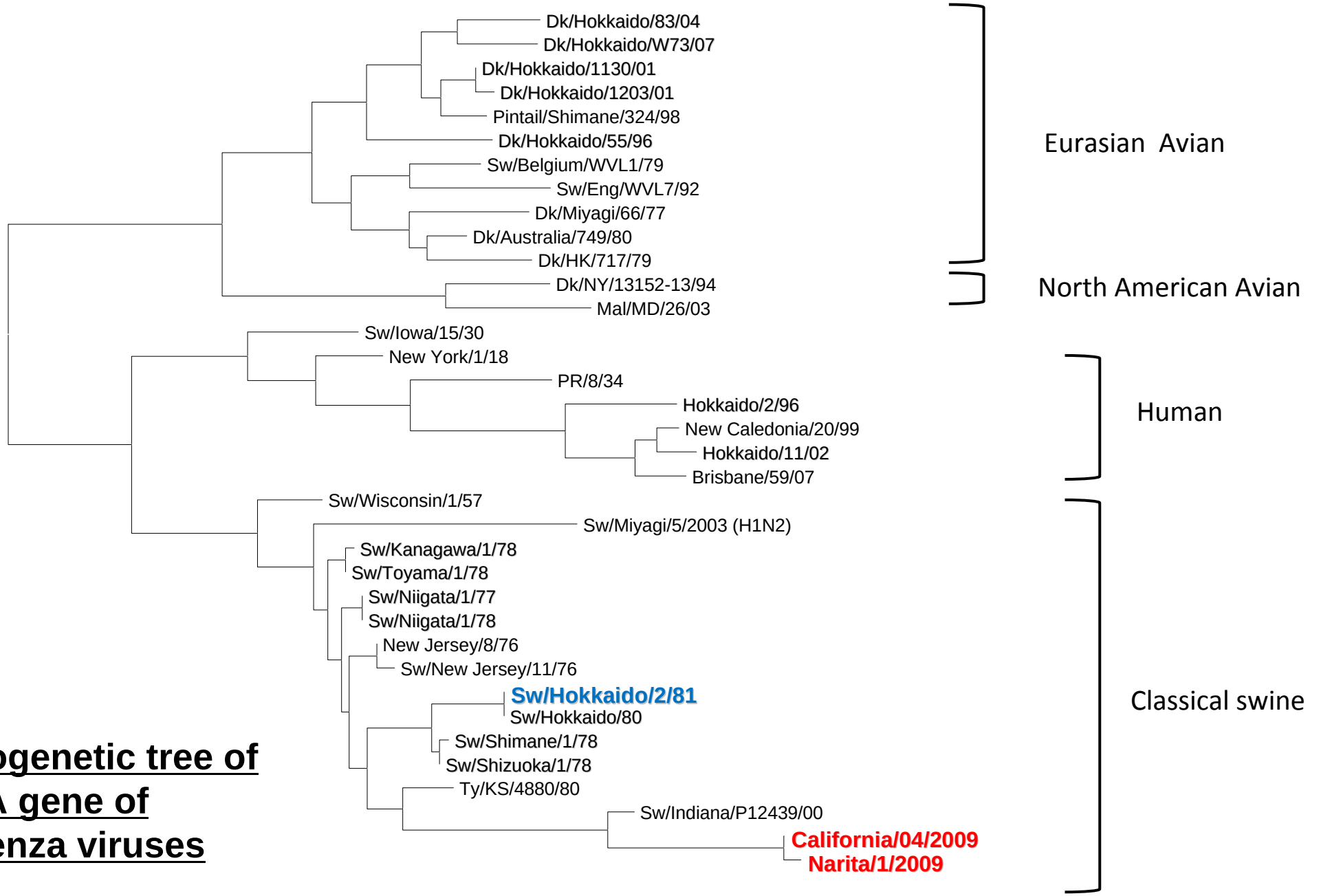
		Days p. i.								
	No.	1	2	3	4	5	6	7	8	9
California/04/09 (H1N1)	#1	5.7[a]	6.7	6.5	3.0	3.8	3.6	2.6	-	-
	#2	5.4	6.0	4.6	2.9	4.7	4.6	2.7	-	-
Sw/Hok/2/81 (H1N1)	#7	3.6	5.1	4.7	4.9	2.7	2.8	1.3	-	-
	#8	4.1	5.6	5.5	4.6	3.2	3.2	1.6	-	-

[a]Virus titers（$\log_{10}$PFU/ml for swabs）in MDCK cells.

Virus titers in tissues of miniature pigs inoculated with swine origin H1N1 viruses on 3days pi

	Virus titres (log_{10} PFU/g) of animals infected with:			
	A/California/04/09 (H1N1)		A/swine/Hokkaido/2/81 (H1N1)	
	#3	#4	#5	#6
Nasal mucosa	6.7	5.0	5.1	4.8
Oro/nasopharynx	3.1	3.3	6.8	5.0
Tonsil	3.2	N.T.	4.5	4.4
Trachea	6.3	5.5	5.8	5.3
Bronchus (right)	5.6	6.1	5.9	6.5
Bronchus (left)	6.7	6.5	5.4	6.3
Lung (upper right)	7.8	6.6	6.1	4.5
Lung (middle right)	7.5	6.7	6.1	5.5
Lung (lower right)	6.4	6.8	5.3	4.5
Lung (upper left)	6.8	6.4	6.8	5.1
Lung (middle left)	8.0	7.6	4.7	5.5
Lung (lower left)	6.2	7.4	5.5	4.7
Ileum	-	-	3.5	-
Jejunum	-	-	2.8	-

No virus was recovered from LN chest, heart, spleen, kidney, liver, duodenum, rectum, LN-mesenteric, bladder, cerebrum, nor brain stem.


Dk/Hokkaido/83/04
Dk/Hokkaido/W73/07
Dk/Hokkaido/1130/01
Dk/Hokkaido/1203/01
Pintail/Shimane/324/98
Dk/Hokkaido/55/96
Sw/Belgium/WVL1/79
Sw/Eng/WVL7/92
Dk/Miyagi/66/77
Dk/Australia/749/80
Dk/HK/717/79
Dk/NY/13152-13/94
Mal/MD/26/03
Sw/Iowa/15/30
New York/1/18
PR/8/34
Hokkaido/2/96
New Caledonia/20/99
Hokkaido/11/02
Brisbane/59/07
Sw/Wisconsin/1/57
Sw/Miyagi/5/2003 (H1N2)
Sw/Kanagawa/1/78
Sw/Toyama/1/78
Sw/Niigata/1/77
Sw/Niigata/1/78
New Jersey/8/76
Sw/New Jersey/11/76
Sw/Hokkaido/2/81
Sw/Hokkaido/80
Sw/Shimane/1/78
Sw/Shizuoka/1/78
Ty/KS/4880/80
Sw/Indiana/P12439/00
California/04/2009
Narita/1/2009
Eurasian Avian
North American Avian
Human
Classical swine
Phylogenetic tree of H1HA gene of influenza viruses
2009/9/16
0.02

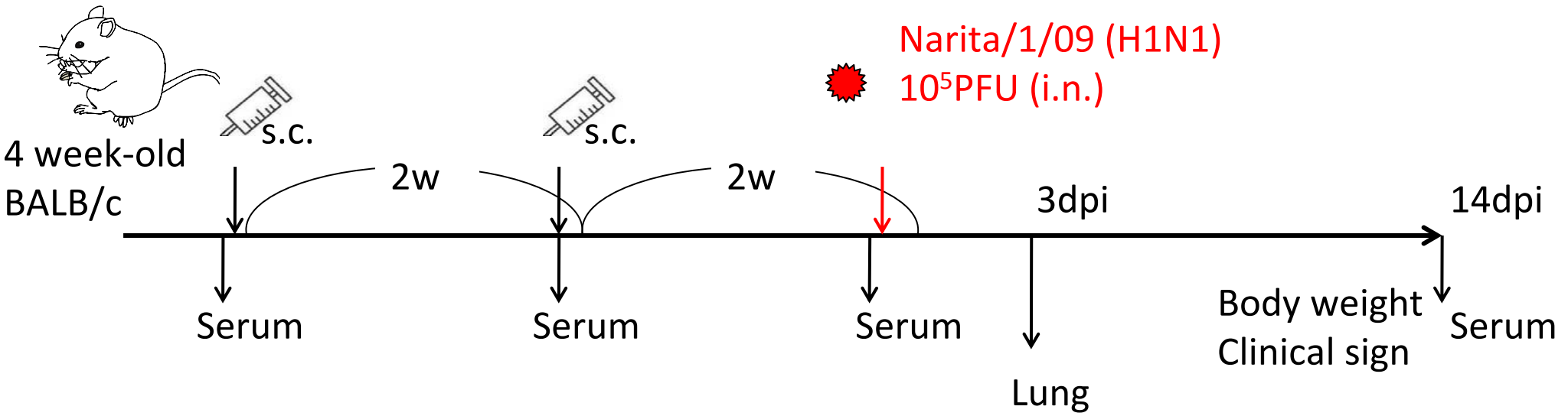
Antigenic analysis of H1N1 influenza viruses

Viruses	Anti-serum against					
	Sw/Iowa/15/30	NJ/76	Sw/Hok/1/81	PR/8/34	Hok/4/96	Dk/Mong/540/01
Swine origin						
A/Narita/1/2009	80	40	640	40	40	80
A/swine/Iowa/15/1930	**1280**	80	2560	20	80	640
A/New Jersey/8/1976	640	**160**	2560	20	40	640
A/swine/Niigata/1/1977	1280	160	2560	40	160	640
A/swine/Niigata/1/1978	640	160	2560	20	80	320
A/swine/Shimane/1/1978	1280	160	5120	40	160	640
A/swine/Shizuoka/1/1978	1280	160	5120	40	160	640
A/swine/Toyama/1/1978	1280	320	5120	40	160	640
A/swine/Kanagawa/1/1978	1280	320	640	40	320	640
A/swine/Hokkaido/1980	1280	80	5120	40	80	640
A/swine/Hokkaido/2/1981	1280	160	**5120**	80	80	640
A/swine/Miyagi/5/2003 (H1N2)	320	160	2560	160	80	80
Human origin						
A/PR/8/1934	40	<20	40	**2560**	160	20
A/Hokkaido/2/1996	80	<20	80	160	**5120**	320
A/Hokkaido/11/2002	80	<20	80	320	5120	80
Avian origin						
A/duck/Miyagi/66/1977	80	<20	80	<20	40	320
A/duck/Hokkaido/55/1996	80	20	40	80	80	1280
A/duck/Hokkaido/1130/2001	80	20	40	<20	<20	1280
A/duck/Hokkaido/1203/2001	80	20	80	<20	<20	640
A/duck/Mongolia/258/2001	160	<20	160	20	40	1280
A/duck/Mongolia/540/2001	80	<20	20	<20	20	**1280**
A/duck/Hokkaido/83/2004	80	20	40	<20	<20	640
A/duck/Hokkaido/W73/2007	80	20	80	<20	<20	640

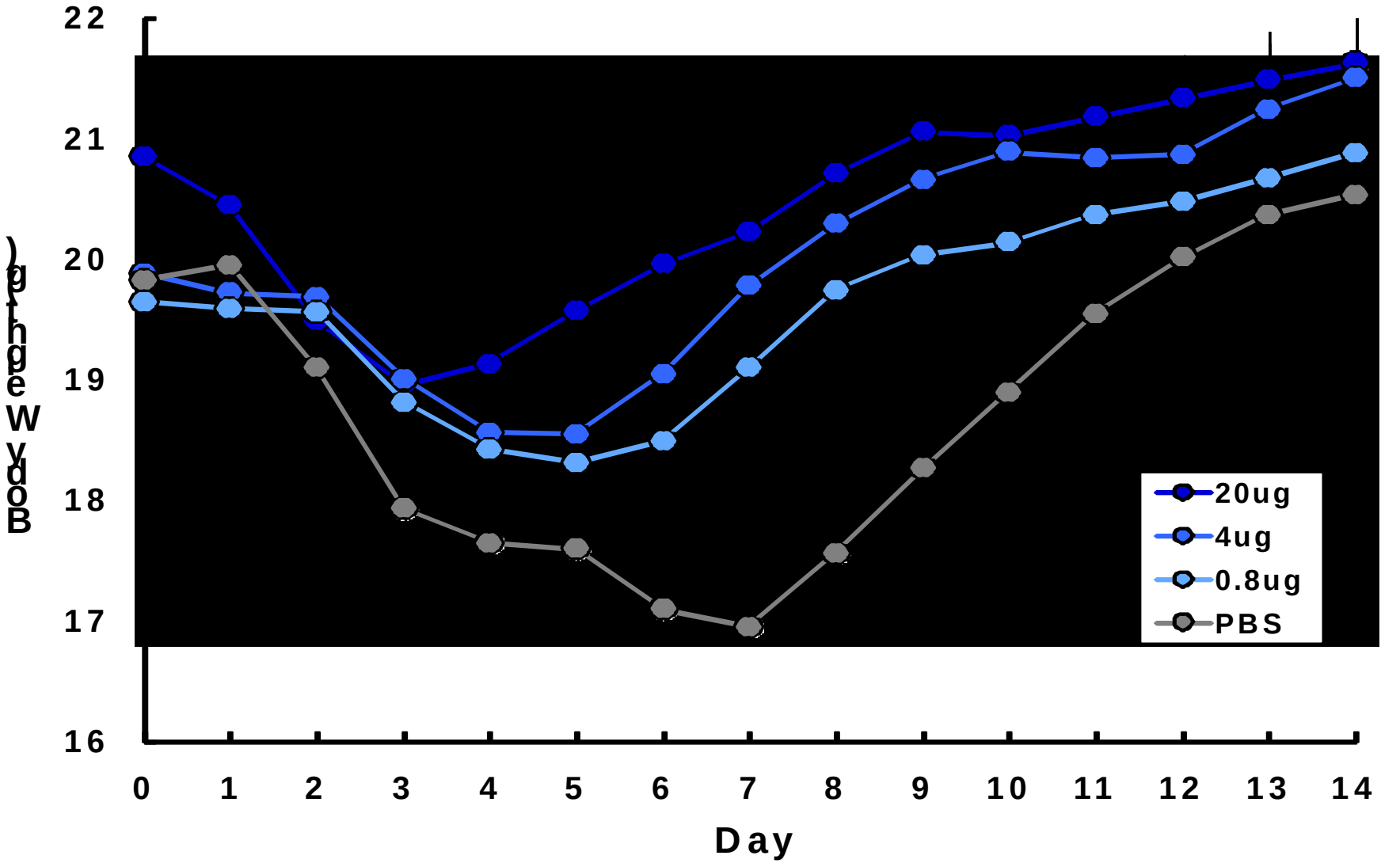
(HI titer)

Efficacy of vaccine prepared from swine influenza virus against A/2009 (H1N1) virus in mice

Sw/Hok/2/81 (H1N1) inactivated vaccine



Body weight of vaccinated mice after challenge with A/Narita/1/2009 (H1N1)



How should swine influenza be controlled?

- 1957 H2N2 and 1968 H3N2 viruses are reassortants between avian influenza virus and the preceding human strains.
- Pigs are susceptible to both of avian and mammalian viruses and generate reassortants.
- Avian viruses of any subtype can contribute genes for reassortants:

  None of the 16 HA and 9 NA subtypes can be ruled out as potential candidates for future pandemics.
- Surveillance of swine flu is crucial in the countries where avian flu has not yet been controlled.
- The swine-origin new H1N1 virus must cause seasonal influenza.

  Vaccine for seasonal influenza had better contain the new swine-origin H1N1 virus antigen.